

Oral & Poster Presentation Abstracts

Katheryn Adam, Chemistry

Faculty Mentor: Marco Bonizzoni, Chemistry

An off-the-shelf sensing system for physiologically relevant phosphates

We have developed a chemical sensing system that can differentiate biologically relevant phosphates (nucleoside diphosphates, pyrophosphate) in neutral water solution using only commercially available components. Our approach uses a common fluorescent indicator and a poly(amidoamine) (PAMAM) polycationic receptor to construct an indicator displacement assay (IDA). The system crucially relies on multivariate data collection and analysis. In fact, using different phosphates in the dye-displacement assay results in subtle differences in the optical signals; however, it is not possible to capture this information using classical univariate data presentation techniques. Instead, we rely on principal component analysis, a multivariate data analysis technique, to evaluate these differences and thus distinguish between the biologically relevant phosphates. We will also present supporting data reporting on the anion binding capabilities of the PAMAM system acquired using optical spectroscopy methods.

Alison Adams, Biological Sciences

Faculty Mentor: Laura Reed, Biological Sciences

QTL affecting genotype-by-diet interactions of larval triglyceride levels

Metabolic Syndrome (MetS) is a complex disease that is becoming increasingly prevalent in the world today. It is identified by an assortment of symptoms such as obesity, insulin resistance, and elevated blood lipids. This disease and its various phenotypes can be modeled in *Drosophila melanogaster*. In a previous study of MetS, our lab implemented a round-robin crossing scheme on approximately 800 isogenic lines from a recombinant inbred line population, and a linear regression was used to determine genotype, diet, and genotype-by-diet interactions. Statistical analysis revealed quantitative trait loci (QTL) associated with larval triglyceride levels. Here we report on the functional analysis of genes within the QTL significant for gene-by-environment interactions through differential gene expression and the testing of mutant triglyceride levels.

Ashley Alexander, Biological Sciences

Faculty Mentor: Stephen Secor, Biological Sciences

Testing the Cooking Hypothesis in Human Evolution

Cooking of food has been hypothesized to have had a significant impact on human evolution. Cooking softens food thereby reducing the time and energy of chewing and digestion, therefore more food can be consumed at a lower cost, and more energy can be allocated to growth and reproduction. We tested this hypothesis by feeding raw and cooked sweet potato and carrot to the omnivorous bearded dragon (*Pogona vitticeps*) and measuring the effort of chewing and the cost of digestion. Pieces of raw sweet potato and carrots required 3 and 4 times more chews, respectively, than pieces of cooked. Both raw vegetables also required twice the time of digestion compared to cooked. Using closed system respirometry, we determined that lizards expended 40% more energy digesting raw sweet potato and carrots compared to cooked. Our data demonstrate the energetic advantage of consuming cooked versus raw foods. Our findings support the hypothesis that the advent of cooking had a significant impact in human evolution.

Stephen Allen, Economics, Finance and Legal Studies

Faculty Mentor: Matt Van Essen, Economics, Finance and Legal Studies

Stress Testing a Fundamental Prediction in Game Theory

A procedure and program was designed to test a particular strategic situation in which number effects are the primary factor expected to drive the behavior of the various test participants. A certain result is expected for any even number of players and a different result is expected with any odd number of players. The test was designed to test at what point the unintuitive nature of number effects causes participants to deviate from the expected outcome.

The situation involved a prize that players must risk their initial endowment to pursue and whether or not they capture the prize or not is dependent on the actions of others. In an odd number of players situation, the players were expected to attempt to capture the prize in the first round but only the first round. In an even number of players game, it was expected that the Nash Equilibrium would have all players inactive in order to protect their initial endowments.

Upon testing, it was discovered that for all but the simplest cases of the strategic situation, the expected Nash Equilibrium does not play out as anticipated but rather players exhibit a max-min behavior. Rather than acting according to the perfectly rational predictions, players, unaware of how the other players will act, choose to maximize their worst case scenario by choosing inaction unless they are the only player remaining in the situation.

Liz Alley, Information Systems, Statistics and Management Science

Spencer Baer, Computer Science

Faculty Mentor: Felecia Wood, Capstone College of Nursing

Diabetes101: an iOS application

The purpose of this project was to develop a tool to improve health literacy and self-management skills in rural adults with type 2 diabetes. Many rural adults read at less than a high school level, which means that they probably struggle with reading most patient education materials. Diabetes101 is an iOS app that introduces users to fundamental concepts and terminology related to type 2 diabetes and self-management. The app was piloted at two clinics in Walker County, Alabama, and includes videos filmed in Walker County to help participants see "people like them" effectively managing diabetes. The videos address shopping, cooking, collaborating with health care providers, engaging in physical activity, and coping with the emotional challenges of living with type 2 diabetes. Brief quizzes assess diabetes knowledge. A dictionary introduces medical terminology. And an exercise assessment provides guidelines for engaging in physical activity.

Samuel Andersen, Biological Sciences

Faculty Mentor: Chelley Alexander, Community Health Sciences

The impact of lay worker education on the frequency of ER visits and hospitalization and use of preventive medication and rescue inhalers in asthma patients

The direct and indirect medical cost attributed to asthma in the US last year was over \$50 billion. Many interventions have been proposed to bring down this cost, however the issue seems far from solved. Though there is no cure for this condition, medications such as inhaled corticosteroids exist and are capable of preventing asthma attacks if taken properly. The National Heart, Lung and Blood Institute care guidelines recommend physicians provide their patients with a written action plan as a part of checkups, yet one survey showed that as few as 25% of physicians comply with this recommendation. To address this situation, this prospective, year-long study seeks to answer the question: can a cheap and simple intervention be found to bring down the cost associated with asthma and improve patient quality of life? Symptom-based written action plans will be administered to study participants by lay people (University of Alabama students, in this study) and benchmarks such as trips to the emergency department as well as number of refills on controller and emergency medications will be monitored over the course of a year.

Ali Anderson, Capstone College of Nursing

Emily Bates, Capstone College of Nursing

Lindsey Badham, Capstone College of Nursing

Jeremy Blount, Capstone College of Nursing

Faculty Mentor: Paige Johnson, Capstone College of Nursing

Childhood Obesity: An Interactive Approach for Parents & Children

Health promotion is the process of enabling individuals to gain control over and improve their health. It goes beyond a focus of individual behavior towards a wide variety of social and environmental interventions. The purpose of health promotion is to increase the wellbeing of the individuals in the community by teaching positive life style changes. These changes will influence all aspects of the individual's health. In order to implement these health promotion behaviors, the community must be assessed to identify risk factors and resources needed to evaluate and improve health. A community assessment is achieved through systemic collections which include windshield surveys, observations, and interviews with community members. This data is then analyzed to determine the specific needs of the community. Interventions supported by evidence-based practice are then implemented to promote the particular health care needs of the community. This presentation will demonstrate a community assessment of Duncanville, AL in Tuscaloosa County. Features such as resources, needs, and demographics are shown to identify the problems of the community. The major health concern is identified, and the intervention is supported by evidence-based practice to address the main concern.

Travis Atchley, Chemistry

Faculty Mentor: Silas Blackstock, Chemistry

Donor-Acceptor Cocrystallization for Molecular Assembly

The synthesis of donor-acceptor cocrystals is of valuable interest in organic chemistry to probe the nature of attractive interactions between molecules. Some instances of cocrystallization lead to unexpected, yet intriguing, results in terms of special electronic interactions between the donor and acceptor components and the resulting macroscopic electronic properties of the cocrystal that may result. Two such instances are found in the cocrystallization of phenyl-substituted pyrazoles, DPOX and 4HP (e-donors, D) with the e-poor quinone, DDQ (π^* e-acceptor, A). The binding of these molecules yields D2A cocrystals that feature $I_p^*/\pi^*/I_p^*$ D-A-D triads. The packing of these triads lead to in-plane assembly of DDQ molecules and π -stacking of the donors in the cocrystal solid.

Parker Baxter, Geological Sciences

Faculty Mentor: Joe Lambert, Geological Sciences

How Stalagmites are Used in Paleoclimate Research in the Southeast (USA)

Many unanswered questions exist with respect to predicting changes in regional rainfall patterns over the next 50-100 years because of the complexity of the Earth's climate system and our limited understanding of how global climate change will affect particular areas. In the Southeast, it is vital that we try to understand changes in future rainfall because rainwater is the sole source for recharging surface and subsurface reservoirs, which are continuously used for drinking water in addition to agricultural, industrial, and recreational needs. In an effort to better understand climate change, scientists are researching periods of climate variability over the past several thousand years. Archives of past climate conditions include, but are not limited to, cave deposits, lake and ocean sediments, ice sheets, and ancient trees. Cave deposits, such as stalagmites, can be dependable climate archives because they (i) preserve various proxies for past climate conditions (eg., rainfall amount) outside the cave, (ii) have the potential to provide long and continuous high-resolution records, and (iii) can be accurately dated by multiple methods. Over the past decade, our research group has been developing paleo-rainfall records for the Southeast from multiple stalagmites collected from two caves in Alabama.

In this presentation we will introduce this type of research, show our current interpretations from DeSoto Caverns, and discuss our preliminary results from Cathedral Caverns.

Zach Beasley, Psychology

Bryan Poole, Psychology (Lee University)

Sydney Gruber, Psychology

Faculty Mentor: Phillip Gable, Psychology

Time Perception in Negative Affects: The Role of Motivational Direction

Time flies when you're having fun, but how does time pass when you're upset? The current experiment investigated the impact of motivational direction in sad and anger states on time perception. In two experiments, we induced approach- and withdrawal-motivated sad (Experiment 1) or angry (Experiment 2) states. Participants wrote about a personal situation when they felt either approach- or withdrawal-motivated sadness or anger. After writing, they viewed a sad film (Exp 1) or anger film (Exp 2) and rated how long the film lasted. Results indicate that approach-motivated sadness and anger caused perceived time to pass more quickly than withdrawal motivated sadness. In two diverse negative states, these results support the conceptual model linking approach-motivated affective states to faster perceptions of time, and withdrawal-motivated affective states to slower perceptions of time.

Jonathan Belanich, Biological Sciences

Faculty Mentor: Stephen Secor, Biological Sciences

Tarantulas vs. Scorpions: Digestive energetics and efficiencies of drinking versus eating

The processing of any meal comes with a cost; a cost that impacts the net energy gained and therefore is incorporated into the efficiency by which energy is acquired. Within the class Arachnida, tarantulas are liquid feeders using oral mastication and enzymes to produce an ingestible liquid sludge, whereas scorpions masticate and ingest small pieces of their prey. To a common meal, crickets, and body temperature, 30C, we examined how two arachnid groups differ in the cost of meal digestion and net energy efficiency. For three species of tarantulas and five species of scorpions we measured their postprandial metabolic response and quantified their SDA, which represents the accumulative energy expended on meal ingestion and assimilation. Both groups experienced a rapid postprandial increase in metabolic rate that peaked within 6-12 hours after feeding and returned to prefeeding values within two days. Tarantula and scorpion SDA averaged 20.8 kJ kg⁻¹ and 42.2 kJ kg⁻¹, respectively, and each was highly dependent on meal size. We found that when controlling for meal energy, scorpions expend 80% more energy on digestion and assimilation compared to tarantulas, however the differences in their SDA were not significant. We suspect that the lower SDA for tarantulas reflects their more liquid-like diet and less post-ingestion effort. Alternatively, the cost of meal digestion may be more similar between the two when including the cost for tarantulas of mastication and enzyme production.

Jonathan Belanich, Anthropology

Faculty Mentor: Christopher Lynn, Anthropology

Sex and Lies: A Study of Cultural Knowledge and Mating Success

This study compares various indicators of mating-relevant self-deception and self-awareness to proxies of mating success. Self-deception, when looked at in the context of human mating, can prove to be a useful tool that may allow individuals to deceptively self-promote without displaying the "tells" that are indicative of lying. To test this, an online survey was created and publicized to get responses. We received a total of 120 responses from both males (N=45) and females (N=75), and had a wide age range (18-60+). The survey contained two parts: in the first responders were asked questions about previous sexual encounters and habits, and in the second responders were asked about their familiarity with cultural objects and people, such as beer, musicians and hobbies. In the second part, false items were

mixed in with the real ones. The amount of true and false positives is a measure of "overclaiming." Correlations were run to look at reactions between different variables, and from these, we were able to identify several significant interactions. Regressions were then run using overclaiming as the independent variable and indices of mating success as dependent variables. Results indicate correlation between the degree of overclaiming and the number of intercourse partners. Therefore it is possible that self-awareness when moderated by self-deception could improve chances of maximizing the total number of intercourse partners.

Luke Bishop, Biological Sciences

Faculty Mentor: Ryan Earley, Biological Sciences

Revealing the Effects of Endocrine Disrupting Compounds on the Behavior and Physiology of Fish: Dose-Response Relationships

In today's world, the environment is under a constant threat of damage from industry. A primary example of this is the mangrove habitat, a valuable ecosystem that is home to a wide variety of species and a breeding site for many marine fishes. However, wastewater treatment plant effluent, which contains many chemicals known as endocrine disrupting compounds, is threatening mangrove habitat. These chemicals can disrupt hormone levels and internal homeostasis of organisms exposed to them. Our experiment examines the effects of two such compounds (ethinyl estradiol and nonylphenol) on the behavior, physiology, and gonad morphology of the mangrove rivulus fish. These chemicals have dramatic effects on reproduction, anxiety-like behavior, and aggression. They can cause increased vulnerability to predation and decreased aggression in males. However, we know little about whether low versus high environmentally relevant doses of these chemicals have different effects on the fish. We thus propose to expose the fish to various doses of the endocrine disrupting compounds for a set time and ascertain the behavioral and physiological consequences of exposure. We will test the fish based on their aggression, boldness, fear response, and hormone levels. With the effects of the endocrine disrupting compounds studied and quantified, we can then determine the potential threat level to the mangrove ecosystem to ensure its safety and the safety of all its inhabitants.

Ruth Bishop, Biological Sciences

Faculty Mentor: Laura Reed, Biological Sciences

The Roles of Endocannabinoids and Their Chemical Relatives in Drosophila melanogaster Metabolism

Endocannabinoids are endogenous neuromodulatory lipids that bind to cannabinoid receptors. They are involved in lipid metabolism and appetite, making them and their chemical relatives interesting to study in the context of metabolic syndrome. Despite previous bioinformatic analyses of gene sequences suggesting that the cannabinoid system is absent in insects, we have found in metabolomic analyses that L-DOPA and N-arachidonoyl dopamine (NADA) levels are correlated with pupal weight, triglyceride levels, and total sugar levels; evidence pointing to these compounds' roles in Drosophila metabolism. We selected 6 compounds for this study, 2-AG, anandamide, L-DOPA, Dopamine HCl, capsaicin, and NADA, because they were either ligands to mammalian cannabinoid receptors or involved in dopamine or NADA synthesis pathways. We first conducted a dose response curve to determine if these compounds would negatively affect survivability. Finding no such effects, larvae from five genetic lines were fed 100 μ M of these compounds to determine whether pupal weight, triglyceride levels, or glucose levels were affected. We found that these compounds had line specific effects on these phenotypes, although we did not find consistent phenotype changes across all genetic lines. Based on these findings, it is unclear whether endocannabinoids play a role in Drosophila melanogaster metabolism since these compounds did not consistently affect glucose/ triglyceride levels or pupal weight.

Elizabeth Bistrong, Psychology

Faculty Mentor: John Lochman, Psychology

Effects of the April 27, 2011 Tornado on Parental Functioning

This research examines the way in which the tornado that devastated Tuscaloosa impacted the way parents function and interact with their children. The data was collected from families of moderate to highly aggressive children in Dr. Lochman's Coping Power Program. Changes in parental functioning were analyzed using the Alabama Parenting Questionnaire, The Beck Depression Inventory and the Caregiver Strain Questionnaire- Short Form. These measures were collected before and after the tornado and provide an assessment of change in parent's individual behavior as well as parenting behaviors. Results indicated that parents felt less caregiver strain after the tornado than before, but that there was no significant change in types of parenting or parental depression over time. After the tornado parent's poor parenting was more related to low levels of inconsistent discipline and poor parental monitoring than before the tornado. Implications of these results will be discussed.

Joshua Blackwell, Biological Sciences

Faculty Mentor: Juan Lopez-Bautista, Biological Sciences

Digitizing the algal herbarium of The University of Alabama

Authors: Joshua Blackwell, Frederik Leliaert, Steve Ginzburg, Juan Lopez-Bautista

Natural history collections serve a highly important purpose in the scientific community. Algal herbaria, in particular, contribute significantly to the identification and classification of specimens, and act as a record of morphology, evolution, and geographical distribution of species. Specimens housed within herbaria can also be used to acquire molecular data, which is the basis of genomic analysis. As such valuable resources, it is vital that the contents of University collections such as algal herbaria be digitized, and thereby made available to the public. Only when information becomes accessible can it become useful for researchers, educators, and students.

Prior to the current project, the University of Alabama has not published information regarding any of the algal specimens contained within the herbarium. The University's collection contains over 1000 specimens of green, red, and brown algae, including many deep-water specimens (down to 50 m) from the Gulf of Mexico. These collections are especially valuable to study shifts in species distributions resulting from increased anthropogenic activity in this region.

The goal of the current project is to database this material, making digital information and images available on the University's herbarium website, as well as the Global Biodiversity Information Facility (GBIF) website.

Emmie Bodiford, Journalism

Faculty Mentor: Chip Brantley, Journalism

Anatomy of a Trial

Anatomy of a Trial is a service learning class introduced to the University of Alabama in 2013 by professors Chip Brantley and Andrew Grace. The class consists of seven undergraduate and graduate students interested in exploring the Alabama Justice system. Through the context of one capital murder case from 1980s, information concerning the structure and processes of the Alabama Justice system was compiled through a group effort. The findings highlight unique aspects of various problems with the current Alabama justice system as well as changes it has experienced over the past several decades.

Hannah Bowers, Chemical and Biological Engineering

Faculty Mentor: Margaret Liu, Chemical and Biological Engineering

High-Level Expression of Targeted Anti-Cancer Biopharmaceuticals Using CHO Cell

Chinese Hamster Ovary (CHO) cell, the most popular mammalian cell used in the biopharmaceutical industry, was used to develop a production cell line to express the targeted anti-cancer therapeutic

protein. Lonza GS vector system was applied to construct the over-expression plasmid of monoclonal antibody IgG1 for high-producing CHO K1/IgG cell line construction. The methionine sulfoximine (MSX) amplification and glutamine-free selection were performed to select and amplify IgG production. Multiple single clones were obtained using limiting dilution cloning, producing about 350-800 mg/L of IgG. The glycosylation of produced protein will be analyzed to define the lead clone for the process development of anti-cancer biopharmaceutical production.

Leah Bradford, Telecommunication and Film

Drew Bryant, Telecommunication and Film

Taylor Crosby, Telecommunication and Film

Sarah Hollingsworth, Telecommunication and Film

Faculty Mentor: Chandra Clark, Telecommunication and Film

City of Alberta: Looking to the Future

Along with the citizens of Alberta, our team is working to re-brand the community. After the devastation of the April 27th tornado, Alberta was left destroyed but the community has a lot on its horizon! This spring, Tuscaloosa Parks and Recreation Authority will break ground on the new tennis complex that will have numerous courts and host tournaments from around the country. Later this year, the new Alberta School will be opening and will specialize in fine arts education. With the help of Councilman Kip Tyner, our team is constructing new websites and social media sites to bring Alberta to the forefront of the Tuscaloosa area. We are working to give the community of Alberta an outlet to use for updates and information about the area using videos on the website. Using Instagram and Vine, we are able to promote upcoming events such as business openings and ground-breakings. My team and I are working as Alberta's unofficial marketing team using our experience and knowledge about social media and community interests. Our team communicates with our client, officially listed as Kip Tyner, weekly to assess our progress and what is needed for the community project. This week alone we are meeting with Mayor Walt Maddox and the Alberta community to present our developments and will present the final product later this month.

Travis Brady, Aerospace Engineering and Mechanics

Faculty Mentor: Vinu Unnikrishnan, Aerospace Engineering and Mechanics

Computational Modeling of Normal and Cancerous Cells

The purpose of this study is to determine the various mechanical properties of a nonhomogeneous eukaryotic cancer cell. While the cell itself is nonhomogeneous, it can be divided into three homogeneous regions (nucleus, cytoplasm, actin cortex) to simplify the analysis. The homogenous properties of the various regions of the cell are obtained using mathematical homogenization techniques and are then analyzed using finite element analysis. Various indentation conditions are simulated and the deformation profile of the cell is obtained. The ultimate aim of this study is to understand and compare the deformation profiles of various types of cancerous cells and normal healthy cells. Such a study would be helpful in identification and prevention of cancerous cells throughout the circulatory system of the human body.

Hannah Brewer, Psychology

Faculty Mentor: Karen Salekin, Psychology

Juror Perception of Culpability and Its Impact on Verdict and Sentencing: Defendants With and Without Intellectual Disability

In 2002, the United States Supreme Court decided that offenders with intellectual disability (ID) could not be executed due to their reduced level of culpability (Atkins v. Virginia, 536 U.S. 304 2002). Previous studies show that jurors view defendants with ID as less culpable than their non-disabled counterparts

(Garvey, 1998; Najdowski & Bottoms, 2012). This study looked at intelligence quotient (IQ) and adaptive behavior (AB) deficits to see if they factored into jury decision-making regarding level of culpability for defendants with ID and those who barely miss the cut score(s) for ID using 544 jury-eligible college participants recruited from a psychology department subject pool. Participants were presented with a vignette of an altercation resulting in a charge of aggravated assault in which IQ and onset of AB deficits of the defendant were manipulated. Participants then completed a questionnaire measuring (1) culpability, (2) ratings of IQ and AB deficits, and (3) weight of factors on sentence. It was found that IQ but not age of onset of AB deficits impact how jurors perceive culpability of defendants and having an IQ below the bright line standard of 70 increases the likelihood that a defendant will be found not guilty or not guilty by reason of insanity. Further research should be conducted to determine what factors other than IQ and AB lead jurors to believe that ID or borderline ID defendants are less culpable than their non-disabled counterparts.

Christian Brewton, Computer Science

Anna Zimmerman, History

Faculty Mentor: Stephen Lovell, Computer Science

Determining the Mood of Someone Through Facebook Feeds

The purpose of this research topic is to assay the messages someone posts on Facebook to compute their mood. By using the Facebook API and Facebook Query Language (FQL) one is able to parse through a user's Facebook messages and pick out keywords and weight them accordingly to try to get an accurate percentage of what mood he or she is in. Facebook emoticons can also be quite helpful because one can get a pretty accurate idea of what mood the Facebook poster was in at that time. This idea can be expanded to even calculate your friends moods, and the user can get an idea of what he or she's friends are feeling. Moods can be spread through Facebook in the same way that mood can spread through human interaction. According to researchers happiness tends to spread more efficiently than any other mood.

John Brinkerhoff, Communication Studies

Faculty Mentor: Jason Black, Communication Studies

The World's Great Father: Paternalistic Rhetoric's Continuities in U.S. Presidential Interventionist Discourse

This essay explores the rhetorical continuities of paternalistic rhetoric within the addresses that surround two key interventions in U.S. history: Andrew Jackson's first three Annual Messages to Congress, which sought to advocate and defend the Indian Removal Act, and Truman's Address before a joint session of Congress on March 12, 1947, which proposed what would later become known as the Truman Doctrine. Both interventions, as well as the legitimation tactics behind them, were foundational in the formation of U.S. foreign policy. This study contends that their use of paternalistic rhetoric created a foundation of paternalism at the core of U.S. foreign policy both historically and contemporarily. This essay identifies similarities in their use of paternalistic rhetoric through its identity constructions of a self/other dichotomy that legitimizes intervention by the self to assist a helpless other. This dichotomy coalesces into four key components: Self as Father, Self as Benevolent, Other as Weak, and Other as Facing Crisis. This study argues that these themes, when taken together, have created a prominent strand of rhetoric that has remained consistent in presidential intervention addresses, even as the surrounding contexts shift.

Cole Buchanan, Biological Sciences

Faculty Mentor: Glenn Davis, Community Health Sciences

Investigating the Effects of Fatigue in Emergency Medical Service Providers

Emergency Medical Service Providers provide out-of-hospital medical care in emergency situations. The majority of Emergency Medical Technicians (EMTs) in the state of Alabama routinely work 24 hour shifts, sometimes consecutively. Our purpose is to determine if the quality of EMT performance late at night is different from the quality of EMT performance during the day. The initial stage of this study consisted of an electronic survey sent to EMTs statewide to determine their perceptions of the effects of fatigue on performance. Data gathered from the survey included information on demographics, sleep patterns, use of stimulants on and off shift, and perceptions of how fatigue affects quality of care at different times during a 24 hour shift. To expand on the findings of this survey, a study was developed utilizing performance based trials to compare performance of paramedics from Tuscaloosa Fire and Rescue Services in the morning to their performance late at night. Trials measured basic skills including intubation and CPR performance in a simulated medical emergency. Data from these trials provides insight into the quality of care given by EMTs over the course of a 24 hour shift.

Katy Buddemeyer, Biological Sciences

Faculty Mentor: Stephen Secor, Biological Sciences

Negative Calorie Food: Fact or Fiction?

Though countless online sources claim that certain foods are "negative calories," requiring more energy to digest and assimilate compared to calories absorbed, there have been no scientific studies to support or refute this assertion. To assess the validity of this idea, we fed celery, a noted "negative calorie food," to omnivorous bearded dragons (*Pogona vitticeps*) and quantified the caloric intake, energy expended in consumption and digestion, and the assimilation efficiency in order to determine the net gain of energy. Lizards assimilated ~70% of ingested celery calories and expended ~90% of that energy on digestion and assimilation. Celery intake therefore resulted in a small net gain of energy, challenging the widespread claim that celery is a negative calorie food.

Alex Bullough, Capstone College of Nursing

Paul Brooks, Capstone College of Nursing

Morgan Buko, Capstone College of Nursing

Meagan Busby, Capstone College of Nursing

Faculty Mentor: Paige Johnson, Capstone College of Nursing

Educating Brookwood about Nutrition

Nutritional education is the process of teaching a specified group the importance of a healthy diet. Nutritional education promotion is a positive way to influence the community. Interjecting our positive nutritional views into an extremely tight-knit community requires a trusting medium, such as the local church organizations. Establishing rapport with a very involved member of the church community can aid us in spreading the word of healthy eating and good nutrition. Nutrition affects all aspects of life. It is extensively involved in many disease processes, preventable and inevitable. A change in nutrition can help drastically change the health of individual. Helping the community understand nutrition's importance and benefits in their daily lives will encourage them to make positive changes. Our community health project will focus on educating the adult population in a comfortable and safe setting about healthy eating.

David Burkhalter, Civil, Construction and Environmental Engineering

Faculty Mentor: Milton Ward, Biological Sciences

Analysis of The Potential Ecological Impact of Controlled River Water Withdrawals on Floodplain Ecosystems Using 3D Modeling

Our nation's food supply is currently heavily dependent upon crop production in the West. Production in this arid climate, however, depends heavily on irrigation from snow melt high in the Rocky Mountains.

Many future climate scenarios indicate less snowfall in the West, and therefore, reduced availability of irrigation water. To reduce the ensuing economic spike, an alternative proposal is to capture and utilize the high winter flow in the rivers of the southeastern US, and create an agricultural environment that is more resilient to the drought seasons. This research explores the feasibility of withdrawing excess river water and storing it offline for summer use. It also considers the ecological impact of withdrawal on hydrologic regimes in rivers and the environmental consequences of withdrawal on adjacent floodplains that depend on river floods.

This study was designed to examine potential impacts of four river-floodplain environments in the Southeastern US. Using USGS flow data and NOAA LiDAR data for each site, we built a 3-D computer generated hydraulic model to predict the frequency, extent, and duration of flooding. These models produced inundation maps that illustrated the relationship between flow rates and inundation extent. Through analysis of these maps, we may more accurately understand the ecological consequences of water withdrawal scenarios on our river systems.

Maranda Burns, Chemistry

Faculty Mentor: David Dixon, Chemistry

Comprehensive Study of the Bond-dissociation Pathways for Glycine and Alanine Dipeptide Anions and their Corresponding Amides

Computational studies of bond-dissociation pathways in small anionic peptides have been performed to determine the bond energies of the backbone bonds. The reaction enthalpies of glycine, alanine, diglycine, and dialanine anions and their corresponding amides have been calculated using the reliable correlated molecular orbital theory G3MP2 method to determine the lowest energy dissociation pathways. Extensive conformational sampling of the neutral and anionic fragments was performed using density functional theory (DFT). In all cases, a rearranged BDE that results from the fragmentation of CO₂ is the lowest energy pathway and all other pathways are higher in energy by ~ 30 kcal/mol.

Gregory Cabot, Electrical and Computer Engineering

Vaishali Batra, Electrical and Computer Engineering

Samantha McPeak, Electrical and Computer Engineering

Faculty Mentor: Sushma Kotru, Electrical and Computer Engineering

Labview Programming for Research Analysis

LabVIEW programming is a graphical programming language commonly used for automated data collection in a research environment. In this project, LabVIEW programs were created and used to measure and record data for several research projects. The measurements included, but were not limited to, temperature effect on resistivity of various electrode materials; current-voltage measurements and photovoltaic response of PLZT thin film based solar cells. Results obtained on the use of seed layer to enhance the photovoltaic response of PLZT film based solar cells will be presented.

Emily Capps, Psychology

Faculty Mentor: Tricia Witte, Human Development and Family Studies

The Meditational Role of Marital Conflict in the Associations Between Parental Problem Drinking and Children's Social Information Processing

Marital conflict and parental problem drinking has a strong link with children's maladjustment. The objective of this study is to examine the effects of these variables on children's social information processing. Around 60 participants will be brought in for this study through magazine subscription databases, the local YMCA, and from Dr. John Lochman's Coping Powers group. Parent participants will be completing questionnaires measuring level of marital aggression with the subscale of psychological aggression. They will also be completing questionnaires about their daily drinking and also their drinking

within the past year. Child participants will be completing questions regarding certain vignettes; those of which contain ambiguous provocations. The dependent variables we will be examining are children's hostile attribution biases, hostile goals, and aggressive strategies. The results of this study will help future intervention methods regarding aggressive children.

Leighton Carlock, Religious Studies

Faculty Mentor: Steven Ramey, Religious Studies

Myth as Illusion

**International focus*

The Ramayana is a story popular in India with many different tellings, but people across the globe have interpreted it in various ways. In this research, I analyze three stories of Ramayana: the English interpretation of Valmiki Sanskrit version, a comic book telling from Dreamland Publications, and the story of Rama from the Warner Brothers film A Little Princess. My analysis focuses on each story's telling of the abduction of the beloved Sita by the evil demon, Ravana. Through critical analysis, I compare each of the three different interpretations. Ultimately, this research will show religious tellings as interpretative and highlight political, social, and cultural biases incorporated in interpretation from authors and readers, challenging this contemporary thought of the "correct" and "true" telling because there is not one authoritative version of this story that exists.

Michael Carton, Metallurgical and Materials Engineering

Faculty Mentor: Su Gupta, Metallurgical and Materials Engineering

Combined interface and bulk anisotropy free layers for MgO based MTJ

We have investigated the effect of Ta insertion thickness on perpendicular magnetic anisotropy (PMA) in [Co/Pt multilayers]/Ta/CoFeB (hard/soft) composite free layer. We observed increase in PMA with increase in Ta insertion thickness. We found that this increase of the effective anisotropy is associated with bulk-type PMA of multilayers and enhancement of CoFeB/MgO interface anisotropy with Ta insertion thickness. The interface anisotropy increased by more than 0.9 mJ/m² as the Ta insertion thickness increased from 0 nm to 0.5 nm. For insertions less than 0.6nm thick, the ferromagnetic exchange was strong enough to switch the two layers together. The interlayer exchange coupling changed from ferromagnetic to anti-ferromagnetic in nature for Ta insertion thicknesses above 0.7nm. The H_k value for the composite free layer with 0.5nm thick Ta insertion was around 11 kOe, leading to a high thermal stability factor, estimated around 152 for 20 nm nanodots. A micromagnetic model was set up to study the effect of interlayer exchange coupling on switching current density and switching time. The ab-initio calculations for Fe/MgO and Fe/Ta interfaces were performed for parameterization of the micromagnetic model. We found that the switching current density increased with increase in the coupling parameter, and thus the Ta insertion layer was not expected to degrade spin-torque transfer (STT) switching characteristics.

Cole Cecchini, Biological Sciences

Faculty Mentor: Debra McCallum, Institute for Social Science Research

Helping Children Make Healthy Food Choices: Progressive Agriculture Safety Day Program

In response to high rates of obesity among rural youth, Progressive Agriculture Foundation (PAF) has begun an initiative through their safety day program to improve the diets of elementary school children by educating the students on overall healthy lifestyles and changing their school food environment to encourage healthy choices.

The project was implemented through PAF Farm Safety Days held at five test sites and five control sites in rural southern communities. During the safety days, youth attended sessions on various safety and health topics. In the test sites, one of these units focused on healthy eating. Also, in test sites a

workshop was conducted for adults to develop a strategic improvement plan (SIP) aligning the educational outreach with concrete local goals to improve the school food program and track progress toward those goals.

To evaluate the project, students completed pre- and post-tests before and after the safety day. One year later, they will complete a follow-up test, and the test sites will be visited by researchers to evaluate progress toward SIP goals. Data collection will be completed in spring, 2014, and test sites will be compared to control sites that had no healthy eating lesson and no workshop. Results will indicate whether goals outlined in the SIP were met and the impact the program had upon the participants. If this pilot project is found to be effective, PAF will expand the program to include other rural communities.

Sarah Chaffee, Human Nutrition and Hospitality Management

Emily Huie, Human Nutrition and Hospitality Management

Hannah Rath, Human Nutrition and Hospitality Management

Cassidy White, Human Nutrition and Hospitality Management

Faculty Mentor: Lori Greene, Human Nutrition and Hospitality Management

Effects of Community Based Garden Intervention on Fruit and Vegetable Consumption in Children: A review

Background: One of the leading causes of premature death in the US is low fruit and vegetable intake. Food preferences developed during childhood have been shown to have a great effect on food habits for life.

Purpose: To determine the effect of community garden based interventions on fruit and vegetable consumption among children.

Methods: Scientific databases were searched for relevant articles. Our inclusion criteria comprised of articles that were focused on children, fruit and vegetable intake, and studies examining the effect of exposure to community gardens.

Results: Gardening programs have been shown to promote intake, availability, and preference for fruits and vegetables. Groups of children who received nutrition education as well as garden experience showed higher preferences and consumption of fruits and vegetables and increased nutrition related knowledge. Programs which involved parents showed increased availability of fruits and vegetables in the home. Several surveys demonstrated support for community garden programs.

Conclusion: Community garden based nutrition interventions have been shown to be effective in promoting fruit and vegetable intake among children which could decrease nutrition related health disparities and improve overall health status in the future.

Siddhartha (Neil) Chakraborti, Economics, Finance and Legal Studies

Zhechen Yu, Culverhouse School of Accountancy

Faculty Mentor: David Ford, Management and Marketing

Impact Fees Study

This project seeks to determine the use, basis, rationale, and potential benefits of implementing an impact fee for the city of Tuscaloosa, Alabama. The project and presentation is divided up into three basic phases. In the first phase, we define the impact fee, and discuss some theoretical implications, and what local officials have determined as the most urgent needs for their individual departments and if and how the impact fee can fix these. Next, we survey other cities and state governments that already implement impact fees to understand their rationale, structure, and calculation. Finally, we attempt to develop a hypothetical impact fee structure for Tuscaloosa.

Yang Chen, Psychology

Tenisha Lynch, Psychology

James Cranford, Psychology

Kristy Shoji, Psychology

Faculty Mentor: Natalie Dautovich, Psychology

Tossing and Turning: The Role of Anxious Arousal in Sleep Outcomes

Background: Many factors are involved in obtaining restorative sleep. Excessive arousal, which can occur both physically and psychologically, is often implicated in poor sleep. The purpose of the present study was to investigate the association of physiological arousal with multiple sleep variables.

Methods: An archival analysis was conducted using data from 314 adults participating in the Midlife in the United States-II study. Participants completed the Mood and Symptoms Questionnaire (MASQ) about the prior week. The anxious arousal subscale of the MASQ was used as a measure of arousal. Participants also wore actiwatches and completed sleep diaries for seven days.

Results: Bivariate correlational analyses showed that anxious arousal was significantly correlated with the sleep diary variables of: sleep onset latency, $r=.22$, $p<.001$, perceived difficulty in falling asleep, $r=.25$, $p<.001$, and sleep quality ratings, $r=.26$, $p<.001$. Anxious arousal was also significantly correlated with the Actigraphic variable of wake time after sleep onset, $r=.16$, $p=.01$.

Conclusions: This study linked general feelings of physiological arousal to multiple sleep domains, measured subjectively and objectively. Individuals who experienced higher levels of anxious arousal reported taking longer and having more difficulty falling asleep and reported a lower quality of sleep. Higher levels of anxious arousal were also associated with more wake time during the night as measured by actigraphy.

Brent Chester, Electrical and Computer Engineering

Faculty Mentor: Dave Nikles, Chemistry

The Impact of Nanotechnology on the Food Industry

Nanotechnology will have a future impact on food storage as well as enhancing and changing our foods. Packaging in the food industry is a large source of waste which, with help from nanotechnology, will not be a problem in the future. With future advancements, fully biodegradable packaging will be possible with help from nanotechnology. Even now, we have the nanotechnology to alter the texture and flavor of the foods we consume. With these examples and more, I will go into the societal implications, benefits and possible resistance to use of nanotechnology in food will be discussed.

Trever Chidester, Anthropology

Faculty Mentor: Keith Jacobi, Anthropology

Denisovans: From a Pinky to a People

**International focus*

Three hundred years before a remote, Siberian cave would make headlines in the scientific world, the nearby village told stories of a banished hermit named Denis, who took shelter in the large, three-chamber grotto. It was a cozy home, just up the mountain from a flowing river and fully equipped with a naturally made chimney. Little did Denis know that he had not been the first resident of the cave that would eventually bear his name. In fact, over the last 100,000 years, he would be one of three hominid species to ever take refuge in the perfect prehistoric home. One of those hominid species had never before been seen, but they would eventually take the name of Denisovans. The recent discovery of this relatively young hominid has blown up in the paleoanthropological world. With new advances in DNA analysis, researchers have been able to reconstruct entire genomes from just a pinky bone. Although the genome has opened up many doors for interpreting the species, traditional methods of researching the specimen are very limited due to the small amount of fossilized remains discovered. Nevertheless, researchers have already imaged an entirely new paleolithic world with the information present.

Possibly one of the most important discoveries in recent paleoanthropology, a finger bone and millions of base pairs decoded from ancient DNA support the uncovering of a new hominid species known as Denisovans that are claimed to have interacted with Neanderthals and Humans across Eurasia.

Catherine Cofer, Chemistry

Faculty Mentor: Marco Bonizzoni, Chemistry

Solubilization of hydrophobic molecules by hyperbranched polyelectrolytes

Dendrimers are highly branched polymers that have been shown to increase the water solubility of otherwise insoluble organic molecules. In particular, we have shown that poly(amidoamine) (PAMAM) dendrimers have the ability to preferentially increase the water solubility of hydrophobic aromatic molecules. In order to prove this concept, we have conducted the dendrimer mediated extraction of anthracene, a fluorescent aromatic hydrocarbon, from an organic solvent into a buffered neutral aqueous solution. The phase transfer was monitored using fluorescence emission spectroscopy. The increased fluorescence intensity of the water phase indicates that the anthracene molecules have been transported from the organic to the water phase. Here we will first present results confirming the dendrimer's preference for aromatic substrates, and the results from the extraction experiments. We will also outline the work currently in progress in our group aimed at quantifying these interactions through liquid membrane extraction experiments.

Ian Connell, Music

Faculty Mentor: Andrea Cevasco, Music

Hospice Music Therapy and The Six Domains of Human Experience

Music therapy (MT) is a multi-faceted healthcare profession that helps people cope with life and life events. Hospice and palliative care (HPC) focus on improving quality of life (QOL), relieving pain and distress at the end of life. The field of hospice music therapy has grown vastly in the past two decades, and continues to grow as its benefits are documented. There are six domains in which MT can benefit those in HPC settings: motor, cognitive, communication, social, emotional, and spiritual. By addressing the unique needs of those receiving HPC in the final months of life, music therapists can improve QOL using various MT techniques to benefit each of those six domains.

Keisha Cook, Mathematics

Faculty Mentor: Elizabeth Wilson, Educational Studies in Psychology, Research Methodology and Counseling

The Relationship Between African American K-12 Perceptions and Their Participation in STEM Fields

The purpose of this study is to examine the relationship between African American perspectives and their participation in STEM fields. Within the category of African Americans in STEM fields, less females are represented than males. In my study male and female perspectives will be examined separately to determine the difference between the genders. The importance of this study is to examine if there is a relationship between African American perceptions and choosing STEM fields.

The objective of this research is to examine the perspectives that African Americans have towards STEM fields that affects their decision to pursue STEM fields. The main research question is the following: What factors support and/or hinder African American participation in STEM fields? To answer this question, the data will examine internal motivations, external influences, initiatives and programs that affect the decisions of African Americans pursuing STEM fields. I hypothesize that students who have positive motivators, influences and experiences will be more like to pursue STEM fields, than students who have negative motivators, influences and experiences. By understanding the negative and positive factors, a change can be made in K-12 education. This research will add a better idea of how to

positively engage African American students in STEM subjects; consequently, leading to an increase in African Americans in STEM fields.

Molly Cook, Biological Sciences

Faculty Mentor: Ryan Earley, Biological Sciences

Prey Response to Predation Risk in Acidified Environments

Acidified environments are the result of human-induced elevation of greenhouse gases (carbon dioxide) and pollutants (sulfuric acid). In unexposed environments, fish are able to sense chemical cues that alert them to predation risk, allowing them to flee without being preyed upon. This may be due to the presence of a cell within the epithelium of prey species called a club cell that when punctured, releases a chemical to signal other fish in the area that a predator is successfully hunting. When a fish senses either a predator cue or a club cell signal, it employs several tactics to escape or become less conspicuous such as fleeing or freezing. In acidified environments, the ability to identify such cues as being harmful becomes inhibited by altering the Cl⁻ and HCO₃⁻ gradients in the brain causing GABA receptors to become excitatory (instead of inhibitory). Such neurochemical changes inhibit fleeing behavior and may even cause predator approach behavior. Our project first confirmed the presence of epidermal club cells in mangrove rivulus, which never have been recorded in this fish or its family. We then compared epidermal club cell abundance in fish exposed to predator cues alone and predator cues combined with club cell alarm substances. With this information, we hope to examine how acidified environments affect the recognition of alarm and predatory cues and whether behavioral changes that result from exposure to acidified environments are inherited transgenerationally.

Jessica Crook, Capstone College of Nursing

Chelsea Costley, Capstone College of Nursing

Lee Chatham, Capstone College of Nursing

Brandon Caldwell, Capstone College of Nursing

Faculty Mentor: Paige Johnson, Capstone College of Nursing

Improving Nutritional Education for Children in Coaling, Alabama

Nutritional deficits and other factors contributing to poor health are common occurrences in smaller rural towns. Specifically, one of these factors is a deficit in nutritional education. Health education is a vital part of improving health. The purpose of this project is to evaluate aspects of the community in Coaling, Alabama that affect it's members' health, and to describe an assessment of the community as a whole. We also will propose an intervention related to health promotion that will be targeted at the children of this community. This intervention, implemented at the school that the majority of the children in Coaling attend, would aim to improve their nutritional knowledge on the subject of reading and understanding food labels.

Anthony Curto, Chemistry

Faculty Mentor: Elizabeth Papish, Chemistry

Analysis of Transformation of Iridium Water Oxidation Catalysts - What is the Nature of the True Catalyst?

The Papish Group has found that the use of [Cp*Ir(N,N)Cl]Cl (Cp* = C₅(CH₃)₅; N,N is a bidentate ligand) as a catalyst is highly effective in water oxidation. The group uses both N,N = 6,6'-dhbp and 4,4'-dhbp (where dhbp = C₁₀N₂H₆(OH)₂) and has found that they have been effective when combined with an oxidant but they form an unknown blue species. Using UV-Vis analysis and measuring the absorbance at different concentrations and over time we can gain more information into this unknown substance and help determine whether it is forming nanoparticles or a different homogeneous species. Understanding what is formed will help further investigation of the Iridium complexes and their role as catalysts.

Nicholas Davies, Mechanical Engineering

Faculty Mentor: Eric Giannini, Civil, Construction and Environmental Engineering

An App for Concrete Mixture Design

The design of concrete mixtures is a very relevant science in today's world. Whether it be for streets and driveways, building foundations, or buildings themselves, the procedural approach to designing a concrete mixture is necessary to ensure the concrete can satisfy its requirements. While professionals and their companies have the tools to approach concrete mixture design with ease, the procedure can be difficult and time consuming for students, DIY-ers, and others who may use it. By creating an Android application that can handle all of the calculations of concrete mixture design while presenting a user-friendly interface, the field may be made more approachable by a general audience, and the time spent using repetitive calculations can be drastically reduced. The Android app currently in development allows users to create mixtures by defining desired concrete properties and listing the materials on-hand, then returns the necessary proportions to create the mixture. The specific mixtures created by the user can then be saved and recalled or edited at a later time. Additionally, the saved mixtures can be recalled to perform corrections for varying moisture content of the aggregates. Finally, the app is designed to include tables and charts used for working through mixture design by hand, along with a guide for the use of the app. Following the release of the application, it should be a comprehensive utility used by many students in the concrete field.

Paul Davis, Mechanical Engineering

Faculty Mentor: David Nikles, Chemistry

Nanotechnology in Knee Surgery

This project will examine how nanotechnology can be used in the future to aid in reconstructive knee surgery procedures. Injuries to knee ligaments and cartilage are very common and often do not heal on their own. This means that many of these injuries require surgery, which can require lengthy rehabilitation times and are not always completely effective. However, nanotechnology has the capability to improve the effectiveness of surgical repairs to two of the most commonly injured tissues: the meniscus and the anterior cruciate ligament (ACL). Meniscus surgeries often consist of the removal of the damaged portion of the meniscus. This is an inadequate fix that often leads to arthritis in the future. Nanotechnology has the potential to give us a solution to this problem. In the future, doctors may be able to use nanomaterials and meniscal cells from a patient to grow a new meniscus that can then be implanted back into the patient. Nanotechnology can also impact ACL repairs, as it can be used to create synthetic ligaments covered in nanoparticles that prevent the body from rejecting the synthetic implant. Nanotechnology can also be used to aid bone sites in accepting implants, decreasing the rate of implant failure. In the future, nanotechnology may give us the tools to reduce the rehabilitation time of an ACL repair surgery to half of what it is now.

Alex Davis, English

Russell Robertson, English

Lauren Gilmer, English

Drew Pendleton, English

Faculty Mentor: Jessica Hollander, English

Analysis of Jewel in Faulkner's "As I Lay Dying"

In Faulkner's classic "As I Lay Dying" the character Jewel presents a complex dynamic exploring themes of manhood, independence, and teenage angst. Through a letter written from Jewel's perspective, utilizing various literary devices, we analyze his state of mind and driving forces and seek to understand how his character relates universally.

Hunter Dean, Biological Sciences

Faculty Mentor: Janis O'Donnell, Biological Sciences

The Effects of Positively Charged Nanoparticles on Survival and Fertility in Drosophila melanogaster

The magnetic activity of iron oxide nanoparticles (IONPs) gives them a wide range of applications in medical imaging, drug delivery, hyperthermia, and tissue repair among other fields. IONPs' potential for biomedical application raises concerns about their stability and toxicity. While previous research has focused on measuring toxicity in vitro, our study introduces *Drosophila melanogaster* as a candidate for whole organism toxicology assay of the nanoparticles. IONPs, coated with positive-charged polyethyleneimine, were fed to 2nd instar *Drosophila* larvae over a 24 hour period, and were then immediately assayed for effects on larval mortality, pupation, and eclosion. While there were no effects on larval survivorship, eclosion, or pupation, a concentration-dependent relationship was found in fertility of adult males and females. This relationship resembles data found in the literature for in vitro studies, suggesting *Drosophila* could act as a complex, in vivo model for researchers looking to elucidate mechanisms of IONP toxicity.

Amy Deeble, Communicative Disorders

Amy Hase, Human Development and Family Studies

Faculty Mentor: John Lochman, Psychology

Fights versus Teases: Exploring how Semantic Changes Affect Survey Results

The Coping Power Program is an intervention for aggressive behavior in at-risk children. The long-term goal of this study is to compare the effectiveness of the Coping Power Program in two formats of administration: individual and group. Various measures were taken previous to our involvement on the project, including longitudinal sociometric data from the classrooms of the target children. Items on the sociometric survey included "fights," "leader," "likes most," and "victim," along with a ranking of other children in the classroom on a preference scale of 1 to 6. The data files from the survey were scored to calculate social preference scores, as well as race-specific peer nomination statistics. Two forms of the survey were administered with different terms for the same measure (i.e. "fights" and "teases"). The correlation between these terms was calculated to determine if the children perceived these words to have the same meaning. A positive correlation is critical to verifying the accuracy of data for the overarching project goal.

Zachary Diltz, Biological Sciences

Faculty Mentor: Leslie Rissler, Biological Sciences

Analysis of Drosophila Niche Modeling

We examined the environmental variables associated with the geographic ranges of 10 North American *Drosophila* species: *Drosophila affinis*, *D. aldrichi*, *D. algonquin*, *D. americana*, *D. ananassae*, *D. arizonensis*, *D. athabasca EA*, *D. athabasca EB*, *D. flavomontana*, *D. laticola*. All species were georeferenced (latitude and longitude) from locality information obtained from Taxodros (<http://www.taxodros.uzh.ch/>). We then used Maxent to obtain ecological niche models (ENMs) for each species. Data included 19 environmental layers (temperature, precipitation, etc.) from Worldclim (<http://worldclim.org/>). The ENMs were projected onto world maps using ArcGIS. We used the ENMs to better understand what factors limit the ranges for each species. Some species were geographically constrained to eastern North America; others were confined to western North America. We also noted that some species had ENMs showing high quality habitat in areas outside of their natural range in places like Africa, Australia, and South America. This can occur because a species is invasive in areas outside of the native range. Alternatively these ENMs could be used to determine whether a species is

likely to become invasive, which is particularly important for Drosophilids since they are common crop pests.

Garrett Diltz, Biological Sciences

Faculty Mentor: Leslie Rissler, Biological Sciences

The Effect of Incomplete Sampling on Species Tree Accuracy

This project studied how incomplete sampling of populations would affect the accuracy of objective species trees delimitation using the computer program BP&P. MCCoal uses coalescent theory to simulate DNA matrices, and can be implemented to include variable rates of migration between populations. To study the effect of incomplete sampling, species trees were generated from these DNA matrices using the program BP&P, which uses Bayesian statistical methods to determine the probability of nodes on the trees, which quantify the likelihood that two populations should be grouped as separate species. The genetic data from a population (or sampled from a simulated population) was removed and the data was rerun through BP&P to observe the differences that arise from incomplete sampling on species delimitation. We hypothesized that incomplete sampling would result higher speciation probability between nodes when intermediate populations were not sampled. Migration rates were also varied between simulated populations, to test the hypothesis that increased migration (and thus gene flow) between populations would negate incomplete population sampling in species trees generated. This is because gene flow should homogenize populations reducing the probability of speciation events. Preliminary results show that incomplete sampling actually decreases the probability of nodes and that migration does increase the probability of an accurate species tree.

Karis Dison, Capstone College of Nursing

Danielle Drews, Capstone College of Nursing

Matthew Dodson, Capstone College of Nursing

Victoria Eatmon, Capstone College of Nursing

Faculty Mentor: Paige Johnson, Capstone College of Nursing

Promoting Change One Grocery List at a Time

An overlooked priority in achieving optimal health in a community is health promotion. Health promotion is any implementation of activities, education, or interventions with a goal to establish a positive change in health knowledge, lifestyle, and overall health. In order to promote health in a specific community, the community of interest must first be assessed in order to determine positive and negative aspects of health, resources available, education level, and socioeconomic status. In this poster presentation, Coker, Alabama was assessed using windshield surveys, walk-throughs, and research of community resources and sociodemographic information related to this community. Priority health concerns are chosen in order to focus interventions on specific indicators of health from Healthy People 2020. This presentation will use evidence based practice in order to determine useful and practical interventions that will help increase nutritional resources, education, and practice in Coker, Alabama. Through the use of assessment, determination of a priority health concern, planning, and interventions, this research-based presentation has a goal of increasing overall health in the specified community. Evaluation is used to determine the success of the interventions, how well goals were met, and to allow room for further improvement in future efforts.

Karis Dison, Capstone College of Nursing

Faculty Mentor: Leigh Tubbs, Capstone College of Nursing

Tiny Toes, Tiny Nose, Tiny Pain? A Review of Pain Control in the Neonatal Intensive Care Unit

Pain is a subjective symptom perceived by a patient. Typically, pain will elicit crying, facial grimaces, discomfort, lack of sleep, increased heart rate, increased respiratory rate, and most likely, verbal

expression of pain. On a typical unit, a patient will verbally express their pain to a nurse to request pain medication, and depending on doctor's orders, pain medicine is given in order to increase patient comfort. However, verbal expression of pain is something that not everyone is able to do when they are hurting. In the neonatal intensive care unit (NICU) there are many tiny, sick babies who are all being cared for with a common goal of attaining health and wellness so they can go home with their families. This process can take days, even months, and often requires the use of many invasive and painful procedures. This poster presentation will explore the painful procedures used in the neonatal intensive care unit along with the typical pain control mechanisms applied by the medical care team. Through the use of evidence based research and personal shadowing experience in the NICU, this presentation will outline how pain is assessed in neonates, how pain is controlled, what procedures and interventions require pain control, and how this is evaluated in order to determine whether or not interventions were successful in lowering pain. The goal of this presentation is to address pain control and the effectiveness of interventions in lowering pain in the NICU.

Robert Douglas, Metallurgical and Materials Engineering

Faculty Mentor: Su Gupta, Metallurgical and Materials Engineering

Bit Patterned Media Using Block Copolymer Templating on FePt

Block copolymer (BCP) templating has been used to pattern perpendicular magnetic anisotropy media [1~3]. Large-area arrays of magnetic dots with diameter of ~30nm have been obtained by BCP templating in FePt films. FePt was deposited by dc sputtering elemental targets and in situ annealed in Shamrock at 550°C for 1hr. The polystyrene polyferrocenyldimethylsilane (PS-b-PFS) was spin-coated onto the film and annealed to cause phase separation, followed by oxygen plasma treatment to remove the polystyrene matrix and expose the PFS nanospheres[4]. The FePt films were subsequently etched using an ion mill. Then post-patterned annealing at 600°C was also performed to reverse the ion damage of the film. SEM and XRD were employed to characterize the morphology and structural properties respectively, while magnetometry was carried out to show the magnetic properties. Response surface methodology was performed to optimize the power, etching time and etching angle of the block copolymer mask and magnetic film. The effects of these patterning parameters on structural and magnetic properties were discussed.

Acknowledgements: NSF ECCS 0901858 "GOALI: Nanopatterned Graded Media" is acknowledged for partial support. The UA Microfabrication Facility and the Central Analytical Facility are acknowledged for support and use of facilities.

Leah Dunkel, Telecommunication and Film

Connor Mills, Telecommunication and Film

Shayla Garrett, Telecommunication and Film

Kristina Cruz, Telecommunication and Film

Faculty Mentor: Rachel Raimist, Telecommunication and Film

Capitol School Center for Digital Literacy

The Capitol School is an international school in Tuscaloosa, Alabama educating students through the 12th grade. In the summer of 2013, The Capitol School opened the Center for Digital Literacy (CDL). The purpose of the CDL is to help students develop an understanding of expression through different forms of digital media. Students from the Telecommunication and Film department at the University of Alabama instruct students ages 12-17 in the Center for Digital Literacy and assist them in the creation of original film projects.

Demi Eckhoff, Human Nutrition and Hospitality Management

Faculty Mentor: Amy Ellis, Human Nutrition and Hospitality Management

Understanding Resting Energy Expenditure Differences in Individuals with Duchenne Muscular Dystrophy: A Literature Review

Introduction: Duchenne muscular dystrophy (DMD) is a X-linked recessive disease that affects expression of the dystrophin gene in males. This progressive disease is characterized by severe muscle wasting.

Purpose: The aim of this literature review was to investigate whether resting energy expenditure (REE) differs among individuals with DMD since lean body mass is a major determinant of REE.

Methods: Studies from peer-reviewed journals were located using the key words "resting energy expenditure" and "muscular dystrophy".

Results: Dual-energy X-ray absorptiometry, basic anthropometric measurements and indirect calorimetry were the most common methods for assessing the participants' body composition and resting energy expenditure. Most participants had shorter body stature and higher BMI. The findings confirmed a significant loss of muscle among males with DMD compared to the control groups. Overall, resting energy expenditure was lower for people with DMD, reinforcing the hypothesis that with DMD REE will be lower due to the decreased muscle mass.

Conclusion: Since resting energy expenditure may be lower for males with DMD, REE can be useful for determining total energy expenditure and kilocalorie needs. There were some discrepancies between the studies reviewed; further research is needed.

Sophia Eldred, Psychology

Faculty Mentor: Angela Barber, Communication Studies

Patterns of executive function within a college population of students with ASD

Objective: Examine the characteristics of a sample of students with an ASD diagnosis who are entering college, focusing primarily on EF skills, for the purpose of documenting strengths and weaknesses that may impact the college transition. Methods: 11 students from a college transition and support program for degree-seeking students with an ASD diagnosis at a major public university were administered a battery of measures at summer orientation and toward the end of each semester during their college career. One of these tests is the BRIEF (both informant and self report versions) which examines various aspects of executive function. This study focuses on these results as well as information such as GPA and IQ scores. Results: Preliminary analyses of the BRIEF indicated significant difficulty in the areas of metacognition and behavior regulation (mean T-scores: 63.8 and 64.6, respectively). Conclusion: Overall, these results highlight the unique difficulties faced by students with HFA on a college campus. Despite above average intelligence these students experience significant social and EF difficulty relative to the general population. These difficulties are most apparent in the areas of task initiation, organization, and shifting attention, all of which can cause significant difficulty in the absence of the structure of the home and high school environments.

Karrie Elpers, Psychology

Faculty Mentor: Ansley Gilpin, Psychology

Undergraduates' High in Religiosity Have Increased Fantastical Beliefs

The present study explores relations between undergraduate's religiosity and fantastical beliefs. Often in conservative religious populations, fantastical thoughts, interests, and beliefs, such as children's belief in Santa Claus and the Tooth Fairy, are highly discouraged. Children are taught that only God has power. Thus, the general public may assume that religious individuals have low fantastical beliefs. However, based on theories of cognitive development, we hypothesized that undergraduates' religiosity scores would be positively correlated with their fantasy scores; that is, that individuals with greater religious beliefs would also have greater fantastical beliefs. One hundred and forty-two undergraduates

completed 7 questionnaires relating to religiosity and fantasy thoughts, interests, behaviors, and beliefs. Confirming our hypothesis, individuals with high religiosity scores were significantly more likely to have high fantasy scores than their peers, indicating that there is a positive association between religious and fantastical thoughts, interests, beliefs and behaviors. We speculate that both are related to divergent thinking abilities and the openness personality trait. Future studies will explore these relations.

Grant Fairchild, Biological Sciences

Faculty Mentor: Kimberlee Caldwell, Biological Sciences

Use of microRNAs to identify novel neurodegenerative genes in C. elegans

MicroRNAs (miRNAs) are short (~22 nucleotides), non-coding RNA transcripts that regulate gene expression at the post-transcriptional level. They are implicated in almost all aspects of cell biology and are expressed throughout the brain. Our laboratory hypothesized that certain miRNAs, identified through bioinformatics analyses, play a role in the regulation of multiple neuroprotective genes with implications for Parkinson's Disease (PD) in which dopaminergic neurodegeneration is a hallmark. Our *C. elegans* model of PD consists of overexpressing human α -synuclein in the dopaminergic neurons resulting in age-dependent neurodegeneration (Hamamichi et al., 2008, PNAS). Using a combination of overexpression and genetic mutation of select miRNAs, two miRNAs, mir-2 and mir-797, were found to be involved in neurodegeneration. Next, predicted targets for these miRNAs were identified using bioinformatics analyses. These targets were evaluated for their role in neurodegeneration by RNA interference (RNAi) knockdown. Of these predicted targets, two were found to protect the neurons when their expression levels were reduced. These two genes are involved with the SNARE family of vesicular-docking proteins. These findings corroborate and advance prior studies from our lab and collaborators (Cooper et al., 2006, Science) that implicate the impairment of vesicular trafficking as a cellular cause of α -synuclein-induced toxicity.

Savannah Feezor, Music

Faculty Mentor: Andrea Cevalco, Music

The Effects of Music and Multimodal Stimulation on Positive and Negative Behavioral Responses of Premature Infants

Music therapy is used to help with developmental outcomes of medically fragile infants in the Neonatal Intensive Care Unit (NICU), including premature infants and low-birth weight infants. Music and multimodal stimulation (MMS) is one music therapy protocol to help premature infants with neurological development. The purpose of this study is to conduct a preliminary analysis on the effects of MMS protocol on positive and negative behavioral responses. Behavioral responses were examined for five premature infants, who received their first MMS session between 31-34 weeks gestational age. Helping the infants habituate to multiple layers of stimulation assists them in the noisy and over-stimulating NICU and will prepare them for the home environment. Previous researchers have indicated that MMS helps decrease the length of stay in the hospital environment; however, specific details on the habituation process have not been examined yet.

Anna Forrister, Educational Leadership, Policy and Technology Studies

Faculty Mentor: Philo Hutcheson, Educational Leadership, Policy and Technology Studies

A History of Court Cases and School Desegregation in Alabama: All Due Deliberate Speed over the Decades

This presentation will examine the role the judicial system played in school desegregation in Alabama. Even after *Brown v. Board* make segregation illegal, there was much resistance to desegregation in Alabama. Attorneys and judges played a very important role in desegregating schools. One such attorney was Fred Gray who was the lead attorney of the case *Lee v. Macon*, which resulted in court

orders to desegregate every school in the state. Judge Frank Johnson made significant strides in school desegregation by enforcing federal desegregation laws. In spite of all the progress that was made in the judicial system, it took over half a century for Alabama schools to desegregate.

Katy Frazier, Capstone College of Nursing

Mary Halles, Capstone College of Nursing

Katie Gouse, Capstone College of Nursing

Brooke Hansen, Capstone College of Nursing

Faculty Mentor: Paige Johnson, Capstone College of Nursing

Elrod-Moores Bridge-Echola Community Assessment

A community assessment is done to gather information about biological, psychological, and sociocultural factors that influence that particular community's overall health. Research has shown that a combination of lifestyle choices, environmental factors, and social factors like income all affect overall health status. The goal of a community assessment is to use the information gathered to identify a priority problem for that specific area. The first crucial step in performing a community assessment is traveling to the community and performing a windshield survey. A windshield survey is a quick, overall measure to obtain a glimpse into the health of a community. Through a windshield survey, the researchers can observe the status of businesses, the condition of homes, presence of recreational areas, and environmental status by presence of litter. Some of the other subjects that are explored in a community assessment are health and social services, education, safety, and transportation. Once a problem is identified, specific interventions are set in place to improve the overall health of the community and move towards correcting the priority health problem. Then a formative evaluation phase of the community assessment is performed. The presentation is focused on the community of Elrod-Moores Bridge-Echola. A community assessment was performed on this specific area of Tuscaloosa County, Alabama and the findings, interventions, and evaluation measures will be discussed during the

Kathryn Gallagher, American Studies

Faculty Mentor: Jeffrey Melton, American Studies

Gender and Mobility

American culture understands traveling as a means to escape, gain experience, discover oneself and/or assert personal freedom. In our society, males typically dominate car culture because of the social norms expected from them. I examined the role gender plays on the idea of mobility and the open road mentality.

Jack Kerouac's *On the Road* shows the open road as a male fantasy of freedom. Kerouac uses movement to represent male spontaneity and subversion to conventional ideology. In the book, women are seen as sex objects while the men are praised for their ability to continuously move forward. I contrasted this book with Bobbie Ann Mason's *In Country* as well as the film *Thelma and Louise*, which was co-produced and directed by Ridley Scott and written by Callie Khouri. Both of these examples employ a female's perspective on road culture. The main characters in each blur the stereotypical lines of male and female spaces. Both *In Country* and *Thelma and Louise* use movement as a symbol of female independence and power.

I found that the books and film idealize male authority in mobility. Women are expected to be domesticated and maintain perpetual stasis. When the females do not abide by the American social norms, they are treated harshly by their society. On the other hand, males have greater opportunities to travel therefore more prospects to achieve absolute freedom.

Sam Gerard, Political Science

Faculty Mentor: Dana Patton, Political Science

Religion And Public Policy: How Abortion Provisions Differ Based On Religiosity Of A Region

The landmark Supreme Court ruling of Roe v. Wade in 1973 made a substantial change to the abortion issue in the United States. The decision gave the woman autonomy over her body and protected her right under the Fourteenth Amendment. Ideally, a ruling from the highest court in the country would outline a more definite behavior -- abortions are legal and the law of the land. Case closed, right? Wrong! Extreme religious fervor in some states has lead state lawmakers to develop harsh restrictions toward abortion. I believe this is due to heavily rooted religious attitude that religious people hold holy sanctity over human lives, and that directly affects public policy by region. Religious people are willing to help people who are similar religiously as an indirect means to further the interests of their faith. This is a large contention on why religious organizations contribute to the community on the scale they do. In order to ascertain some level of certainty on how religion influences access to receive preventative reproductive care in a region, I will assess the way that policy is crafted in regions that are heavily religious. This research through Qualtrics will also assess whether there is a direct corollary between access to abortion and the religiosity of a region.

Jesse Gettinger, Chemistry

Lindsey Cobb, Chemical and Biological Engineering

Benjamin McCormick, Chemistry

Faculty Mentor: David Nikles, Chemistry

Drug Binding and Isothermal Release from Polymer Micelles

The goal is to create a magnetically triggered drug delivery system using amphipathic polymer micelles to entrap and deliver the cancer drug doxorubicin. The polymer micelles consisted either of the diblocks (containing a poly(ethylene glycol) block, PEG, and a polycaprolactone block, PCL), PEG42PCL19, and PEG113PCL99, or the triblock PEG120PCL40PLA37, where PLA is poly(lactic acid). Microcal DSC curves for these polymers showed well-defined melting endotherms for the polycaprolactone block in the temperature range 40 to 50 °C. Drug loading experiments showed high doxorubicin loading capacity (>ten weight percent) for PEG113PCL99 and PEG120PCL40PLA37. Dibucaine was used as an inexpensive surrogate for doxorubicin. Isothermal drug release experiments gave plots of the percent dibucaine release as a function of time for each polymer. Data were fit to Crank's model for release from a sphere to give values of D/r^2 , where D is the diffusion coefficient for the dibucaine in the micelle core and r is the radius of the micelle core. In all three cases the values of D/r^2 increased dramatically at temperatures above the melting point of the micelle core.

Al-Karim Gilani, Chemical and Biological Engineering

Faculty Mentor: Cassandra Ford, Capstone College of Nursing

Barriers and Facilitators to HIV/AIDS Management

While a number of studies have been conducted focusing on HIV/AIDS in American populations, health disparities related to treatment and management still exist. An integrative literature review was conducted to identify barriers and facilitators to treatment for HIV/AIDS. African American, female, and rural populations may experience the most barriers to treatment for HIV/AIDS. Antiretroviral therapies provide a treatment and management plan by decreasing viral load levels in patients. However, due to perceived stigmas, individuals may face barriers in receiving these traditional therapies to manage their conditions. Further research into strategies implicating support groups and other easy-to-establish and low-cost mechanisms may alleviate barriers to care, such as stigmas, especially in areas of limited resources.

Ashley Gilchrist, Biological Sciences

Faculty Mentor: Laura Reed, Biological Sciences

Life History Determinants: Physiological Mechanisms of Egg Dumping in Drosophila melanogaster Using Extreme Phenotypes and Genetic Mapping

Life histories are characterized by inherited biological traits that become more or less prevalent in a population because of their beneficial or detrimental investments. The best indicator of a species' life history is an organism's mortality rate. Organisms with high mortality rates usually mature earlier than those with low mortality rates and give birth to more offspring at a time. *Drosophila melanogaster* have dynamic life histories that promote an array of different investments such as number of viable offspring, survivorship, and development time. Egg dumping is a natural behavior that occurs in virgin females with an unknown evolutionary effect. Rarely, un-mated *Drosophila* adults exist in the wild, but by using females in this costly state, results are more prevalent in finding energy allocation targets and genetic variation. Using two different extreme phenotypes of high and low egg dumping, we have been able to conclude that high egg dumping females have a longer life span and are more fecund. . To add more detail to the females' complex egg dumping strategy, we genetically mapped ten QTL's that showed peak gene expressions on both the second and third chromosome. Combining the analysis of six extreme dumping lines and ten QTL's we have achieved a basic life history that explains the physiological trade-offs of egg dumping.

Nick Goga, Political Science

Faculty Mentor: Dana Patton, Political Science

Factors Contributing to Diminished Representation of Women in STEM Degree Majors

The purpose of this study is to investigate the different factors involved in the decreased representation of women in STEM related majors. This study incorporates a survey tool to test the hypotheses present in the study. The different factors explored are: preparation in high school math and science courses, subject strength self-assessment, college major through the pipeline, and representation of particular genders in degree major classes. The target population is ages 18-24 at the University of Alabama.

Chase Golden, Biological Sciences

Faculty Mentor: Ryan Earley, Biological Sciences

Exploring the Salinity Preference of Mangrove Rivulus Fish "Kryptolebias marmoratus"

An animal's survival and reproduction depends on its ability to operate in environments where conditions often fluctuate. When conditions become suboptimal, animals should move to habitats in which fitness is maximized, thereby showing habitat preferences. Mangrove rivulus fish (*Kryptolebias marmoratus*) exist along an extreme gradient of salinity, in mangrove habitats of Florida, Central and South America, and the Caribbean. This fish is a self-fertilizing hermaphrodite and is capable of producing offspring that are genetically identical to both the parent and all siblings. Six different isogenic lineages derived from different populations (Florida Keys and Eastern Florida) were experimented on to determine salinity preferences. We hypothesized that there would be variation in salinity preferences among populations and within-individual consistency of preference. Ten fish from each lineage were placed individually in a tank containing nine different areas filled with water of different salinity, ranging from 5-45 ppt. The fish then were recorded for 24 hours with a webcam to capture the fishes' movements. Each fish went through this process twice. Movements were recorded, and observers quantified the latency to first movement, length of time spent in each salinity area, and the number of transitions between areas. We found that there were significant differences among lineages in their sampling behavior, number of transitions between areas, and overall salinity preference.

Brian Goodell, Chemical and Biological Engineering

Faculty Mentor: Dave Nikles, Chemistry

Isolation of Manganese-Bismuth Nanoparticles for Application in High-Energy Magnets

Ferromagnetic MnBi nanoparticles were produced through a two-stage approach: 1) Mn nucleation followed by 2) heterogeneous deposition of Bi on the Mn nuclei. This synthetic mechanism consistently yields a mixture of MnBi nanoparticles and Bi nanoparticle side-products. Separation techniques were devised and tested to address contamination by Bi. Differences in the density of MnBi (8.98 g/cm³) and Bi (9.78 g/cm³) permitted preferential sedimentation of Bi. Alternatively, external magnetic field gradients trapped the ferromagnetic MnBi particles, allowing removal of Bi. Isolated MnBi nanoparticles will exhibit stronger ferromagnetic character than the product mixture.

Elise Goubet, Psychology

Faculty Mentor: Matthew Jarrett, Psychology

Hot and Cool Executive Functioning Deficits: Associations with Eating Disorder Symptomatology

Gaining a better understanding of the cognitive and emotional functioning of individuals with eating disorders is a critical step for informing treatment development. Previous research has identified executive functioning (EF) deficits as important in the development and maintenance of eating disorders.

There is also debate regarding whether EFs are intact but are disrupted due to high emotionality. Hot EF reflects EF in the context of emotion and cool EF reflects EF in the absence of emotion.

This study examined how measures of hot and cool EF predict restraint and bingeing. The main data analytic plan involved a hierarchical regression analysis with the following variables: Step 1 variables of age, sex, positive and negative affect; Step 2 cool EF variables; Step 3 hot EF variables. For Bingeing, only Step 1 was significant ($p < .05$). Positive affect and lack of perseverance were the only significant predictors with positive affect negatively related to bingeing ($\hat{\beta}^2 = -.35$) and lack of perseverance ($\hat{\beta}^2 = -.25$). For Restraint, none of the 3 steps was significant, but positive affect was again a significant predictor ($\hat{\beta}^2 = -.26$). Lack of perseverance was marginal ($p = .07$) with this variable being negatively related to restraint ($\hat{\beta}^2 = -.35$).

The current study points towards a lack of positive affect and greater perseverative tendencies as important risk factors for the potential development of eating disorder symptomatology.

Rob Grady, Civil, Construction and Environmental Engineering

Faculty Mentor: Zheng O'Neill, Mechanical Engineering

Development of an Energy Model for a UA Residential Hall

Enhancing building efficiency represents one of the easiest, most immediate and most cost effective ways to reduce carbon emissions. Building energy modeling recently has received increased attention as a tool to help reduce building energy consumption as a way to access efficient design and operation strategies without exhaustive field testing. Energy models can be used for 1) code compliance such as green building LEED certification and ASHRAE 90.1; 2) evaluations of different concepts during the building design stage; and 3) reference points for building real time performance monitoring and energy diagnostics during the operation stage. The purpose of this CBHP project is to 1) introduce the UA undergraduate student the state-of-art building energy modeling and simulation software and 2) use a real problem (i.e., a residential hall on UA campus) to illustrate the energy consumption pattern by utilizing modern computer simulation software. In the first phase, the students has been creating and developing a building energy model for a residential hall on UA campus using SketchUp plugin OpenStudio. Moving forward, the students will have opportunities to explore the calibration and validation of computer models using real-time energy data.

Jonathan Grammer, Biological Sciences

Faculty Mentor: John Clark, Biological Sciences

The Phylogenetic placement of Lampadaria (Gesneriaceae): an enigmatic plant genus from the New World tropics

**International focus*

Molecular systematics has allowed biologist to accurately classify plant diversity so that it reflects evolutionary lineages. Data have been generated for accurately predicting and classifying most plant lineages on the planet. In this study we provide the first molecular sequence data on Lampadaria in the flowering plant family Gesneriaceae. A recent expedition to the Potaro-Siparuni region in central Guyana resulted in a collection of this monotypic and endemic plant genus that had only been known from two previous collections. Molecular sequence data was generated from the nrDNA ITS and ETS regions. These data were evaluated using a parsimony framework for evaluating Lampadaria's phylogenetic placement among the New World members of the Gesneriaceae.

Braxton Greer, Biological Sciences

Faculty Mentor: Stevan Marcus, Biological Sciences

Role of endocytosis in the cytoprotective response to the anti-tumor compound avicin in the fission yeast, Schizosaccharomyces pombe

Avicin is a saponin from the desert plant *Acacia victoriae* that has been shown to be a potent inhibitor of a variety of human cancer cell types by one or more mechanisms of action that have yet to be defined. It has been approved for Phase I clinical trials, which are currently in the planning stages.

Schizosaccharomyces pombe is a rod-shaped yeast that divides by medial fission, producing two nearly identical daughter cells. *S. pombe* is an excellent model organism for studying the cell cycle, which is invariably dysregulated in cancer cells. Recent studies in our lab show that de-acidification of vacuoles, the yeast counterparts of lysosomes in animal cells, as well as redistribution of ergosterol via an endocytosis-dependent mechanism, are characteristic of the response to avicin in *S. pombe*. Taken together, our results lead to the hypothesis that endocytosis is the means by which avicin gains entry into *S. pombe* cells. My research focuses on the study of avicin's effects on endocytosis in *S. pombe* and includes the use of fluorescence microscopy to visualize the localization and relative fluorescence of FM4-64, a fluorescent dye often used to visualize the process of endocytosis. Findings resulting from studies on avicin in our lab may provide a basis for predicting characteristics that render cancer cells most susceptible to the cytotoxic effects of avicin, as well as insight into the tractability of avicin as a therapeutic treatment.

Victoria Griffiths, Communication Studies

Faculty Mentor: Meredith Bagley, Communication Studies

Why We Work Hard: A commentary on American motivation

The 2014 Cadillac ELR commercial, "Poolside (Work Hard)", is one company's commentary-and promotion of-the American working style. The commercial casts Americans into a play that reminds them how we do what we do and why we do it. The commercial is narrated by a man who has worked, who has earned, and who has accumulated. This paper will use Kenneth Burke's Pentad Method to analyze the situation rendered in this short clip and what it says about human motivations. Throughout, I will seek to answer the question: How does the emphasis of America as a scene leave the audience questioning the value of material gain as the purpose? Through analysis I will discuss how the scene actually becomes the sole purpose given to justify the act of working hard and how the presentation of this fact actually defeats its purpose, as it leaves Americans dissatisfied with their acts, disgruntled with the scene, questioning their agency and seeking greater purpose.

Olivia Grubbs, Biological Sciences

Sawyer Mullen, Biological Sciences

Faculty Mentor: Julie Olson, Biological Sciences

Streptomyces species: can those who produce neurodegenerative compounds also help us fight infections?

Some soil *Streptomyces* spp. have been shown to produce a neurodegenerative compound(s). Members of this genus are also well known to produce antibiotics; this study evaluated antibiotic production of *Streptomyces* isolates based on their ability to cause neurodegeneration in a worm model. Neurodegeneration-tested isolates were grown in small-scale fermentation broths, and the cell-free supernatants were inoculated into paper discs, which were placed onto agar lawns of 4 test microorganisms. Results suggest that there was not a correlation between neurodegenerative compound production and antibiotic production. In fact, more than twice as many strains that did not demonstrate neurodegeneration produced antibiotics than did neurodegenerative compound-producing strains. Although neurodegenerative compound-producing strains showed less activity against the test organisms, the activity of their antibiotics was greater, with a larger average zone of inhibition compared to the zones generated by non-neurodegenerative compound-producing strains.

Matthew Grybas, Mechanical Engineering

Faculty Mentor: Jeremy Bailin, Physics and Astronomy

Synthetic Images of Simulated Galaxies

In order to further understand the process of galaxy evolution, synthetic images of simulated galaxies were generated using Sunrise, a Monte-Carlo Radiation Transfer Code which calculates the absorption and scattering of light in astrophysical simulations by assuming dust exists in the gas of a galaxy. Images of a theoretical galaxy, comparable to the Milky Way Galaxy, were created and analyzed by examining the colors, luminosities, and structure at multiple points in the galaxy's evolution. This data was then compared to that of real observed galaxies.

Livia Guadagnoli, Psychology

Faculty Mentor: Jim Hamilton, Psychology

The Interaction between Tornado Exposure and Attachment Style on Post-Traumatic Stress Disorder in a College Sample

Among people who experience major traumas, like natural disasters, only 8-10% develop post-traumatic stress disorder (PTSD). There is strong interest in determining the risk factors that characterize that 8-10%. The current study assessed whether the effects of exposure to an EF-4 tornado on PTSD were particularly prominent in people with insecure interpersonal attachment. We used data from pre-tornado measures of anxious and avoidant attachment to conduct our data analyses. Using regression analyses, we found that there was a simple effect of exposure on PTSD; the more severe one's storm exposure, the more likely one was to experience PTSD symptoms.. We also found that the effect of exposure to the tornado on PTSD that was moderated by the anxious attachment. Individuals with moderate and high anxious attachment were more affected by the exposure to the tornado in comparison to more securely attached individuals, among who storm exposure was unrelated to PTSD. In contrast, the regression analyses for the effects of exposure and avoidant attachment on PTSD revealed that the effect of exposure on PTSD was not moderated by avoidant attachment. Neither attachment style was directly related to PTSD symptoms. In conclusion, anxious attachment style appears to heighten the risk for PTSD among those who experience a natural disaster. The likely mechanism through which this effect occurs is poor social support among persons who are insecure in their interpersonal relations.

Kristen Guenther, Human Nutrition and Hospitality Management

Katherine Boles, Human Nutrition and Hospitality Management

Mary Hales, Human Nutrition and Hospitality Management

Jourdann Rhodes, Human Nutrition and Hospitality Management

Faculty Mentor: Lori Greene, Human Nutrition and Hospitality Management

Minority, Low-Socioeconomic Status Associated with Diabetes Risk; A Review

Purpose: The purpose of this review is to examine the relationship between low-socioeconomic status and risk for diabetes by reviewing ten current peer reviewed articles

Methods: Searched on SCOUT, ScienceDirect, and CINAHL databases using keywords "low-socioeconomic", "diabetes", "poverty", "minorities", and "risk factors". Ten articles were selected as relevant for use for this review.

Results: African Americans, Hispanics, and Asian Americans have cultural dietary habits and lack of access to nutritious foods making diabetes highly prevalent in these minority populations. A major obstacle making this population more susceptible to diabetes is limited resources. Individuals living in poverty have more concern with meeting basic needs before living a healthy life style. Due to their limited financial resources, this population tends to buy foods of lower cost and with high calorie and sugar content. A small percentage of farmers markets accept SNAP or WIC, making accessibility and affordability of nutritious fruits and vegetables very limited for a population that strongly relies on these assistance programs.

Conclusion: Based on the articles reviewed, there are many diabetes risk factors prevalent in minorities of low-socioeconomic status.

Audrey Gunn, Psychology

Faculty Mentor: James Hamilton, Psychology

Tornado Trouble: The Negative Effects of Avoidant Coping in the Face of a Natural Disaster

Trauma is a well-known predictor for negative mental health outcomes, such as post-traumatic stress disorder and depression. However, only a small proportion of traumatized people experience these outcomes. It may be that the ways in which people cope with trauma determine whether trauma leads to these negative mental outcomes. On April 27, 2011, an EF4 tornado devastated the city of Tuscaloosa. After the tornado, a significant minority of individuals who experienced the tornado reported negative psychological effects. The current study tests whether a negative coping style represents a mechanism through which trauma lead to negative psychological outcomes in individuals who experienced the tornado. Specifically, we tested whether fear during the tornado was particularly likely to lead increased depression, and neuroticism, by increasing the use of avoidant coping styles. Our results indicated that fear was actually associated with less depression overall. In a separate effect, fear increased avoidant coping, which increased depression. A similar mediation pathway was found for changes in neuroticism, where fear led to increased avoidant coping which in turn led to increased neuroticism. Taken together, our results suggest that those who experienced greater fear from the storm resorted to more avoidant coping, leading to increases in trait neuroticism and depression. These results support the use of interventions designed to help people confront trauma and reduce avoidance.

Lauren Hagler, Chemistry

Faculty Mentor: Silas Blackstock, Chemistry

Increasing the Pi Electron Density in a Pyrazole Donor Molecule to Optimize its Donor-Acceptor Bonding with Quinones

Cocrystallization can be used to study non-covalent attractive associations between electron-rich (donor, D) and electron-poor (acceptor, A) substances. Electron rich molecules often bind to electron poor molecules to form DA complexes in solution which can sometimes be crystallized to obtain two-component cocrystals, The packing of the molecules in the cocrystal, as imaged by X-ray diffraction, provides an image of the preferred geometry of DA complex and guides the molecular assembly process

of cocrystallization. The target donor of my study is the electron-rich pyrazole donor 3,5-di(p-anisyl)-4H-pyrazole (DA-4HP), which is being synthesized in three steps from p-methoxyacetophenone and p-methoxybenzoate via a crossed Claisen condensation followed by methylation and subsequent condensation of the intermediate diketone with hydrazine. Progress in this ongoing synthesis will be reported. The DA-4HP donor complexation and cocrystallization will be studied to evaluate the effect of increasing the pi electron density in a 4HP donor on its complexation and cocrystal growth with electron acceptor quinones. The results will help provide a basic understanding of the nature of the 4HP-quinone attractions that drive the assembly of these structures and promote their cocrystallization.

Elizabeth Haley, Capstone College of Nursing

Faculty Mentor: Yonghyun Kim, Chemical and Biological Engineering

Role of Basic Fibroblast Growth Factor in Glioblastoma Stem Cell Expansion

Glioblastoma (GBM), the deadliest form of brain tumor, has recently been shown to possess a unique subpopulation of cells exhibiting a stem cell-like phenotype with the ability to self-renew and differentiate into multiple cell types. These glioblastoma stem cells (GSCs) are resistant to current available treatment options and are thought to be a major reason for tumor relapse in GBM patients. In order to make greater numbers of GSCs available for future GBM research, current in vitro culture methods need to be improved. Basic fibroblast growth factor (bFGF) is an essential supplement in cell culture media to support the growth of GSCs. It is the most expensive component of GSC media, yet is often used in excess to account for its depletion by the cells. We are studying the degradation rate of bFGF in culture of several GBM cell lines so that we can use more precise amounts of bFGF in the media. We are also analyzing the stemness of cells grown in the presence of bFGF over time in order to better understand the growth factor's effect on the cells. By enabling a greater number of GSCs to be grown at a minimized cost, our development of an optimized GSC culture media is poised to offer a method to help recover more significant numbers of GSCs for future research applications.

Tanner Hallman, Biological Sciences

Faculty Mentor: Laura Reed, Biological Sciences

Genotype-by-Diet Interaction on Protein normalized Triglyceride levels in Drosophila melanogaster

Previous research has shown significant variation in levels of triglyceride concentration across genotypes and food types of *Drosophila melanogaster* larvae. In my research I am measuring protein concentration in addition to triglyceride concentration and doing a triglyceride by protein content analysis of the results. To obtain these results, recombinant inbred genetic lines were fed a control diet and a diet high in fat, and then triglyceride and protein assays were performed on third instar larvae. We find significant genetic, dietary, and genotype-by-diet interactions contributing to variation in protein normalized triglyceride concentrations.

Russell Hancock, Mechanical Engineering

Faculty Mentor: Brian Fisher, Mechanical Engineering

Autoignition of n-Heptane in a Direct-Injection Constant-Volume Combustion Chamber

While conventional petroleum fuels such as diesel fuels are widely used, alternative fuels are becoming more widely used today. A significant concern with this is the effect of fuel properties on ignition, affected directly by fuel composition and structure. Our purpose is to acquire and process combustion data for alternative fuels to measure ignition delay, low-temperature heat release, and combustion duration. We have begun with n-heptane, a relatively standard fuel, to validate our process for future use with less understood fuels.

We inject fuel directly into a direct-injection constant-volume combustion chamber (DI-CVCC) where it auto-ignites from pressure and heat. We infer information about ignition delay and heat-release rate

from pressure data recorded during injection and combustion. The idea is to decouple chemistry from physics in this process to study chemical properties independently. We do this by creating the longest possible ignition delay, allowing the fuel to mix evenly in the chamber and minimizing physical variations.

In our DI-CVCC system, we have gathered data from temperature sweeps (540 degrees C to 650 degrees C) at 2, 5, 8, and 10 bar, maintaining constant injection pressure and equivalence ratio. We have used these data to observe the presence of negative temperature coefficient behavior, validating our system as useful for continuing research with alternative fuels.

Caitlin Hanley, Computer Science

Faculty Mentor: Monica Anderson, Computer Science

Event-Driven Programming Environment for FINCH Robots

Because computer science is a relatively new field, researchers and educators are still figuring out how to teach students various computer science concepts and test that they have understood them well. Popular introductory middle-school programming environments tend to have drag-and-drop features (syntax-free environment) and the students write programs linearly. However, programming projects that appeal to students, like smart phone applications, video/PC games, and robots tend to rely on an event-driven program, not a completely linear one. This research project involves modifying the Calico integrated development environment, specifically the Jigsaw extension, to change it from a linear programming environment to an event-driven programming environment. This extension will be used in middle-school classrooms with the FINCH robots. The students will be interviewed and their interview responses will be analyzed in order to get a better understanding of the learning processes used and mental models developed through an event-driven programming environment.

Tarif Haque, Computer Science

Chris Chockley, Computer Science

Faculty Mentor: Jeff Gray, Computer Science

Learning Symbolic Hand and Finger Motion Gestures

Hand and finger motion gestures have not yet been widely integrated into human-computer interfaces. Detecting symbolic gestures, or gestures within a defined interval and mapped to a specific command, can be trivial to complex, depending on the nature of the gesture. Symbolic gesture recognition techniques were investigated with respect to the Leap Motion Controller, a hand and finger motion tracking sensor. To evaluate the performance of existing gesture recognition tools and explore the implications of symbolic gesture recognition, we developed a gesture mapping interface that is able to recognize gestures learned using exemplar-based machine learning approaches and compositions of primitive gestures the Leap recognizes natively. To illustrate an application symbolic gesture recognition, the interface provides a means to map learned symbolic gestures to speech; such a system could potentially be used to teach blind users how to sign.

Emma Harms, Capstone College of Nursing

Paige Henderson, Capstone College of Nursing

Camille Hayes, Capstone College of Nursing

Alayna Hinton, Capstone College of Nursing

Faculty Mentor: Michele Montgomery, Capstone College of Nursing

Who's Your Doc?

Rural populations are among the communities with the poorest health outcomes in the U.S. There are many contributing factors that place rural communities at an increased risk for unhealthy lifestyles, such as the community's resources, demographics, occupations, and health knowledge. By definition, Fosters,

Alabama is a rural community, with a population of 26 people per square mile. The purpose of community health is to provide people with the knowledge needed to improve their own health, ultimately influencing and improving health behaviors of an entire community. In order to objectively determine the exact health needs and resources of a particular area, a thorough community assessment needs to be conducted. This presentation will illustrate the process of assessing the characteristics of Fosters, determining its strengths and weaknesses along with its unique identified priority health need. A specific evidence-based intervention is then proposed to improve this problem in the community.

Claire Harper, Mechanical Engineering

Julia Rozanski, Mechanical Engineering

Faculty Mentor: Marcus Ashford, Mechanical Engineering

Characterization of Exotic Alternative Fuels

A single cylinder engine is being modified to accept the simultaneous and independent injection of liquid and gaseous fuels. Initial research will be conducted on natural gas/gasoline blends; future work will explore blends of gasoline and biofuels such as butanol and ethanol.

Joy Harris, Journalism

Shelby Burbach, Theatre and Dance

Morgan Whitten, Art and Art History

Faculty Mentor: Alana Baldwin, Journalism

Accessible Website Design

Inclusive design is an integral part of website development. At the Center for Instructional Technology, we must make sure our websites are designed according to the standards of the World Wide Web Consortium (W3C). These standards make sure websites are fully functional to make the site as easy to use as possible. Our poster will concentrate on how design can make a website navigable, readable, predictable, compatible, adaptable and distinguishable.

Haley Hatchell, Clothing, Textiles and Interior Design

Hanna Roberts, Clothing, Textiles and Interior Design

Faculty Mentor: Jan Brakefield, Consumer Sciences

Spotlight: The Ugly Truth

"Spotlight: The Ugly Truth" reveals an unacceptable trend within the fashion industry regarding the lack of diversity on high fashion runways. From influential industry professionals to our peers, it is evident that the issue facing the fashion industry is anything but a secret. Efforts to conceal this inequality have proven futile in the wake of a new generation of fearless leaders who are determined to eliminate stereotypes and prejudices in the industry.

The fashion industry claims to represent creativity, open-mindedness, forward thinking, and acceptance. Unfortunately, as celebrated as those traits are they are not portrayed through the faces of the industry - the models.

In the backbone of the industry, diversity prevails as represented by designers and auxiliary professionals. From editors to CEO's and everything in between, these people come from across the globe forming a melting pot of experiences. They fuse together to create a beautifully unique industry that intrigues, entertains, and dresses our society.

Megan Hathcock, Mechanical Engineering

Faculty Mentor: Paulius Puzinauskas, Mechanical Engineering

Electronic Throttle Control

This study seeks to reduce air/fuel ratio fluctuation during transient states. Generators tend to fluctuate from a stoichiometric air/fuel ratio during transient states, causing a decrease in power quality and fuel efficiency. To reduce air/fuel ratio fluctuation, we installed an electronic throttle body to replace the mechanical governor. Using the control system of the electronic throttle, we will develop an algorithm to predictively modify fueling of the engine, which will reduce emissions and increase generator efficiency and power quality.

Patrick Hawkins, Geological Sciences

Bradley Chiri, Geological Sciences

Faculty Mentor: Rona Donahoe, Geological Sciences

Experimental microcosm study of the effects of Deepwater Horizon MC-252 oil and COREXIT 9500 chemical dispersant on the geochemistry of salt marsh seawater

The explosion and sinking of the Deepwater Horizon oil platform at BP Macondo-1 well on April 20, 2010 released approximately 4.9 million barrels of MC 252 crude oil into the Northern Gulf of Mexico. In an attempt to clean up surface oil, approximately 1.8 million gallons of COREXIT 9500 chemical dispersant were applied to the oil slick. The hypothesis of this study is that oil and dispersant contamination will affect the geochemistry of the coastal salt marsh environment, potentially causing the release of toxic trace elements which could enter the food chain. To test this hypothesis, a 21 day time-series experiment was conducted. Salt marsh sediment and seawater samples were collected from the Alabama Gulf Coast near Bayou La Batre. Duplicate jars were prepared for each time period, along with appropriate controls. Ten grams of oil and dispersant were added to each duplicate jar and a spiked sterile control. ICP-OES was used to analyze the aqueous elemental concentrations of jars sacrificed at different time points. Results indicate that microbial reductive dissolution of Fe and Mn oxide minerals in the sediment begins after 24 hours of incubation and peaks at 7 days. Arsenic and Se concentrations strongly correlate with Fe and peak at 7 days. Other aqueous trace elements such as Co and Cd showed significant increases at 21 days. Concentrations of Ca, Sr, and B increased after 1-2 days, through the end of the experiment.

Justin Heck, Political Science

Faculty Mentor: Joseph Smith, Political Science

Distinguishing language of Tea Party candidates

The lack of unity in the Tea Party movement has created a fragmented definition of what it means to be a Tea Partier. With grassroots networks, national funders, and conservative media outlets all trying to use the momentum or title of the Tea Party in slightly different ways, it becomes unclear which issues are most important to Tea Party candidates. The purpose of this study is to identify a significant difference in the language used by Democratic, Republican, and Tea Party candidates in the 2010 and 2012 U.S. congressional elections. The campaign material of each candidate was assessed in four categories that represent some of the commonly held principles among Tea Party organizations: constitutional limits, fiscal responsibility, free markets, and gun rights. Each category was made up of words chosen from a frequency analysis of the online literature of sixteen Tea Party organizations. A Python program was created to analyze the relative frequencies of the words within these categories for each candidate. The candidates were then grouped by party affiliation in order to determine whether Tea Party candidates present themselves in a way that is unique from Democratic and Republican candidates.

Bethany Herndon, Criminal Justice

Jason Atchison, Criminal Justice

Faculty Mentor: Mark Lanier, Criminal Justice

The Effects of Prejudice on the Legal System and Conviction Decisions

Justice is meant to be blind, but often convictions are made based on either presumed or real prejudice. Prejudice is an issue that affects us all, and often carries over into the justice system. It is accepted common knowledge that African Americans are more likely to be incarcerated, teens are actively deviant, that the Islamic faith teaches terroristic practices, and that men are much more violent. The statistics reported about current prison populations and crimes may prime juries to be prejudiced. These types of statistics and current personal prejudices may create a view that a certain race, ethnicity religion, age group, or gender is less sophisticated, more likely to commit crime, or more violent. This type of information may be hindering defendants from receiving a fair and just trial. Studies have looked at how prejudices affect a jury's decision, but none have looked at how the presence of a prejudicial juror may affect the decision. For this reason we will be evaluating how the presence of a prejudicial juror affects and changes others' conviction decisions.

Danielle Herubin, Chemical and Biological Engineering

Faculty Mentor: David Nikles, Chemistry

Synthesis of Bismuth-Oxychloride Nanorods and Nanocubes

This research project has focused on developing a procedure to synthesize BiOCl nanoparticles (either nanocubes or nanorods) with controlled size and shape. Reduction of BiCl₃ and thermal decomposition of Mn₂(CO)₁₀ to produce BiMn nanoparticles had a significant amount of single crystal BiOCl nanorods as a contaminant. This result led to the systematic study into preparing single crystal BiOCl particles. Reduction of BiCl₃ in the absence of Mn₂(CO)₁₀ produced single crystal BiOCl nanocubes. BiOCl is a wide bandgap semiconductor (E_g = 3.46 eV) that may be valuable for solar energy conversion.

Mercedes Hisbrook, History

Faculty Mentor: Sharon Nichols, Curriculum and Instruction

Historical Survey of Past and Current Trends of the Involvement of Women in Physics

The topic of the research is a survey of past and current trends of women in physics education. The purpose is to identify and compare gender equality trends in physics education in the United States. By looking over historical documentation and comparing it to modern data, trends can be mapped and progress can be seen more clearly than looking at only the most recent data sets. The survey has a focus on secondary and post-secondary school data on both involved persons and curricula to map the change in physics education.

While massive strides are being made in gender equality, particularly in STEM fields, there are certain areas that have been lagging behind. These areas include physics and chemistry. For the sake of brevity, only physics will be the focus. The significance of this problem is much broader than the specific issue itself. The struggle for gender equality in all areas is an ongoing problem that merits continually updated research and a steady push for further progress. Before issues such as wage gap and corporate discrimination can be fully addressed, society must ensure that education - the foundation of that society - is fully integrated and there is equal opportunity to all regardless of gender. By focusing on problem areas such as physics, the worst stumbling blocks in the quest for equality can be identified and then remedied. Further, by studying the history of the inclusion of women in these fields, particularly pervasive issues can be brought to light.

Kelly Hite, Telecommunication and Film

Spinks Megginson, Telecommunication and Film

Megan Breese, Telecommunication and Film

Katie Malone, Telecommunication and Film

Faculty Mentor: Dr. Chandra Clark, Telecommunication and Film
Tuscaloosa Arts and Beverages

The city of Tuscaloosa is home to many art museums and restaurants. The city has a variety of bars with signature drinks that are sure to satisfy anyone's taste buds. Title Town is known for football but there are things to see and beverages to drink all year long! We are thrilled to be able to speak about our home for the past four years, the city of Tuscaloosa.

Madden Hogan, Human Nutrition and Hospitality Management

Mary Garner, Human Nutrition and Hospitality Management

Hannah Grogan, Human Nutrition and Hospitality Management

Holly Klotzly, Human Nutrition and Hospitality Management

Faculty Mentor: Lori Greene, Human Nutrition and Hospitality Management

Sensory Nutrition Education as a Primary Learning Method for Children: A Review

Introduction: Early childhood nutrition education is essential in the development of positive life-long dietary habits. In order for nutrition education to be effective in young children, the teaching method must be appropriate for their developmental stage. This literary review shows how hands on nutrition education can be effective in promoting beneficial dietary habits.

Methods: Research for this review was obtained from various accredited databases including PubMed, CINAHL, and The University of Alabama library database, Scout. Each article was reviewed and chosen based on the following criteria: written in the past ten years, peer reviewed, and fell within the topic of interest.

Results: Based on the research it was determined that children respond well to hands on learning versus traditional formal learning. Sensory and taste education programs have been shown to have a positive effect on dietary habits in children by increasing their willingness to try a variety of foods. Hands on nutrition education has also been shown to promote life-long healthy habits including good food choices, a positive attitude towards food, and decreased risk for nutrition related diseases.

Conclusion: Overall, the review concludes that knowledge from hands on learning experiences at an early age are retained and are more likely to become habits throughout life.

Grace Hoover, Chemical and Biological Engineering

Faculty Mentor: Marisa Giggie,

Psychiatric Co-morbidity in Collegiate Recovery Communities

College students who are in recovery from substance-use disorders are faced with challenges when trying to reintegrate into an often abstinence-hostile college environment. In order to support and retain these students, many colleges (including The University of Alabama) have established Collegiate Recovery Communities (CRCs) for students who want to pursue active recovery while in college.

However, mental health issues can create serious challenges for individuals recovering from substance-use disorders. In order to maintain low relapse rates within CRCs, it is important to investigate whether student members are not only receiving support in their recovery from substance abuse but also psychiatric treatment if needed. The goal of this research is to determine the extent of psychiatric comorbidity within the CRC population and to ascertain if CRC students are conscious of resources available for mental health care on their campus or within their community and whether they are receiving psychiatric treatment if necessary.

Tanner Howitz, Geological Sciences

Clayton Jernigan, Geological Sciences

Harris Hunter, Geological Sciences

Faculty Mentor: Harold Stowell, Geological Sciences

New Evidence For Loading During Metamorphism Of The Emuckfaw Group, Eastern Blue Ridge, Alabama
Garnet-bearing high-Al pelite from the Josie Leg Member of the Emuckfaw Group, provides new evidence for loading in the Eastern Blue Ridge. Garnet ranges from ~0.1 to ~2.5 cm in diameter and contains inclusions of staurolite, chlorite, rutile, ilmenite and quartz confirming a high-Al pelite composition. Garnet displays concentric zoning in Mn (decreasing from core to rim), Fe (slightly decreasing from core to rim), and Mg (increasing from core to rim). Ca zoning varies from concentric in a larger grain to oscillatory in a smaller grain. We interpret a single metamorphic event based on Mn zoning. The Ca variations of ~0.03 mole fraction likely reflect growth in equilibrium with minerals that varied during garnet growth and/or fluid flow.

MnNaCaKFeMgAlSiHTi P-T pseudosections and garnet compositions provide P-T estimates for core and rim growth. The core (Mn=0.05, Fe=0.74, Mg=0.05, & Ca=0.17) of a large garnet grain (1.75 cm) from the first sample indicates initial growth at ~540°C at ~6 kbar. The rim (Mn=0.02, Fe=0.72, Mg=0.13, & Ca=0.15) indicates an increase in P-T to ~650°C at ~10.5 kbar. Modal garnet predictions from ~2% to ~10% at termination of growth are compatible with growth along the predicted P-T path. The high Mn center of center of a smaller garnet (0.45 cm) from a second sample does not align with the geometric center of the grain. The garnet compositional isopleths do not intersect in P-T space and we infer post-peak metamorphic resorption and disequilibrium.

Joana Hubickey, Biological Sciences

Matt Kieffer, Biological Sciences

Faculty Mentor: Laura Reed, Biological Sciences

The Effects of Laminin A Mutation on Metabolic Phenotypes in Drosophila melanogaster

The increase in prevalence of metabolic syndrome and its associated co-morbidities has pushed research towards studying the genetic mechanisms of this complex disease. A mutation in the Lama5 gene in humans is associated with changes in serum triglyceride, glucose and weight in children and adults (DeLuca 2012). The Lama5 gene encodes for the Î± subunit of a laminin molecule, which is a major component of the basement membrane. Laminin molecules help in cell adhesion, migration and signaling (NCBI 2014). Drosophila melanogaster have a homologous gene known as LanA, and when LanA is mutated similar metabolic effects occur in the fly (DeLuca 2012). Our research reinforces the occurrence of significant metabolic effects using a drosophila LanA mutant. The mutation was caused by a p-element insertion 150 base pairs upstream of the gene, effectively causing an overexpression of the gene. The control used was the isogenic background line, Canton SB. We found the mutant fly to have significantly lower circulating trehalose, triglyceride and weight than the control. Moreover, we found that sex of the fly plays a role. Female flies had lower circulating trehalose and triglycerides, yet weighed more than males. Lastly, an increase in sugar in the diet caused a general increase in trehalose, triglycerides and weight in both genotypes. A LanA mutation seems to be conferring a protective effect against symptoms of metabolic syndrome in Drosophila melanogaster.

Haleigh Hulsey, Biological Sciences

Faculty Mentor: Jason Scofield, Human Development and Family Studies

Startle Response to Auditory Stimuli

Despite considerable research on the physiology of the startle response, there appears to be much less research on psychological factors such as matching and mismatching the sense modality of attention (e.g., visual) and the sense modality of a startle prompt (e.g., visual or auditory), either of which may have differential effects on the presence and magnitude of a startle response. The current study piloted a procedure that would allow for such differential effects to be observed. Adults (n=12) participated in a 45 minute testing session during which they were connected to a Biopac MP150 system for the acquisition of physiological signals, including skin conductance or galvanic skin response (GSR100C

Electrodermal response amplifier), muscle activity of the obicularis oculi (EMG100C Electrodermal response amplifier), and heart rate (ECG100C Electrocardiogram response amplifier). Participants were then seated in front of a display monitor to complete a testing phase. The testing phase featured 6 blocks of 10 "stroop" trials (where participants were instructed to respond to printed color words according to either the color or meaning of the word on the screen). Within each block of 10 trials, an auditory startle prompt (i.e., a 500 ms tone of white noise, 100 dB SPL) was randomly administered between trials 3 and 8. Preliminary analysis indicate that the piloted procedure successfully elicits a measurable startle response, even across mismatched sensory modalities.

John Hunt, Mechanical Engineering

Faculty Mentor: Keith Williams, Mechanical Engineering

Controlled Distribution of Ionic Liquids

The purpose of this research is to develop and deploy a method for precisely depositing solid material that has been dissolved in an ionic liquid. Current ionic liquid application uses a commercially available syringe pump to extrude the ionic liquid across a surface. Position control is not used for the syringe or the target, limiting any extrusions to simple, imprecise geometries. To realize precise deposition control, we have retro-fitted a MakerBot Thing-O-Matic 3D-Printer with a custom liquid extrusion device and altered the printer's programming to synchronize the motion of the syringe head with the ionic liquid extrusion rates. We have also developed techniques for designing single layer patterns in commercially available modeling software to provide an interface for path generation. This research will allow for a greater focus on the actual properties of ionic liquids by removing large amounts of human error from the application process. It also has future applications in the areas of liquid extrusion and 3-dimensional circuit design.

Michael Ikegami, Electrical and Computer Engineering

Faculty Mentor: Dawen Li, Electrical and Computer Engineering

Simulation Study of Inverted Solar Cells Based on Low-Bandgap Polymers

An inverted solar cell structure has been shown to be a promising solution to increase the air-stability of bulk-heterojunction photovoltaic cells while preserving their solution processability and ability to be fabricated on a variety of flexible substrates. In this project, we systematically studied the effects of PCPDTBT:PC70BM active layer thickness, charge carrier mobility, the Langevin recombination rate, and the effects of materials with different work functions as the electron transport layer on inverted solar cell power-conversion efficiency. Through the use of SETFOS commercial optical simulation software, it was observed that an increase in hole mobility and a decrease of Langevin recombination rate causes an increase in the device's power-conversion efficiency. Furthermore, it was determined that an increase in mobility or a decrease in recombination rate causes an increase in the optimized active layer thickness, increasing the amount of incident photons absorbed and converted to free charge carriers. Finally, the relationship between electron transport layer selection and efficiency was studied and determined to depend strongly on the work function and optical properties of the material used. With these relationships, mobility, recombination, active layer thickness, and electron transport layer selection can be optimized to obtain inverted organic solar cells with efficiencies near those of standard solar cells.

Christina Irion, Telecommunication and Film

Sarah Catherine Perry, Human Nutrition and Hospitality Management

Kiley Pfeifer, Accounting

Kaley Hogan, Capstone College of Nursing

Faculty Mentor: Jessica Hollander, English

Dewey Dell - An Analysis

In our letter to Lafe from Dewey Dell, our group focuses on her internal conflict, that she is incessantly worried about the changes happening inside her body, and how the pregnancy affects her place in society-being a mother out of marriage- and changes her position in the context of family. Should she step in a motherly roll, allow the New Mrs. Bundren to take the place of her mother, or start a family of her own?

Throughout the text, Dewey Dell is constantly paranoid about the possible reveal of her pregnancy. It seems as if Dewey Dell emphasizes her biggest fears by repeating them. When she realizes that Darl has figured out her situation, she continues to repeat the word knew and know throughout the paragraph.(706) She talks of her predicament like her body is a tub of guts, and also repeats Lafe's name, five times, when she is worried about her position in the family changing.(719)

Lafe was the person that suggested that Dewey Dell have an abortion, so we believe because she cannot complete the abortion; she would attempt to reach out to Lafe. Our group began this letter after the Bundrens left Jackson. The intention was to write this letter after an abortion was an unviable option. We incorporated Dewey Dell's confusion about her role in the family by having the new Mrs. Bundren take Dewey Dell's spot in the wagon.

Ronneshia Jackson, Biological Sciences

Faculty Mentor: Julie Olson, Biological Sciences

Diversity of secondary metabolite genes in symbiotic bacterial communities

Bioactive compounds produced by bacteria have been harnessed for human and animal pharmaceutical applications. However, less is known about why bacteria produce these secondary metabolites in their natural ecosystems. In this study, cell-free supernatants from bacteria associated with the external surfaces of lionfish, *Pterois volitans*, from both the native and invasive ranges were evaluated using antimicrobial assays. Over a third of the isolated bacteria showed antimicrobial activity against common fish pathogens. Based on these results, molecular techniques were used to examine the diversity of secondary metabolite biosynthetic genes in both antimicrobial compound-producing and non-producing isolates. Genes within nonribosomal peptide synthetases (NRPS), a diverse but important family of secondary metabolites, were amplified via PCR and the resulting products were digested using EcoRI chosen from in silico digestions of NRPS genes available in the NCBI database. Examination of the banding patterns generated by restriction enzyme digestions demonstrated the diversity of NRPS genes within the isolates and indicated whether strains that were found to produce antimicrobial compounds possessed similar genes as the non-producing strains. All isolates were evaluated, as some bacteria may not produce secondary metabolites in the absence of an environmental stressor.

Chelsea Jarvis, Political Science

Faculty Mentor: Dana Patton, Political Science

Sexual Assault at the University of Alabama

Objective: The fear of sexual assault continues to be constant in today's society and women are at risk more as they enter the collegiate setting. While there are many national studies on sexual assault, a study on a particular university could be used to change the dialogue about sexual assault on said campus. Method: through the use of Qualtrics, a survey delivery service.

Alexander Jenkins, Chemical and Biological Engineering

Faculty Mentor: Jason Bara, Chemical and Biological Engineering

3-D Printing for CO₂ Capture and Chemical Engineering Design

3-D printing is a form of "additive manufacturing" that allows the fabrication of items directly from digital files and for users to produce virtually any solid object "on demand". Already a frequently

discussed topic in the mainstream media, 3-D printing is beginning to find a number of applications in research laboratories. We have recognized that 3-D printing can have many roles in the design of chemical engineering processes as a means of fabricating parts or perhaps entire unit operations. We foresee many opportunities for 3-D printing as a means of producing novel and advanced components for gas treating. Gas treating plays a crucial role in many energy-related processes including natural gas sweetening, flue gas desulfurization and pre- and post-combustion CO₂ capture. These processes are typically carried out in absorption columns containing trays or packing that provide interfaces for gas-liquid contacting. New devices such as membrane contactors are also emerging as alternative mechanisms for achieving separation of gases with potential cost and energy saving benefits derived from having smaller footprints, being of lighter weight and having much larger interfacial areas. Yet in all cases, the design, cost and ability to optimize gas-liquid contactors may be limited by conventional manufacturing techniques. In this presentation, we show our efforts to date in the application of 3-D printing for the fabrication of components and devices for CO₂ capture applications.

Nick Johnson, Electrical and Computer Engineering

Faculty Mentor: Dr. Claudia Mewes, Center for Materials for Information Technology

Origin of the Anisotropy in CoFe/MgO Multilayer Structures

In this project CoFe/MgO multilayer structures were analyzed within first principles calculations using density functional theory to get a better understanding of the origin of the different anisotropy contributions. Interfacial anisotropy was emphasized for application in spin transfer torque random access memory (STT-MRAM). The anisotropy induced by the interface of CoFe to MgO is used to pull the magnetization of the thin magnetic layer out of the layer plane. This particular geometry has advantages compared to so called in-plane devices, for example in terms of the critical current threshold. The critical current is the current necessary to switch the free layer of the magnetic memory device. We have studied strained CoFe multilayers in a B2 structure, to model the experimental situation, when CoFeB is grown on a MgO layer. Based on previous findings the interfacial anisotropy contributions seem to depend strongly on the quality of the interface.

Margaret Johnson, Chemistry

Faculty Mentor: Dave Nikles, Chemistry

On the Use of Rhodamine B as Nanothermometer to Measure the Local Temperature in Magnetically Heated Polymer Micelles

The linear dependence of the peak intensity in the fluorescence spectrum for Rhodamine B makes it an ideal candidate to determine temperature with nanoscale spatial resolution. In this study, a method for placing Rhodamine B into the core of micelles was developed. Rhodamine B was reacted with caprolactone to create a polymer with a terminal Rhodamine B. This polymer was then incorporated into a diblock copolymer micelle for future magnetic heating experiments.

Megan Johnston, Chemistry

Faculty Mentor: Kevin Shaughnessy, Chemistry

Palladium-Catalyzed Direct Intramolecular Arylations Using Water-Soluble Phosphine Ligands

Palladium catalyzed coupling reactions that form carbon-carbon/heteroatom bonds are very important in organic chemistry. Some of these reactions take advantage of the activation of the carbon-hydrogen bond by a leaving group; however, the use of a leaving group involves several steps, is time-consuming, is costly, and creates waste. By developing direct arylation reactions, chemists have been able to decrease the number of steps and the cost of these reactions. Organic solvents are often necessary to accomplish these processes, but those solvents are toxic, expensive, and difficult to dispose. Water is a viable solvent substitute because it is considerably less expensive, is more environmentally benign, and

potentially allows for the recycling of the palladium catalyst. We are studying the activity of water-soluble phosphine ligands such as triphenylphosphine trisulfonate (TPPTS) and di-tert-butyl phosphine propane sulfonate (DTBPPS) in direct intramolecular arylations with the hope of developing aqueous phase conditions for these systems. In the future, this methodology may be applied to catalyst recycling.

Patrick Joswick, Capstone College of Nursing

Stephanie Kinsey, Capstone College of Nursing

Alexandra Leonelli, Capstone College of Nursing

Hillary Lowery, Capstone College of Nursing

Faculty Mentor: Dr. Paige Johnson, Capstone College of Nursing

Substance Abuse among Adolescents in the Holt Community

This presentation describes critical areas of interest that reveal a complete approach to substance abuse among adolescents in the Holt community. In 2013, up to a quarter of the Holt High School senior class admitted the use of an illicit substance in the past month. The status of the community of Holt, AL is predisposed to have an increased risk of adolescent substance abuse due to an increased high school drop out rate, lack of a productive recreational center, and police patrol. The future for adolescents in the Holt community appears to be heading in a positive direction with support services available, specializing in substance abuse among adolescents. A new initiative has in placed a state funded grant funding the construction of a new community learning center. With extremely addictive and fatal drugs such as methamphetamines and opiates being more commonly used among Holt adolescents, it is imperative to have the entire community take a stance against this promiscuous behavior. Effective community interventions include instilling a peer-resistance education and monitoring a positive school climate, increased school attendance, and changing the perception of support, will all dramatically decrease substance abuse among adolescents in the Holt community. By focusing on the positive aspects of the Holt community and realizing the severity of the consequences of substance abuse on adolescents, a more productive, safer, and closer knit community can be in Holt's future.

Courtney Kaderbek, Telecommunication and Film

Faculty Mentor: Rick Dowling, Telecommunication and Film

Captioning Workflow and Documentation: Research, Comparison, and Best Practices

Available captioning services vary greatly in their accuracy, time-on-task, and total cost of ownership. DocSoft is a server-based, automated text-to-speech, captioning software recently acquired by The University of Alabama. The DocSoft system can be trained to create closed captions with varying degrees of accuracy based on how much additional information is added to the automated system. The purpose of the DocSoft system is to make class lectures recorded at the University of Alabama as accessible to deaf and hard-of-hearing students as students without hearing disabilities. By evaluating DocSoft's text-to-speech capabilities and determining how to enhance its degree of accuracy, the time-cost of the DocSoft workflow will be substantially reduced. The results of this research will be documented on multimedia guides that will aid future DocSoft users in developing their own captioning workflow using the automated server solution, DocSoft's Transcript Editor, and Tegrity lecture capture.

Morgan Kendrick, Telecommunication and Film

Calvin Ross, Telecommunication and Film

Faculty Mentor: Christina Frantom, Telecommunication and Film

Caption That!

Accessibility needs are becoming more prevalent, especially around the University of Alabama campus. Video captioning is one of those accessibility needs that will benefit everyone, including those with

disabilities. At Multimedia Services, we now provide captions with every video we produce, and strive to find ways of making the captioning workflow smoother. Upon the University's acquisition of Docsoft, a top-of-the-line captioning device, we at Multimedia Services have been developing a workflow to better incorporate captioning into our every day video production routine. Our poster illustrates the process we have developed using Docsoft to caption a variety of videos for our clients here at the University of Alabama.

Lauren Key, Music

Faculty Mentor: Andrea Cevasco, Music

Modified Musical Instruments and Technology for Individuals with Multiple Disabilities and Their Application Within a Music Therapy Setting

Music therapy is the clinical and evidence-based use of music interventions to reach individualized goals within a therapeutic relationship by a certified music therapist. Musical instruments are often utilized as a key component of these interventions, but unfortunately, regular instruments are not always accessible or versatile enough on their own to be used as an effective therapeutic tool for individuals with multiple disabilities. Individuals with multiple disabilities have two or more impairments that affect their physical, sensory, intellectual, and/or social-interpersonal functioning. Modified musical instruments and advancements in music technology may revolutionize the therapeutic music interventions used for this population. The aim of this study is to (a) review the literature of the need for modified instruments and music technology for individuals with multiple disabilities, (b) determine what modified instruments and music technology are currently available, (c) discuss how these instruments can be and are being incorporated into the clinical and educational practices of music therapy, and finally, (d) examine how these modified instruments and music technology actually benefit individuals with multiple disabilities within a music therapy setting.

Owen Killeen, Civil, Construction and Environmental Engineering

Nathan Klenke, Civil, Construction and Environmental Engineering

Faculty Mentor: Eric Giannini, Civil, Construction and Environmental Engineering

Advancement of a Rapid Concrete Durability Test

Alkali-silica reaction (ASR) is a chemical reaction that occurs in concrete, ultimately causing expansion leading to durability issues and loss of service life of concrete structures in use around the world. The three main factors that influence the amount of expansion observed from ASR are the amount of alkalis within the cement, the reactivity of silica from the rock and sand (aggregate), and the amount of moisture present at the site of the reaction.

The goal of this research is to evaluate an experimental test method that drastically reduces the amount of time required to determine the reactivity of various aggregates, thus reducing the time required to determine the magnitude of effects caused by ASR. This is accomplished by exposing the concrete to the extreme environment of an autoclave, normally used to sterilize medical equipment. The high temperature and moisture within the autoclave accelerate the ASR, allowing measured expansion within days.

This ACPT study has included testing eleven different aggregates each of varying known reactivity. Students have conducted the research both here at UA and at the Turner Fairbank Highway Research Center in Virginia. The results have shown promising correlation to the current standard ASR test method. More aggregates will be tested to broaden the advancement of the test. One day it could allow accurate identification of newly found sources of aggregates generating sound construction material around the world.

Catherine King, Chemistry

Faculty Mentor: Robin Rogers, Chemistry

Biorenewable Chitin Films from an Ionic Liquid Process as a Platform for Advanced Functional Materials

Chitin is a long chain polymer found throughout the natural world; because of its flexibility, strength, biocompatibility and biodegradability, it can be very useful for many applications. Chitin materials, made from either chitin alone or combined with different polymer(s), can be prepared into a variety of architectures (nanostructures, fibers, beads, films, etc.) and utilized depending on their attributes. However, before preparation of any functional materials, the most effective way to make reproducible, strong, versatile chitin films needs to be developed. Presented here is the study of neat chitin films, prepared through the dissolution of chitin in a special solvent (ionic liquid), and followed by the casting of films. We have studied a variety of preparation conditions (biopolymer load, heating time, casting, washing and drying conditions) on films' composition, thickness, surface properties, flexibility, transparency, etc., and characterized the prepared films by various techniques. The knowledge gained will be used for future preparation of functional chitin films.

Daniel Klein, Computer Science

Faculty Mentor: Joseph Smith, Political Science

Comparing Supreme Court Opinions Across Time

Automated text analysis has great potential for advancing the study of courts. Texts, such as legal arguments and opinions, form important influences on and outputs of judicial institutions. However, texts have been resistant to the social science methods that require quantification. Automated text analysis has the potential to rigorously and meaningfully transform large amounts of texts into quantitative data.

We push the study of Supreme Court opinions and the use of automated text analysis by comparing the language of Court opinions across time. We analyze the texts of all Supreme Court opinions since 1925, cross-referencing the text-data with the quantitative data in the US Supreme Court Judicial Database for cases since 1946. Our research uncovers changes in the way the justices have used language to accomplish particular goals. We compare language across justices, eras, different types of opinions (majority, dissents, concurrences), and different areas of law. Our research sheds light on themes emphasized in justices' opinions across time and across these categories.

James Koch, Mechanical Engineering

Faculty Mentor: Marcus Ashford, Mechanical Engineering

Developing Mixed-Mode Internal Combustion Technology

New combustion technologies like Homogeneous Charge Compression Ignition (HCCI) work well only for certain power bands in the operational range on an internal combustion engine. By combining multiple combustion strategies, such as lean-burning cycles and conventional power-dense cycles, the operational range of a lean-burning engine can be vastly expanded to meet the needs of commercial or industrial power generation. Facilitation of this mixed-mode combustion will be done through variable valve timing, lift, and duration.

Mark Koren, Aerospace Engineering and Mechanics

Faculty Mentor: Amy Lang, Aerospace Engineering and Mechanics

Laminar Boundary Layer Growth over Butterfly Scale Inspired Geometries

The goal of this project was to further explore the effects of butterfly scales on drag. To achieve this, we will look at the boundary layer growth of a fluid as it moves across a flat plate of scales, and compare that to the boundary layer growth of a smooth flat plate. As the mechanics of boundary layer growth over a smooth plate are already known, this will give us a reliable way to verify the effects of the butterfly scales. The first phase of this research was to use computer simulations to predict the boundary layer

growth with different simulation models. Next, we will set up an experiment to move fluid across the flat plates and experimentally find the boundary layer thickness. The combination of these results will show the effects of butterfly scales on aerodynamic drag.

Jillian Krieger, Psychology

Juliann Friel, Psychology

Faculty Mentor: Beverly Thorn, Psychology

Relationships among pain intensity, vital signs, and psychosocial variables in patients presenting to the Emergency Department for pain

Accurate measurement of pain intensity in patients presenting to the emergency department (ED) for pain is needed for effective pain treatment. Some physicians believe vital signs can be used to validate patients' self-reported pain intensity, but previous research has failed to find clinically meaningful relationships between pain intensity and vital signs. No studies have explored the relationships among pain intensity, psychosocial variables, and vital signs in patients presenting to the ED for pain. The present study aimed to investigate these relationships in 40 patients presenting to the ED for pain. Participants completed measures of pain catastrophizing, anxiety, and perceived stress, and vital signs and pain intensity at triage were retrieved from patients' medical records. Bivariate correlations indicated significant relationships between pain intensity and each of the psychosocial variables (r 's=.33-.43). Consistent with previous research, no significant associations were found between vital signs and self-reported pain intensity. Results from this study suggest that psychosocial variables are more strongly related to pain intensity ratings than vital signs. Consequently, vital signs should not be used to validate self-reported pain intensity. Further research should further examine the relationships between pain intensity and psychosocial variables to determine which psychosocial variables are the best indicators of pain intensity.

Katie Kucharski, Psychology

Faculty Mentor: James Hamilton, Psychology

Prevalence of PTSD Among College Students in the Wake of Natural Disasters

Following the 4/27/11 tornado in Tuscaloosa, AL, many University of Alabama students experienced adverse psychological effects, including Post-Traumatic Stress Disorder (PTSD). The present study analyzes data collected through online surveys conducted before and after the tornado struck. 397 participants were screened for signs of PTSD and also reported their exposure to the tornado. Analyses revealed that approximately 10% of participants met the DSM IV criteria for PTSD. This finding agrees with most other studies of PTSD in college students, which report that approximately 9-11% of college-aged students meet criteria. Our results differed from the existing literature in that there was no significant difference in PTSD status between genders. Although there were many more female participants in this study, similar proportions of males and females met criteria for PTSD, while the existing literature suggests that PTSD is significantly more prevalent in women. The present study investigated the association between different types of exposure to the tornado and subsequent PTSD status. Property damage and personal harm were not significantly associated with PTSD, but personal physical harm and exposure to death and injury were significantly associated with post-tornado PTSD. These findings have important implications in our understanding of college students' functioning in the wake of a natural disaster, as well as the aspects of disaster exposure that are related to PTSD.

Danny Laderberg, Biological Sciences

Faculty Mentor: Stephen Secor, Biological Sciences

Carbohydrate breakdown and the regulation of blood glucose for the diamondback water snake

Well documented are the mechanisms by which herbivorous and omnivorous animals absorb glucose and regulate blood glucose levels. Less known is how strictly carnivorous animals are able to absorb carbohydrates in their diets and regulate glucose in their blood. We examined the capacity of the carnivorous diamondback water snake to regulate blood glucose to a natural diet and to glucose-loaded diet and diets loaded with the disaccharides maltose, sucrose, and lactose. We also examined the water snakes capacity to hydrolyze maltose, sucrose, and lactose. The ingestion of a catfish diet did not alter blood glucose levels; however a significant glucose load (9 mg/g body mass) generated a 10-fold increase in blood glucose levels. Glucose levels remained elevated for up to 8 days before returning to normal fasting values (25-30 mg/dL). Of the three disaccharide sugars (maltose, sucrose, and lactose), blood glucose levels were raised only by the ingestion of maltose; suggesting an absence of the enzymes lactase and sucrase. Assays of intestinal samples support this outcome, demonstrating that water snakes possess maltase, but lack both sucrase and lactase. These studies show that when faced with an unnatural glucose load, water snakes are unable to rapidly remove glucose from their blood. Alternatively, when faced with carbohydrates not commonly ingested in their natural diet, water snakes are unable to hydrolyze the disaccharide, and therefore absorb the resulting simple sugars.

Samantha LaManna, Clothing, Textiles and Interior Design

Bria Robinson, Clothing, Textiles and Interior Design

Casey Straughn, Clothing, Textiles and Interior Design

Faculty Mentor: Marcy Koontz, Clothing, Textiles and Interior Design

The "Carrie Project"

By definition, an accelerated learning experience is "an intensive method of study employing techniques that enable material to be learned in a relatively short time." When this type of experience is coupled with creativity, commitment and courage, extraordinary things can happen. This presentation focuses on the "Carrie Project," a unique accelerated learning opportunity in the CTD 340 Portfolio Design class that lasted 20 days during the first part of the fall 2013 semester. Apparel design students were asked the simple question, "What if, Carrie Bradshaw, the main character on the television series Sex and the City, was an undergraduate student at The University of Alabama?" Working as a team, a storyline was quickly developed, local retailers were recruited, and locations were scouted for the editorial photo shoots. Active engagement in the learning process, using higher-order thinking tasks, was a main requirement as well as the ability to talk, write, relate and apply knowledge in a very fast-paced creative situation. The project culminated in the creation of a print catalog featuring a visual storyline and large format posters. Keywords: accelerated learning, fashion, editorial design, catalog design, visual storytelling

Drew Lansdell, Civil, Construction and Environmental Engineering

Faculty Mentor: Wei Song, Civil, Construction and Environmental Engineering

Bridge Weigh-In-Motion using Finite Element Analysis

Bridge weigh-in-motion (BWIM) is a bridge monitoring technique which allows a person to instantly know the weight of a truck passing over a monitored bridge. The concept of BWIM relies on the ability to relate the strain at the midspan of a bridge to the load of a truck passing over. The calculation from strain in the bridge to weight of a vehicle is extensive and requires a computer program performing finite element analysis (FEA) to complete. Since the summer of 2012, I have been working to build my own MATLAB program which is able to perform FEA on 3-dimensional frames. The FEA program I have built is currently able to analyze frames in static and dynamic load cases. This program is able to analyze structures for element strain and other properties based upon an input load. Currently my program is unable to perform the reverse calculation of determining the load based upon a strain input.

In the future, I will be working to give my program the ability to back-calculate the load on a structure from input strain data. The Riverside pedestrian bridge will be used as a testing platform for the work. I have a model of the bridge that I can run through my program. I will be using test data from strain gauges placed under the Riverside Bridge alongside the known weight of a vehicle to refine my model to match expected results. If I am able to succeed this program will be deployed on a local bridge to further test my work, and provide a better tool for bridge monitoring.

Matthew Larkin, Biological Sciences

Faculty Mentor: Stephen Secor, Biological Sciences

The metabolic determinant underlying the rate of energy use during prolonged fasting for the diamondback water snake, Nerodia rhombifer.

Fasting related loss in tissue and organ mass varies as a function of differences in metabolic expenditure and the allocation of endogenous energy. Furthermore, there is considerable variation in the rate at which individuals lose body mass during fasting. The findings that watersnakes exhibit individual variation in standard metabolic rate (SMR) as well as in loss of organ and fat mass during fasting led us to hypothesize that variation in SMR is linked to observed variation in fat loss. Snakes with relatively high SMR would predictably metabolize fat stores at a greater rate than snakes that possess a relatively low SMR. To explore the functional relationship between metabolism and fat loss during an extended bout of fasting, we examined the variation in SMR and differential loss of tissue and organ mass for the diamondback water snake (*Nerodia rhombifer*). We obtained baseline measures of SMR and body mass from 55 snakes and organ masses of ten of those snakes immediately after their capture. For the next five months we dissected five snakes each month and ten snakes the sixth month, as well as measuring SMR of the remaining individuals at two month intervals, to assess the reduction in body and organ masses from fasting.

Arielle Latiolais, Communication Studies

Faculty Mentor: Meredith Bagley, Communication Studies

Resurrecting the Monster: A Queer Feminist Reading of Disney's Female Villains

Though there exists abundant research and criticism on Disney's famed princesses, analysis of their villainous counterparts is sparse. To further interrogate these narratives, this paper offers a queer feminist reading of Disney's most infamous female villains-the Evil Queen from *Snow White*, Maleficent from *Sleeping Beauty*, and Ursula from *The Little Mermaid*. Grounded in Barbara Creed's exploration of the 'monstrous feminine' in horror films and, more specifically, Julia Kristeva's theory of abjection and the maternal, this analysis employs psychoanalytic, feminist, and queer theory to disrupt the traditional princess plot. Through a critical rhetorical analysis of these narratives, from the original fairy tales to Disney's filmic interpretations, this paper reexamines the role of the villainess by reframing the relationship between villainess and princess, one that interprets the villainess as a 'mother' figure-though not in biological or reprocentric terms. Rather, in reading the villainess as mother, this paper challenges the patriarchal and heteronormative underpinnings of the conventional princess narrative. This reimagining radically alters the implications of Disney's princess films and breaks open multiple possibilities of meaning surrounding female-centered relationships, identity, agency, and power.

Leah Leonard, Biological Sciences

Faculty Mentor: Laura Reed, Biological Sciences

*Genotype-by-Diet Interactions for Body Weight in *Drosophila melanogaster**

Obesity is a growing problem in today's society, especially in the United States. *D. melanogaster* is a good model organism to study the genotype-by-diet interactions, which we expect play a role in the symptoms commonly associated with obesity. By performing round robin crosses on recombinant

inbred lines, our experiment focuses on differences in the specific phenotypes of *D. melanogaster* when fed a normal vs. high fat diet. By comparing the dark pupae weight of crosses raised on a high fat vs. normal diet while considering their specific genomes, we were able to identify a list of several quantitative trait loci (QTLs) that contribute to body weight. After studying these QTLs, particular genes that showed more extreme results on either diet were selected for further study and experimentation with the crosses. Our research continues to search to help us better understand the role of the genetic and environmental interactions on the precursors to type-2 diabetes, such as obesity.

Jason Lewis, Political Science

Faculty Mentor: Daniel Levine, Political Science

Negative Externalities and Land Market Operations in Mandate Palestine

**International focus*

A unique environment was created with the mandate for Palestine following WWI (1919-1939). The introduction of colonial rule and market forces, as well as the added nuance of establishing a "Jewish National Home" affected the British, Arab, and Zionist populations in very different ways. These three groups frequently interacted within the land market, where property was transferred from Arabs into Zionist possession. While varying degrees of political and economic sovereignty existed between the three communities, in the absence of an uncontested sovereign authority in Mandate Palestine, market forces ultimately exercised control over land transactions during the mandate. Utilizing two case studies and other print sources, my presentation will identify the three main actors' motivations, actions, and interactions within the land market. My research concludes that the land rights of the Arab Fellahin were undermined by Zionist and British colonial ambition. This negative market externality was a result of British unwillingness or inability to enforce market regulation, the unequal political and economic representation of the Zionists, and the Arab community's ineffectiveness in organization. This research is pertinent to understanding the effects of market implementation and land privatization. In addition, this research helps the audience understand the effects of a dual-colonial state, economic inequality, and differences in access to political power between ethnic groups.

Emily Liang, Biological Sciences

Brian McWilliams, Biological Sciences

Faculty Mentor: Matthew Jenny, Biological Sciences

Faculty Mentor: Ryan Earley, Biological Sciences

Age and Sex Effects on Learning and Memory in Zebrafish

Alzheimer's disease is the most common form of degenerative dementia, affecting one in nine Americans over 65 as of 2013. It causes significant cognitive impairments to memory and thinking, and eventually leads to death. Recent postmortem studies have shown that Alzheimer's patients have an abnormally large load of herpes simplex virus type 1 in the brain, which may constitute a key environmental factor that contributes to the onset of Alzheimer's. This project focused on validating the zebrafish as a powerful animal model to study age- and sex-related effects of herpes on cognitive impairment. The long-term goal is to compare the cognitive deficits of aging in healthy zebrafish against a transgenic strain modified to conditionally express herpes virus genes in neural tissue. The current objective is to establish a baseline of learning capability in healthy zebrafish across a range of ages and between sexes using simple associative learning, pairing a cue with a food reward. Preliminary data collected thus far indicates that cohorts of 8 and 12 month old female zebrafish showed significant learning ability. However, the 12 month old female zebrafish were not able to retain the skill for the same length of time as the 8 month old fish, suggesting an age-related difference in memory. If the zebrafish model can be validated, this could have a significant impact on our understanding of the causes of Alzheimer's disease and lead to the development of possible treatments.

Katherine Love, Psychology

Faculty Mentor: Dr. Jeffrey Parker, Psychology

The Role of Body Image in Early Adolescents' Vulnerability to Friendship Jealousy and Aggression

Numerous studies document the concerns that youth of both sexes express over their body shape and weight, particularly in early adolescence. Negative body image has been implicated in past research in the etiology and maintenance of eating pathology and in internalizing symptoms such as depression. However, much less is known about how body image affects adolescents' social relationships, particularly the selection and maintenance of friendships. In the present study, we explore the role of body image in adolescents' vulnerability to friendship jealousy and aggression. We propose that negative body concerns heighten early adolescents' vulnerability to jealousy and aggression by increasing their sensitivity to approval and acceptance by friends and peers. This study examined 72 early adolescents (39 girls) ranging in age from 10 to 15 years. Participants completed a battery of questionnaires including standardized measures of friendship jealousy, contingent self-esteem, body esteem, aggression, and self-reported height and weight. As predicted, negative body esteem related to greater vulnerability to jealousy, relational and physical aggression. Results and implications for future research are presented in this study.

Gabrielle Lowery, Geography

Faculty Mentor: Sagy Cohen, Geography

Suspended Sediment and Turbidity in the Black Warrior River

Using samples collected in the Black Warrior River, this project attempts to find a correlation between the level of suspended sediment and the turbidity of the river. Using samples collected daily a vial of water is tested using a hand-held turbidity meter. The rest of the water sample is filtered through a previously weighed piece of filter paper, set to dry, then weighed to find the density of the sediment. The weight of the sediment over the volume of the water sample gives amount of suspended sediment. The results of this research can be used in later research projects to predict the level of suspended sediment in a water sample using just the turbidity.

Thomas Ludwig, Chemical and Biological Engineering

Faculty Mentor: C. Heath Turner, Chemical and Biological Engineering

Molecular Simulation of Ionic Liquid-Bismuth Telluride Interfaces

Thermoelectric materials, which can effectively create an electric potential in the presence of an external temperature difference, are of interest for a variety of applications. Bismuth telluride is one of the most efficient thermoelectric materials known, and recent experiments have shown that nanostructures of bismuth telluride have greater thermoelectric efficiency than in the bulk material. One proposed way of synthesizing bismuth telluride nanosheets is by exfoliation of bismuth telluride crystals in ionic liquid solutions. In this project, molecular dynamics computer simulations were used to investigate ionic liquid-bismuth telluride interfaces. We have found that the kinetics of the process are temperature-dependent, and that higher temperatures result in more rapid exfoliation. Also, by analyzing the density profile of each component of the liquid, we have derived information about the structure of the interfacial layers formed around the bismuth telluride surface that can be compared to experimental data for verification. The electrostatic environment of the bismuth telluride has been numerically simulated in order to understand the effects of electrostatic forces on the exfoliation process. In this research effort, we hope to accelerate the experimental search for the most effective, economic solvents for the exfoliation process.

Nikolaus Luhrs, Electrical and Computer Engineering

Gatlin LaRochelle, Electrical and Computer Engineering

Faculty Mentor: Yang-Ki Hong, Electrical and Computer Engineering

UHF Ferrite Antenna for Unmanned Aerial Vehicle (UAV) Applications

UHF antennas can be further miniaturized by utilizing the permeability and permittivity of ferrite. Such miniaturization is due to the decreased wavelength in the ferrite resulting from increases in both permeability and permittivity. Accordingly, we have fabricated a miniature ferrite antenna having high directivity for unmanned aerial vehicle applications. For this project, we constructed a wireless communication system to compare the signal quality of a ferrite antenna to that of an air core antenna. The fabricated ferrite antenna has a helical winding radiator with a diameter of 14mm and height of 18mm giving a volume only 25% that of the air-core antenna (28mm in diameter and 18mm in height). High directional radiation along the axis of the helix was confirmed for both antennas through antenna gain measurements in an anechoic chamber. Accordingly, each antenna was mounted in the direction offering maximum gain for wireless image analysis. Peak-signal-to-noise ratio (PSNR), expressing the signal fidelity, was measured for the ferrite and air-core antennas. It was found that the received image quality, in terms of luminance and chromaticity, by the ferrite antenna was better than that by the air-core antenna. Therefore, high-performance and reliable wireless communication can be more easily realized with the miniature ferrite antenna as compared to the high volume air-core antenna. We will demonstrate how antenna design affects the quality of wirelessly transmitted data.

Jonathan M. Norris, Journalism

Faculty Mentor: George Daniels, Journalism

Miss Sorority Row

Miss Sorority Row is an annual event hosted by the Delta Sigma Phi Fraternity at the University of Alabama. This event is designed to raise awareness of Greek philanthropic efforts with the proceeds going to the West Alabama Red Cross. Since its creation in 2008, the event has raised over \$80,000. The event follows a beauty pageant format and is open to all panhellenic sororities on campus. Each contestant is scored on: display of school spirit; performing a talent; evening gown; and responding to an interview question about their sorority's philanthropic activities. The winning sorority receives 25% of the money raised to go to their designated charity; 15% to second place; 10% to third place.

Yanet Manresa, Biological Sciences

Hillarie James, Biological Sciences

Faculty Mentor: Christopher Lynn, Anthropology

The Effects of Rap Music on Evolutionary Attitudes and Literacy

**International focus*

Baba Brinkman is a Canadian rapper who recently performed, as part of the ALLELE series, on the University of Alabama's campus. The captivating October performance featured "peer reviewed" songs about evolution. Brinkman and a professor at a largely creationist university in the UK hypothesized that perhaps Brinkman's performance might have a positive impact on students' understanding and acceptance of evolutionary theory. They distributed the Evolutionary Attitudes and Literacy Survey to 91 students, each of whom should have taken a pre-, post-, and retention survey before and following the performance. Although we hoped for a positive impact, upon analyzing the data we found little correlation between evolutionary understanding and the performance. This may be due to the size and strong religious bias of the sample group.

Caitlin Marsh, Biological Sciences

Faculty Mentor: Julie Olson, Biological Sciences

Diversity of Biosynthetic Genes Associated with Symbiotic Bacterial Communities

Symbiotic bacteria produce bioactive compounds that are often utilized by the host, human or animal, for chemical defense. However, little is known about the ecological role of these secondary metabolites in situ. This study evaluated cell-free supernatants from bacteria associated with the external surface of native and invasive lionfish, *Pterois volitans*, using antimicrobial assays. Antimicrobial activity against common fish pathogens was found in over one third of the isolates. Based on these results, molecular techniques were used to test the diversity of secondary metabolite biosynthetic genes in both antimicrobial compound-producing and non-producing isolates. Genes within nonribosomal peptide synthetases (NRPS), a diverse group of secondary metabolites, were amplified using degenerative primers via PCR. The amplified products were then digested using EcoRI, and the resulting banding patterns were examined to determine the diversity of NRPS genes within the isolates. Surprisingly, antimicrobial compound-producing and non-producing isolates shared similar NRPS genes, suggesting that expression of these genes may be regulated by environmental factors.

Marissa Marshall, Capstone College of Nursing

Maria Mizerany, Capstone College of Nursing

Kayla Manning, Capstone College of Nursing

Raven McWilliams, Capstone College of Nursing

Faculty Mentor: Michele Montgomery, Capstone College of Nursing

Accidental Poisoning: Lake View, Alabama

Health promotion is necessary for a community to be successful and grow in a healthy manner. There are multiple major health concerns that are shared across Tuscaloosa County. However, accidental poisoning has become a recent epidemic and a major public health concern. Statistics show that accidental poisonings in the U.S. account for 10.7% of all deaths, per year. In the Lake View community of Tuscaloosa County, accidental poisonings account for 24.3% of all deaths, per year. Accidental poisoning can be defined as any substance that interferes with normal body functions after it is swallowed, inhaled, injected, or absorbed. Poisoning due to both prescription and non-prescription drugs has become a major health concern in the Lake View community. These medications can harm the body if taken in large quantities or with other medications that could cause adverse reactions. In order to prevent this number of accidental poisonings in the community, teaching must be done to educate members of the dangers of pharmaceuticals when used incorrectly. Through the initial windshield survey, research, data collection, and analysis, interventions were determined to help lower the incidence against accidental poisonings in the Lake View community. This presentation will show a community assessment of Lake View including strengths and weaknesses and the major health problem of accidental poisonings will be defined with interventions stated to help promote healthier living and prevention.

Caroline Mayberry, Psychology

Faculty Mentor: John Lochman, Psychology

Leaders in Deviant Peer Groups: A Study In Childhood Characteristics

The topic of leadership in children's deviant peer groups is not a well-researched one. Some prior studies have shown a negative correlation between aggression and perceived leadership in peer groups. The current study looks at the leadership behaviors and characteristics of children in more and less concentrated aggressive peer groups in 4th-5th grade. The research project involved looking at data previously collected in a study on aggression intervention groups. 98 children from 10 elementary schools in southern suburban communities ranging from 9-11 years of age were studied. The researcher hypothesized that less aggressive children will be viewed as leaders in their peer groups, and that more aggressive children will be seen as leaders in groups more concentrated with aggressive children.

Jessica Mays, Anthropology

Faculty Mentor: Matthew Wolfram, Anthropology

The med-science "we" and the pre-med "you": The classroom socialization of pre-med student identity

This poster documents the role of pronoun use in classroom discourse in the process of pre-med student identity formation. For this research, I employed a software called Transana to analyze and transcribe video recordings of teacher-student interactions in a pre-med college classroom. The lecture recorded was in an Honors seminar course pertaining to obesity and diabetes. The instructor, a medical doctor and professor of public health, employs distinct uses of "you" and "we". The use of "we" signifies solidarity within the medical system and situated the professor and her students within a linear and progressive concept of the history of medical knowledge. The use of "we" can also signify solidarity with the instructor and class. When the instructor uses "you" to the pre-med class, she is referring to the potential futures of the students as possible clinicians. "You" also separates the instructor from the students. From the data, I argue that the professor projects a concept of the medical community onto students and socializes the students with a pre-med identity by including them within the clinical profession.

Sarah McFann, Chemical and Biological Engineering

Faculty Mentor: Anthony Arduengo, Chemistry

Characterization of Picolinium Quinodimethane under Electro-Optic Device Conditions

Over the past decade, much attention has been paid to the discovery and application of organic electro-optic materials. These materials typically consist of easy-to-synthesize dyes (i.e. chromophores) and are intended to replace expensive inorganic crystals currently used to produce nonlinear optical (NLO) responses. During testing of electro-optic devices, however, it has been observed that materials composed of chromophores tend to lose their NLO properties over time. Although efforts have been made to reduce the chromophores' tendencies to clump and lose alignment, a contributing factor to the loss of NLO properties, little attention has been paid to the chemistry surrounding the chromophores themselves, which may be at the root of the problem. To counter this, picolinium quinodimethane (PQDM), a chromophore showing high potential for integration into electro-optic devices, was synthesized and characterized. Synthesis and characterization of the structural relatives of PQDM was attempted in order to explain irregular PQDM behavior observed during electro-optic device testing.

Erin McMinn, Biological Sciences

Emily Peel, Biological Sciences

Faculty Mentor: Janis O'Donnell, Biological Sciences

The Effects of the Common Soil Bacteria, S. venezuelae on Drosophila melanogaster

Parkinson's disease is characterized by the loss of dopamine neurons, tremors, bradykinesia, and rigidity. The disease has been correlated with both genetic and environmental factors. Past studies have shown links between the disease and rural lifestyle as many rural inhabitants participate in farming activities and/or drink well water by which they are exposed to harsh agricultural chemicals and other contaminants in the soil. Recent studies in *C. elegans* have shown that the common soil bacteria, *Streptomyces venezuelae* (a gram-positive bacteria) is associated with disease pathology. Interestingly, these bacterial cells can release secondary metabolites that are toxic to other organisms. Specifically, in *C. elegans*, *S. venezuelae* has been shown to cause truncated life span, mitochondrial dysfunction, and the production of reactive oxygen species. The purpose of our study is to determine the effects of the bacteria on the fruit fly, *Drosophila melanogaster*. Here we show that when the fruit fly is exposed this bacterial toxin, it exhibits a reduction in survival, loss of dopamine neurons, and poor locomotive function.

Michelle Meadows, Human Nutrition and Hospitality Management

Carlie Robertson, Human Nutrition and Hospitality Management

Kyle Parker, Human Nutrition and Hospitality Management

Margit Sample, Human Nutrition and Hospitality Management

Faculty Mentor: Lori Greene, Human Nutrition and Hospitality Management

Diet Trends, Food Availability, and Obesity Risk among Low-Income, Minority Children: A Review

Children of low-income, minority populations are likely to have low availability to dietary selections, with or without the presence of food security. Lack of food availability and resulting dietary trends are believed to increase obesity risk during childhood. The purpose of this study was to assess the correlation between dietary trends, food availability, and obesity risk among low-income, minority children. Topic related literature published in the year 2001 to 2013 was collected for assessment. The target population was low-income, minority children of African American and Hispanic ethnicities. Diet content of children trended toward a lower intake of fruits, vegetables, vitamins (vitamin D and calcium), and minerals (iron and zinc). Total intake varied among gender and ethnicity. Substitutions for these dietary selections were in the form of sugary drinks, high fat foods, and high sodium content foods. The relationship between the lack of fruit/vegetable intake and these substitutions positively correlated to obesity risk. A higher intake of fruits/vegetables and more normal body mass index was established in English speaking children as compared to non-English speaking children. The relationship between food availability and obesity risk showed food insecure children were subject to a higher risk for obesity than food secure children. Results suggest a positive correlation between dietary trends/food availability among low-income, minority children and obesity risk.

Hannah Medders, Psychology

Kimberly Still, Psychology

Faculty Mentor: Jason Scofield, Human Development and Family Studies

Language and Shape in Children's Categorization: A multimodal approach

We examined preschool children's (i.e., 3-, 4-, and 5-year-olds) categorization tendencies across multiple sense modalities and in various language conditions. Each child (n=72) was given a target object either to see or to touch, was given a description of the object, and was shown two test objects (one with a matching shape, one with a matching texture). The child was then asked to select which object is in the same category as the one they were seeing/feeling. In the "shape" trials, the target object's shape was highlighted (i.e., "What you're seeing/feeling is a round ball"). In the "texture" trials, the target's texture was highlighted (i.e., "What you're seeing/feeling is a fuzzy ball"). Finally, in the neutral condition, no feature was highlighted (i.e., "What you're seeing/feeling is a neat ball"). Findings revealed that children most often categorize objects by shape, regardless of sense modality or language; however, descriptive language can intensify or mute the attention given to shape as the primary means of categorization.

Spinks Megginson, Telecommunication and Film

Kelly Hite, Telecommunication and Film

Katie Malone, Telecommunication and Film

Megan Breese, Telecommunication and Film

Faculty Mentor: Chandra Clark, Telecommunication and Film

Tuscaloosa Arts & Beverages

Over the past several months, our small group of TCF students has worked with the Tuscaloosa Tourism and Sports Commission (TTSC) to promote art museums and local bars across the city. We have developed a 'new media-based' strategy to help TTSC catapult their website and social media platforms into the lives of more people both in Tuscaloosa and across the nation. We have done this by visiting

numerous local bars and restaurants to develop a photo essay filled with information about signature beverages. In addition, we've harnessed the power of social media to reach a new, diverse audience that will surely bring more revenue to the art museums and bars of Tuscaloosa. We also have worked with traditional media outlets to promote Title Town through radio PSAs and videos. While Tuscaloosa rolls with the Tide year-round, our city has plenty to offer outside of football season. Our team is showcasing all of that and much more. We would be honored to present how we have done this throughout the semester.

Theresa Mendez, Anthropology

Faculty Mentor: Matthew Wolfgram, Anthropology

"That's totally normal!": The discourse of "normal motherhood" in a La Leche League meeting

My research focuses on how women in a Tuscaloosa La Leche League breast feeding group construct their own ideas of what is normal in relation to breastfeeding and early motherhood. The research is based on a detailed analysis of observations and video recordings of meetings, and on unstructured and semi-structured interview materials collected from the participants. I identify three discourse-ideological processes that the participants employ to construct their particular sense of what is normal, especially in opposition to the "other normal" of mainstream society. These processes are evidenced in the interview and observational transcripts and include (1) the use of the progressive verb tense and time words to construct a sense of the group's breast-feeding practices as situated in a normative time-frame, (2) the use of language of desire and self to foreground the mother's own subjectivity as a basis of what should be considered normal, and (3) the use of words indicating mother-child needs, including what is easiest and works for them, to frame the ideology of the group as a rational-pragmatic response to the considerable pressures and labors of modern motherhood. I argue that through these discourse-ideological processes the women construct an emergent counter-mainstream normative position-a "new normal"-which is specific to the ideology of the La Leche League.

Sean Mendez, Biological Sciences

Faculty Mentor: Laura Reed, Biological Sciences

TreadWheel - Novel Exercise Apparatus for D. melanogaster.

Obesity is one of the dramatic health issues affecting this country and exercise is a well-established intervention strategy. While exercise by genotype interactions have been shown in humans, overall little is known. Using the natural negative geotaxis of *D. melanogaster*, an important model organism for the study of genetic interactions, a novel exercise machine, the TreadWheel, can be used to shed light on this interaction. Using this machine, we are able to assess large cohorts of genetic lines for their response to exercise. We have measured their triglyceride, protein, and glycogen content as well as climbing ability and respiration rates, and generally find that exercised flies are more fit than unexercised flies.

Jordyn Merriam, Chemical and Biological Engineering

Faculty Mentor: Laura Reed, Biological Sciences

Effects of the Mediterranean Diet on Metabolic Phenotypes

People in the Mediterranean region tend to experience increased life spans and reduced risk of cardiovascular disease, diabetes, and other chronic diseases. This may be due to a diet where nuts and olive oil are the main sources of fat. I am modeling Mediterranean diet in *Drosophila melanogaster* to evaluate if the phenotypes of increased longevity and reduced risks of chronic diseases like diabetes are diet related. I will focus specifically on the effect of unsaturated fat; therefore diets high in olive and walnut oil will be tested. The effects of saturated fat will be measured with food made with coconut oil. For each of these diets, 1.5% oil will be added to the normal food. Phenotypes resulting from these

three diets (olive, walnut, and coconut oil) will be compared to a normal laboratory diet. First instar larvae were collected and placed in groups of 50, for density control, into 10 mL of each dietary treatment. The metabolic pools of 3rd instar larvae were tested for glucose, triglycerides, and glycogen, corrected for protein content. Pupae were measured for survival, development time, and weight. Lifespan for of adults raised on the dietary treatments was also recorded. We observed significant diet effects on these phenotypes.

Sean Miller, Chemistry

Faculty Mentor: David Dixon, Chemistry

Comparison of Gas-Phase Acidities of Phosphorylated and Unaltered Amino Acids

The gas-phase acidities (GAs) of ten phosphorylated amino acids have been calculated using the reliable correlated molecular orbital theory G3MP2 method to develop anionic proteomic approaches. Extensive conformational sampling was performed using density functional theory (DFT). The most stable anion resulted from deprotonation of the phosphate group except for phosphotyrosine which generated the carboxylate anion. Multiple strong hydrogen bonds are present in the most stable phosphorylated amino acid neutral and anionic structures. The GAs of the phosphorylated amino acids range from ~13 kcal/mol to ~35 kcal/mol more acidic than the corresponding non-phosphorylated amino acids.

Charles Millirons, Chemical and Biological Engineering

Faculty Mentor: Ryan Earley, Biological Sciences

Consistent individual differences in behavior: do certain personalities confer greater fitness?

Behavior has major implications for individual fitness. Behaviors differ consistently from individual to individual, which means that each individual has its own personality that may or may not be adaptive in its environment. We used the mangrove rivulus fish (*Kryptolebias marmoratus*) to evaluate the relationship between personality and fitness. Populations of mangrove rivulus are genetically diverse but each genotype has the ability to essentially 'clone' itself. This allows the testing of many genotypes and multiples of the same genotype. To determine whether consistent individual differences in behavior exist, we will examine within- and among-clone variation in aggression, risk-taking, and the ability to escape threat. Then, individuals will be placed in two different environments, in which the genotypes will interact with one another. The "no selection" tank will contain enough water and crab burrows (a refuge for rivulus) for all individuals to swim freely. A "strong selection" tank will have the water level lowered on a tidal cycle to create an environment where rivulus must compete for access to crab burrows. After one year, survival and reproduction will be quantified for each genotype using microsatellite analysis, and changes in allele frequencies will be assessed. Our prediction is that the most aggressive, risk-prone individuals that possess a greater ability to escape will be able to survive and reproduce more effectively in the strong selection environment.

Max Mittenthal, Chemical and Biological Engineering

Faculty Mentor: Robin Rogers, Chemistry

Enhanced membrane transport of ionic liquids using a polyethylene glycol based counter-ion

Ionic liquids (salts with melting points below 100 °C generally, but constrained to under 37 °C, or body temperature, for this application) containing active pharmaceutical ingredients alleviate many problems inherent in solid state drugs, and add allow tuning of the physical, chemical, and biological properties. However, due to the fact that salts by nature contained charged ions, ionic liquids often cannot cross the skin membrane effectively, and are unable to benefit from advantages of transdermal drug delivery. In this study, we have shown that by using polyethylene glycol-based counter-ions, we can increase the rate of membrane transport for pharmaceutical ionic liquids. Polyethylene glycols, known to be safe and effective excipients, were incorporated into ionic liquids by appending an ionizable amine functional

group. Salicylate was chosen as the active pharmaceutical ingredient due to its low pKa and high melting point (leading to a need to be formulated as a liquid to cross a skin membrane), as well its use in commercial ionic liquids, such as choline salicylate. Novel salicylate salts were synthesized and characterized, and membrane transport experiments were conducted via Franz diffusion cells. This presentation will discuss the concepts and chemistry which could lead to the ready tunability of many active pharmaceutical ingredients.

Allison Montgomery, Chemistry

Faculty Mentor: Marco Bonizzoni, Chemistry

Simulants of intermolecular interactions in PAMAM dendrimers

Polyamidoamine (PAMAM) dendrimers are a common class of dendrimers suitable for biotechnology applications, such as the assembly of drug-delivery vectors. These large molecules consist of an alkyl-diamine core and tertiary amine branches. However, due to their sheer size, these complex molecules are inherently difficult to study.

The purpose of this project is to construct model compounds to better study the intermolecular interactions within the PAMAM family. The first compound we tackled is a smaller dendrimer simulant that contains the same functionalities, including a tertiary amine, an amide, and a primary amine, in the same arrangement as a full-sized PAMAM dendrimer. The steps of simulant synthesis include a Michael addition of diethylamine to ethyl acrylate and the amidation of the subsequent ester using a protected form of ethylenediamine. We have also designed a series of similar molecules in which one functional group is removed at a time, in order to determine the role of each interaction moiety in the original dendrimers. We will then study the binding of these molecules through optical spectroscopy as well as use calorimetry (ITC) to pinpoint the nature of intermolecular interactions.

Joshua Moon, Chemical and Biological Engineering

Faculty Mentor: Christopher Brazel, Chemical and Biological Engineering

Computational Heat Transfer Modeling for Magnetic Hyperthermia Treatment of Cancer

Magnetic hyperthermia is a novel cancer treatment technique that selectively targets cancerous tissue with ferrous nanoparticles and heats the tumor via an applied magnetic field to a temperature necessary to kill the cancer cells. One of the experimental challenges of evaluating the effectiveness of this treatment involves the difficulty of accurately measuring the heat profiles inside the tissue. The goal of this project was to create an algorithm to simulate three-dimensional temperature profiles inside tissue to determine correlations between a variety of physical parameters and the effectiveness of the treatment method. The algorithm used optimized sparse-matrix functions in the Python language and the Pennes Bioheat equation to solve a finite difference model to predict the transient thermal profiles for the system. One of the most significant results showed that a minimum tumor size on the order of one centimeter is required to reach the minimum critical temperature for cell death, thus predicting an inability of magnetic hyperthermia to treat very small tumors. Future goals involve expanding the model to include discrete vasculature as well as more complex geometries.

Victoria Moore, Biological Sciences

Faculty Mentor: Jennifer Howeth, Biological Sciences

Measuring Seasonal Lake Zooplankton Community Dynamics with Emphasis on Daphnia lumholtzi

This study aimed to understand seasonal dynamics in two lake zooplankton communities with the invasive species *Daphnia lumholtzi*. Emphasis was given on *Daphnia* and how the invasive *Daphnia lumholtzi* may have different temporal density dynamics from native *Daphnia* and other zooplankton in the two lakes. Holt Lake and Nicol Lake in Tuscaloosa, Alabama were sampled monthly for zooplankton from August 2013 to February 2014, except in November. Each lake zooplankton sample was identified

and enumerated to determine the species richness and abundance of zooplankton. The results showed that *Daphnia lumholtzi* was not present in Lake Nicol over the sampling period. Native zooplankton species richness and *Daphnia lumholtzi* densities in Holt Lake were positively correlated over the sampling period. During late Fall in the Holt Lake *Daphnia* community, native *Daphnia* densities declined while *Daphnia lumholtzi* densities increased. This trend suggests that *Daphnia lumholtzi* is a poor competitor with native *Daphnia* during the late summer months. The results suggest a negative relationship between native zooplankton and the presence of invasive *Daphnia lumholtzi*, indicating temporal niche partitioning possibly in response to temperature, competition, or fish predation.

Stephanie Morris, Computer Science

Faculty Mentor: Richard Swatloski, AIME, Technology Transfer

Database Integration and Data Analysis

The purpose of this project is to continue working with the Office for Technology Transfer. In previous semesters, I have helped organize OTT's patent information so that they could better serve the inventors of the University of Alabama. The way we approached this was to implement a database to help store and access key information on patents, the inventors, and comments from any potential investors or other contacts. Now we are changing platforms for this database and refining it further.

Katelyn Moss, Anthropology

Faculty Mentor: Philo Hutcheson, Educational Leadership, Policy and Technology Studies

The Politics of Charter Schools: A Case Study in the State of Alabama

While there is a significant amount of literature available about the school choice movement within the United States, currently, there does not seem to be any comprehensive history of the movement and how it has functioned within the state of Alabama. As one of eight states in the U.S. that has not adopted charter schools, in the future, if the school choice movement continues to gain momentum, there are foreseeable changes in the structure of the Alabama Public School system. While, without a doubt, the arguments for and against charter schools will be key components of the rhetoric surrounding the charter debate, the focus of this research is more so about why charter schools do not exist and less about whether or not charter schools are a good practice. Within this research, I hope to determine what cultural, economic, and political factors are at play and influencing the decisions of policymakers across the state.

Samanta Mukkamala, Biological Sciences

Faculty Mentor: Stevan Marcus, Biological Sciences

The huntingtin interacting protein 1 homolog, End4, is essential for mitochondrial stress response induced by the anti-tumor drug avicin G in Schizosaccharomyces pombe

The huntingtin interacting protein 1 (Hip1) homolog End4 is required for endocytosis, normal actin cytoskeletal organization, and normal cell morphology in fission yeast *Schizosaccharomyces pombe*. Treatment of wild type *S. pombe* with a tumor inhibitory drug avicin G induces formation of multi-septated and morphologically aberrant cells. Multi-septated cells consist of two or more necrotic cell segments and a single terminal cell segment that is normal in appearance, while non-septated cells frequently produced optically dense caps at one or both cell tips. These caps, necrotic cells, and cell segments are invariably enriched for mitochondria and reactive oxygen species (ROS) but not in the healthy cells. This suggests that avicin G induces a stress response in which damaged mitochondria are asymmetrically partitioned to protect cells from oxidative stress. In order to investigate the effects of avicin G on mitochondria end4^Δ strain, which has been shown to be hypersensitive to avicin G, end4^Δ was crossed with an *S. pombe* strain carrying an sdh2-GFP fusion gene. Unlike wild type *S. pombe*, when the end4^Δ sdh2-GFP strain was treated with avicin, cells were unable to partition their mitochondria

and high levels of ROS were detected throughout the cell, even in septated and multi-septated cells. Our findings demonstrate a central role for End4 in the cellular response to avicin-induced mitochondrial stress in *S. pombe*.

Peter Mullins, Chemistry

Faculty Mentor: Robin Rogers, Chemistry

Understanding Amidoxime Selectivity for Uranium through Coordination Studies

Peter H. K. Mullins, Patrick S. Barber, Steven, P. Kelley, and Robin D. Rogers

With the current issue of limited fossil fuels and the effect of their use on environments around the globe, other sources of energy are being increasingly utilized, including nuclear energy. For the last 60 years, extracting uranium from seawater has been researched due to uranium's high value and abundance (1000 times more abundant than terrestrial reserves). Extracting uranium from seawater provides a significant challenge because of the complicated nature of interfering species and low concentration. Through sponsorship of the Department of Energy Office of Nuclear Energy's Nuclear Energy University Program, our group is investigating the use of chitin nanomats functionalized with a highly selective ligand, amidoxime, for the extraction of uranium from seawater. Though amidoxime is the most used ligand studied for this application, few studies have been done to understand the nature of its selectivity for uranium. This project's aim is focused on understanding the interactions and bonding between amidoxime with uranium and the competing metal ions (such as vanadium) in seawater providing fundamental information towards designing more selective and efficient extractants for uranium.

Clarence Mullins, Chemistry

Faculty Mentor: Kevin Shaughnessy, Chemistry

Design of phosphines as ligands for the palladium-catalyzed arylation of malonates

The cross-coupling of aryl chlorides and bromides with malonates without the use of an activated-carbon-leaving-group is especially useful to organic synthesis in terms of time conservation and the lessening of waste byproducts. In order to achieve this, a phosphine ligand with a palladium catalyst is used to allow an aryl halide to complex and form a ligated-arylpalladium complex. Reductive elimination subsequently completes the reaction and results in a new carbon-carbon bond between the malonate and the aryl substituent. The challenges associated with this reaction lie in the stability of the malonate anion and its ability to chelate with the palladium complex, therefore creating a stabilizing effect and slowing reductive elimination. To counter this effect, the phosphine DTBNpP (di-(tert-butyl)neopentylphosphine) was used due to its relative steric hindrance. The steric bulk associated with this phosphine is enough to allow reductive elimination to occur without hindering the ability of the catalyst to react with the malonate, resulting in high yields and successful determination of how steric hindrance effects the process of reductive elimination.

Dave Nearing, History

Faculty Mentor: John Beeler, History

Remarks on the Arctic Whale-Fishery, 1611-1783 With an Econometric Productivity Analysis of British Arctic Whaling Ports 1770-1775

**International focus*

The history of arctic whaling is a history not only of whales, ice, men, and ships, but also of numbers- of tons, tuns, gallons, pence, and pounds. For those brave enough to plumb the depths of the historical record on the subject, there exists a wealth of data regarding most every aspect of the industry. Unfortunately, the statistical analysis and long hours spent poring over logbook and ledger required to interpret the available data almost inevitably makes the study of the whaling industry a decidedly more

difficult task than might first appear. In short, while there is a great deal of statistical information available about the industry over time, the effort required to organize, develop, and above all to interpret the data forces the prospective researcher to limit the scope of the data analyzed, and in doing so to leave the better part of the data unexamined out of necessity. In this study, the methodology applied by Lance Davis, Robert Gallman, and Karin Gleiter in *In Pursuit of Leviathan: Technology, Institutions, Productivity, and Profits in American Whaling, 1816-1906* has been partially applied to a limited set of heretofore unrefined regarding British whaling efforts in the Arctic fishery during the eighteenth century in order to determine which British whaling ships and ports were most productive over the period 1770-1775.

Molly Neeb, Human Nutrition and Hospitality Management

Becky McGuigan, Human Nutrition and Hospitality Management

Kaylie Booth, Human Nutrition and Hospitality Management

Cindy DeVoe, Human Nutrition and Hospitality Management

Faculty Mentor: Lori Greene, Human Nutrition and Hospitality Management

Exploring Nutritional Interventions and Their Impact on the Quality of Diet in College Students

The aim of this study was to further investigate which nutritional interventions decrease the likelihood of weight gain in college students. Articles were obtained and reviewed from EBSCO, Scout, PubMed, and other peer reviewed databases. In studies that studied nutritional intervention techniques, college students were found to respond favorably to visuals that showed accurate serving sizes and were interactive. These interventions were perceived as a more effective way of positively changing dietary habits as opposed to those that were complex and computer based. Food models allowed the student to cognitively make note of their daily eating habits and the recommended portion sizes leading to healthier choices. In-person interventions conducted through nutritional education courses showed promising outcomes of improving healthy behaviors, which in turn lead to healthy Body Mass Index measures in college students. Educating the students on healthy, easy recipes and food choices offered on campus directly changed the student's food choices. By becoming more nutritionally aware of the foods they are consuming, students can improve their overall health. Interactive visual aids (food models) depicting serving sizes, in-person nutritional education courses, college friendly healthy recipe guides and nutrition facts for on-campus facilities were the interventions found most effective in decreasing the likelihood weight gain in college students.

Zoe Nichols, Biological Sciences

Faculty Mentor: Natasha Dimova, Geological Sciences

Assessing Anthropogenic Impacts Along the Long Valley Watershed

The amount of nutrients and pollution from anthropogenic activities in an environment can affect the microbial community. To assess the anthropogenic impacts, we monitored the aquatic microbial communities within the Long Valley Watershed in California. We found that as the water flows from high elevation to low elevation, nutrients and pollutants accumulate and change the microbial community within aquatic environments. We analyzed bacteria from water samples through different methods such as cell count, chlorophyll a analysis, microscopy, and DNA extraction. DNA extraction and PCR of the 16s RNA sequence identifies the type of bacteria and a phylogenetic tree can be made based on genetic sequences. We found that lower elevation lakes and streams contained more phytoplankton which can be an indicator of excess nutrients.

Lauren Nolan, Anthropology

Nathaniel Graham, Anthropology

Faculty Mentor: Christopher Lynn, Anthropology

Religious Signaling and Commitment in the Central Church of Christ in Tuscaloosa

This study, as a part of the overall Research Ecology study, examines how members of the Central Church of Christ signal their commitment to their religious community. This project investigates how members of differing hierarchical levels within the church display religious signaling to varying degrees. We are collecting the data through participant observation, behavioral sampling, interviewing members about their understanding of their religion, and collecting quantitative data about signaling religious commitment.

Lauren Northcutt, Capstone College of Nursing

Kaitlyn O'Brien, Capstone College of Nursing

Maura Owens, Capstone College of Nursing

Brooke Nail, Capstone College of Nursing

Faculty Mentor: Dr. Michelle Montgomery, Capstone College of Nursing

Traumatic Rates of Infant Mortality in Northport, Alabama

A community assessment was done for Northport, Alabama which is in Tuscaloosa County. The strengths and weaknesses were observed during a windshield survey. The weaknesses that stood out were as follows: obesity, smoking, limited access to healthy foods, and the lack of individuals exercising in facilities/parks. After reviewing statistics, infant mortality rate (IMR) revealed that it is a major issue. IMR is often used as an indicator to measure the health and overall well being of a community. Statistics showed significant correlation from the previously stated environmental factors to the overall health in the community, which is influencing the IMR. Several interventions should be implemented to those who are of childbearing age. Low income, lack of education on pregnancy, and no transportation are just a few major concerns that contribute to such a large issue. Environmental factors such as smoking, second hand smoking, and drinking, along with a spike in rates of teen pregnancy are major risk factors that increase the risk of infant mortality. This presentation allows individuals who live in or near Northport, AL to understand the seriousness of the IMR. A difference needs to be made to decrease the rate of infant mortality so the community of Northport can improve the lives of their babies.

Eric Nubbe, Art and Art History

Faculty Mentor: Craig Wedderspoon, Art and Art History

Nucor Children's Charity Classic Auction

A committee member representing the Nucor Children's Charity Classic, an annual benefit for Alabama's Children's Hospital sponsored by Nucor, approached my advanced sculpture class with the desire to work with us to create the big-ticket finale item for their event's auction in the fall. This item is both a trophy for the winning Nucor affiliate bidder to say they gave the most money and a great opportunity to raise money for a good cause. I was fortunate enough to propose an idea, which the committee approved to be the finale of their charity auction. Soon I will begin construction of my idea: a table top trophy version of Birmingham's Children's Hospital sporting the Children's and Nucor's logos built on a pedestal of stairs. The concept seeks to unify Nucor with their charity work for the hospital through direct combination while further emphasizing Nucor in creating the work solely from Nucor steel. By the end of the summer I hope to complete all the steel welding, cutting, and grinding needed to have a completely finished product for the auction in the fall.

Katherine O'Connor, Economics, Finance and Legal Studies

Faculty Mentor: Matt Van Essen, Economics, Finance and Legal Studies

Economic Experiments of Fair Division

Divide and Chose is a type of Fair Division that involves two players. One person, the divider, splits desired items into piles and the other person, the chooser, is allowed to pick which of the piles they

desire. This method is used to try to split the winnings fairly. The purpose of our research is to discover and observe the effects of varying amounts of given information on the decisions of the players in the games. We are accomplishing this by programming multiple treatments of an economic game and allowing subjects to participate to collect data to observe trends.

Jeyoung Oh, Advertising and Public Relations

Faculty Mentor: Yonghwan Kim, Telecommunication and Film

Digital Publics in Social Movement: How the Public Participates in Gangjeong Movement on Facebook

**International focus*

This research examines how activists and the public engage in social movement on Facebook. By analyzing a Facebook page of the Gangjeong movement in South Korea, this study investigates differences and similarities of the public's and activists' messages. The results suggest that the public has been actively participating in social movement on Facebook; both the public and activists use similar types of messages, action frames, and affective attribution in posting.

Charlotte Olson, Theatre and Dance

Faculty Mentor: Sarah Barry, Theatre and Dance

Frederick Ashton

**International focus*

This project explores Frederick Ashton's theories about dance and ballet technique. As one of the most well known choreographers in Great Britain, he has revolutionized ballet through his dedication to dance. The research analyzes his ideas through his original choreography in different genres, his life, and numerous reviews of his work throughout the 20th century. The project culminates in a new ballet piece choreographed to demonstrate Ashton's ideologies at work.

Mark Ortiz, New College

Faculty Mentor: Darren Surman, New College

Resistance Qua Recomposition: Post-Critical Reflections on Non-Capitalist Politics

**International focus*

Much of the literature pertaining to the political economy of global capitalism takes the form of either critique or praise. Though the difference between the two genres is profound, the fact remains that both generally portray capitalism as a naturally-occurring and inescapable macrostructure that dictates the architecture both of the relations of material production and those of social reproduction, with few if any noteworthy exception(s). This being the case, studies within these genres, even those that aim to inveigh against globalized capitalism, take the structural conditions of global capitalism as sine qua non. Consequently, the discursive figurations typical of critical approaches to capitalism have the contrary effect of reproducing what J.K. Gibson-Graham calls, 'capitalocentrism.' In response to this shortcoming of critique, much contemporary scholarship and activism has the explicit aim of undermining the centrality of capital while consciously searching for already-existing 'openings' within the capitalist macrostructure that contest its very laws and logics. The aim of this project is to provide a survey of this emerging corpus of literature, and to argue in support of their underlying notion: that novel political possibilities lie not in resistance to globalized capital, but, rather, in the recomposition of everyday spaces and practices to build on extant, non-capitalist 'openings' in order to destabilize the macrostructure.

Derek Overlock, Computer Science

Lumin Shi, Computer Science

Faculty Mentor: Xiaoyan Hong, Computer Science

Visualizing Underwater Sensor Networks with the Underwater Sensor Network Web Simulator

Underwater Sensor Network (UWSN) is a new network topology used to connect underwater sensor nodes together for various applications. UWSNs use acoustic signals instead of traditional, high-frequency radio channels used in terrestrial networks because of the attenuation radio signals experience underwater. UWSNs have applications and uses in several fields: scientific, industrial, and military. With demand in UWSNs growing, testing for feasibility of an underwater network is necessary. The Underwater Sensor Network Web Simulator (UWSN-WS) gives users the ability to simulate a real-world underwater networking environment to test the viability of their desired network. Users can create simulated networks via a graphical user interface web service, leveraging Aqua-Simulator's command line interface and scripts. The web service will give the user easier control of the system and provide visibility into creating a simulated environment and viewing the results. This service is intended to provide insight on how the user should build their network.

Michael Owens, Psychology

Faculty Mentor: Beverly Thorn, Psychology

Chronic Pain in Emerging Adults: Perceived Stress and Cytomegalovirus Antibody Titers

The current study examined the relationship between Cytomegalovirus (a biomarker for stress), pain catastrophizing, and perceived stress among emerging adults with and without chronic pain at the University of Alabama. There is little known about emerging adults and chronic pain despite the observed relationships between chronic pain and chronic stress in older populations. Sixty-six participants were recruited from psychology 101 classes and received course credit for their participation. The participants completed questionnaires assessing stress and pain catastrophizing and gave a blood spot. The current study hypothesized that participants with pain would perceive greater stress, report higher catastrophizing, and have significantly elevated CMV titers. Results for the present study showed an 85% exposure rate to CMV (N=47). Data analysis show that participants with pain reported higher perceived stress than those without pain. Although CMV titers were not significantly associated with experiencing pain, there was a significant positive correlation of pain catastrophizing and CMV titers after removing outliers. The results of this study support the postulated association of chronic pain with heightened perceived stress. Clinical implications are discussed.

Sydney Page, Political Science

Faculty Mentor: Elizabeth Wilson, Curriculum and Instruction

Assessing Educational Policies Addressing College Preparedness Across The United States

The purpose of this research paper is to review educational policies implemented to prepared students for college and their success rates in the major metropolitan cities of Boston, Atlanta, and Los Angeles in comparison to programs and policies implemented on a national scale. Understanding what programs work in various regions will help policy makers as well as educational advocate more aware of what college preparedness programs should be implemented and which should not. The cities of Boston, Atlanta, and Los Angeles were chosen to compare because of their similarities in terms of being metropolitan cities and because of their difference geographically across the United States. Educational policies implemented on a national scale often treat systems uniformly and do not address specific needs within each city. This case study will show how analyzing differences between cities can lead to a more informed decision in deciding what policies to implement nationally.

Mary Kathryn Patterson, Advertising and Public Relations

Faculty Mentor: Dylan McLemore, Journalism

The Hollywood Effect: An Analysis of the Collision of Global Ethos and Peripheral Cultures through Globalization, Americanization, and Identity Creation.

**International focus*

The influence of film on globalization, Americanization, and the construction of bicultural identities are examined. First, the history of the growth of globalization and how film has contributed to its success is presented. Next, we discuss Hollywood's infiltration of world cultures by increased advancements in technology and the new methods American ideals have to spread globally. The psychological consequences of globalization and Americanization are offered detailing their involvement in the formation of bicultural identities.

Abigail Paulson, Chemical and Biological Engineering

Adam Beg, Chemistry

Faculty Mentor: David Nikles, Chemistry

Magnetic Particles with a Polycaprolactone Coating and Preparation of Magnetic Micelles for Drug Delivery

Single crystal magnetite nanoparticles of varying sizes were synthesized by the thermal decomposition of iron oleate in high boiling organic solvents (benzyl ether or 1-octadecene). 3-Aminopropyltrimethoxysilane was bound to the surface of the magnetite nanoparticles to give a surface of primary amine groups. The polymerization of ϵ -caprolactone was initiated from the surface bound amines to give particles coated with polycaprolactone. These were incorporated into magnetic micelles made from poly(ethylene glycol-b-caprolactone) diblock copolymers. The particles are to be trapped in the semi-crystalline core of micelles.

Emily Peace, Music

Faculty Mentor: Andrea Cevasco, Music

Deciphering the Law: A Comparison of Music Therapy in Early Intervention Settings in Alabama and Georgia

Early intervention is a highly important program. Early intervention strategies and guidelines are rewritten each year in order to improve their effectiveness and to adhere to the No Child Left Behind Act of 2001. Though these programs and guidelines are being strongly enforced each year, the actual requirements for eligibility are not easily accessible or understandable. The eligibility requirements seem to vary from state to state, even county to county, and each state presents them in a different format. For music therapists it is important to understand the early intervention requirements as well as the state licensure necessary to practice music therapy. Music therapists also need evidence-based research to present their cost effectiveness and the benefits they provide to individuals receiving public education services. This presentation explores 1) the early intervention and music therapy licensure requirements for the states of Alabama and Georgia, 2) federal and state laws for early intervention, and 3) evidence-based research for the music therapist to utilize in clinical practice.

Carson Perrella, Chemical and Biological Engineering

Faculty Mentor: Christopher Brazel, Chemical and Biological Engineering

Polymer-Nanocomposite Gels for Magnetic Heating and Drug Release

It is proposed that magnetic fields may one day be able to trigger release of drugs in specific target tissues, such as tumors or ulcers. This research investigates magnetic heating as one such trigger for drug release. Experiments were conducted to study magnetically controlled drug delivery using γ -Fe₂O₃ magnetic nanoparticle dispersions imbedded in polymer networks. Thermo sensitive hydrogels of N-isopropylacrylamide (NIPAAm) copolymerized with other monomers such as acrylamide were created. Several gels were synthesized to maximize the content of evenly dispersed maghemite nanoparticles and evaluated for magnetic heating capabilities. Swelling experiments were performed on the hydrogels to determine their lower critical solution temperature (LCST) and response time to heat. Several gels

(containing different amounts of nanoparticles) were heated using a magnetic coil, and their temperature change and shrinking response recorded. Finally, thermally-triggered drug release experiments using both theophylline and 5-fluorouracil were performed on various gels of differing cross-link and nanoparticle dispersion ratios. Results include the ability to heat and shrink maghemite hydrogels; the magnitude of this heating and shrinking was optimized by developing hydrogels with higher concentrations of nanoparticles.

Taylor Petersen, Psychology

Faculty Mentor: James Hamilton, Psychology

A Text Analysis Study of Illness Narratives in Factitious Disorder

Factitious disorder (FD) is diagnosed among medical patients who exaggerate, feign, or induce medical problems for the purpose of enacting the sick role. Little research currently exists on this topic because people with FD are often unwilling to report honestly on their deceptions. The purpose of this study was (a) to determine whether analyses of illness narratives given by those with FD could be used to distinguish FD patients from those with legitimate medical illnesses; and (b) to learn about the nature of FD by examining any differences that emerged. This study was conducted by taking patient descriptions from online blog posts of known FD patients and comparing them to those of cancer patients. The blog posts were examined with text analysis software to find distinct word use patterns. The results showed that FD patients used more anger and social words than the cancer patients. The findings of this study support clinical impressions of FD as suffering from personality disorders in which interpersonal problems are prominent.

Hudson Pierce, Chemistry

Faculty Mentor: Kevin Shaughnessy, Chemistry

Synthesis of Air-Stable Palladium Precatalysts and Their Reactivity in Suzuki Cross-Coupling Reactions

Abstract: Palladium catalyzed cross-coupling reactions are important tools in organic synthesis. While these reactions tolerate a variety of substrates, they often require the use of air-sensitive trialkylphosphines. Previous research has shown that neopentylphosphines are useful ligands for palladium catalyzed cross-couplings due to favorable steric and electronic properties. In particular, di-tert-butylneopentylphosphine (DTBNpP) and tri-neopentylphosphine (TNpP) have been effective for Suzuki couplings under typical reaction conditions. The research focuses on utilizing two air-stable, mono-ligated palladium dimer complexes $[(DTBNpP)PdCl_2]_2$ and $[(TNpP)PdCl_2]_2$ as potential precatalysts for cross-coupling reactions. The palladium complexes were found to be effective precatalysts for Suzuki cross couplings under mild reaction conditions and low catalyst loading.

Johnson (John) Pounders, Economics, Finance and Legal Studies

Faculty Mentor: Susan Chen, Economics, Finance and Legal Studies

The Impact of the Supplemental Nutrition Assistance Program on Elderly Diet Quality

This study analyzes the effects the Supplemental Nutrition Assistance Program on elderly American diet quality. Using data from the National Health and Nutrition Examination Survey that spans eight-years, the study employs a model that compared Healthy Eating Indices of SNAP participants and income eligible non-participants. Associations between demographic and socioeconomic factors as well as SNAP participation on diet quality are documented. In models that control for whom selects into the SNAP program, associations between SNAP participation and diet quality are documented. Conclusions from the study should prove useful for making policy decisions regarding food transfer programs and their effects on the diet quality of elderly Americans.

Lauren Pratt, Anthropology

Faculty Mentor: Christopher Lynn, Anthropology

Human Evolution at the Hearth: the Relaxation Response and fire's influence on human psychophysiology

Many theorists suggest that fire played a role in developing human cognitive and psychological function; the Fireside Relaxation Study investigated the influence of its disaggregated sensory properties on psychophysiological measurements to estimate the presence of a relaxation response, the evolutionary opposite of a stress response. Blood pressure, galvanic skin response and neurological electrical activity of participants were measured during control, visual fire stimulus, and auditory/visual fire stimulus conditions; data indicated a meaningfully greater decrease in systolic blood pressure in response to the latter than either other condition. Analyses of galvanic skin response and neurological electrical activity across all phases are currently ongoing.

Michael Aston Raddatz, Chemical and Biological Engineering

Faculty Mentor: Yonghyun Kim, Chemical and Biological Engineering

Membrane Proteomics of Fluid Shear Stress-Resistant Leukemia Stem Cells

Cancer is the second leading cause of death in the United States, yet existing therapies do not adequately cure, nor manage the disease. It is postulated that this is due to the presence of cancer stem cells (CSCs). CSCs are a subpopulation of cancer cells that possess stem cell-like properties, such as self-renewal and pluri-potency. These characteristics allow the CSCs to metastasize and/or reinvigorate the cancer. Thus, CSCs are better targets in therapy. Fluid shear stress-resistant leukemia cell lines KG-1a and Kasumi-1 have been identified as containing cancer stem cell populations by the means of the marker proteins CD34 (positive) and CD38 (negative). Distinctive proteins found in one or both of these cell lines can potentially be identified as cancer cell markers, and proteins found uniquely in this duo can be explored to find the proteomic cause of shear stress resistance. Therefore, the principal objective of this project is to identify and characterize the membrane proteome. In this work, the membrane proteome was isolated via detergent-based, selective extraction, and then individual proteins were analyzed through one and two-dimensional gel electrophoresis. Finally, these distinct proteins are analyzed through the use of MALDI-TOF mass spectrometry and peptide-mass fingerprinting. When the proteomes are fully characterized, unique proteins can be identified and utilized as markers for future cancer work or novel drug targets.

Jonathan Ramos, Music

Faculty Mentor: Andrea Cevalco, Music

A Cross-Analysis of Asian and Latino Family Systems in America

**International focus*

When working in multicultural settings, it is important to maintain the distinction between being culturally attuned versus culturally encapsulated. Asian and Latino families carry many similarities in the way in which they are structured and how the individual family members interact with one another; however, generalized nuances can help shed insight into the intricate familial expectations and interactions. Both Asian and Latino families revolve around an interdependent relationship where each member of the family is expected to selflessly serve the best interests of the family over the self. Asian family systems are typically smaller, focus on a nuclear system, and are not bound by time. Latino families typically consist of larger nuclear families embedded in an extended family network. Delineation of power is similar in both cultures which focus on strong patriarchal systems with the women acting as nurturers; however, a Latino mother may use the father's authority to hold power and an Asian mother may act through the eldest son. Sibling interaction is close in both cultures and children often live at home for an extended amount of time. Cultural values must be taken in consideration when working with Asian or Latino families. Whereas the American middle class values individualism,

egalitarianism, self-determination, and future-orientation, Asian and Latino families place higher value in family interdependence, loyalty, collectivism, and cooperation.

Savannah Reach, Chemistry

Faculty Mentor: Silas Blackstock, Chemistry

An Azobenzene, Quinone Embrace

We are studying the reversible complexation of azobenzene (AB) with the electron deficient quinone 2,3-dichloro-4,5-dicyanobenzoquinone (DDQ), the former acting as an electron-donor and the latter as an electron-acceptor. A novel feature of AB is that it may exist in one of two interconvertible isomer forms, cis-AB (contracted structure) and trans-AB (extended structure), which have different shapes and electronic properties. My research is designed to test the binding of the different AB cis/trans isomers to DDQ in solution and if possible to grow cocrystals of the AB isomers with DDQ for imaging these molecular aggregates in the cocrystal state by X-ray diffraction analysis. AB/DDQ association in solution is observed optically as newly formed red and purple complexes. These complexes are detected for the trans- and cis-AB mixtures with DDQ, respectively. Concentration of the red solutions results in trans-AB/DDQ cocrystals whose X-ray diffraction structure has been determined and will be presented in detail in the poster. Attempts to cocrystallize the purple cis-AB/DDQ complexes are underway. To help visualize and imagine the dynamics of AB/DDQ cocrystal growth, a choreographed dance phrase has been written and performed and is offered as part of the poster presentation as a creative expression of the chemical process being investigated.

Kelli Reese, Health Science

Laura Freeman, New College

Faculty Mentor: Pamela Payne-Foster, Community Health Sciences

An Innovative Model to Recruit Rural Persons Living With HIV/AIDS into a Faith-Based Research Study

Background: The authors present a model used to recruit rural AAs living with HIV/AIDS into a study. Description: Researchers partnered with a local ASO in rural Alabama to conduct a World AIDS Day program focused on spirituality and wellness. The program was closed to rural AA clients living with HIV/AIDS and was conducted at a local church and included a sermon, an empowerment message, and a question and answer session. Afterwards, the researchers described the study and survey to be completed on a Samsung Slate PC captured using special software (Audio computer assisted self-interview- ACASI). Twenty seven participants completed the surveys. Objectives:

To describe a model for recruiting PLWHAs into a trial.

Methods: Survey assessed spirituality and wellness, HIV/AIDS knowledge, personal and community stigma, and demographic information.

Results: Advantages include: overall appreciation of participants with the empowerment program; comfort of participants with the open survey process; and efficiency for researchers to collect data quickly in one setting.

Challenges include: having enough resources to conduct mass surveying; and ensuring that answers were not shared.

Survey analysis of PLWHAs will be presented. Conclusions: Overall, we believe this model of combining spiritual empowerment and an open survey process with unique data collection and analysis is an efficient and comfortable method for surveying PLWHAs and may be useful for other studies in the future.

Meagan Reif, Biological Sciences

Carrie Fisher, Biological Sciences

Faculty Mentor: Stephen Secor, Biological Sciences

Testing the adaptive correlation between feeding habits and digestive physiology for snakes

Hypothesized is the adaptive correlation between feeding habits and the magnitude of intestinal responses with feeding and fasting. Infrequently feeding snakes widely regulate intestinal performance whereas frequently feeding species experience modest regulatory changes. We tested this hypothesis by comparing the postfeeding responses in intestinal function and morphology between frequently feeding Asian vine snakes (*Ahaetulla prasina*) and infrequently feeding prairie rattlesnakes (*Crotalus viridis*). We predicted that Asian vine snakes would exhibit more modest responses to feeding and that such responses would be greater for the rattlesnakes. We measure from fasted and fed snakes intestinal morphology and the activities of two intestinal enzymes. Vine snakes and rattlesnakes experienced respective 67% and 174% increases in small intestinal mass with feeding. Feeding induced 25% and 78% increases in intestinal mucosal thickness for vine snakes and rattlesnakes, respectively, in due in part to the 14% and 115% respective increases in enterocyte volume. Feeding resulted in 26% and 46% increases in the activities of the intestinal enzymes aminopeptidase and maltase for the vine snakes, and 90% and 154% increases in enzyme activities for the rattlesnakes. As predicted, infrequently feeding rattlesnakes exhibit much greater regulation of intestinal performance with feeding and fasting compared to vine snakes.

Courtney Rentas, Biological Sciences

Faculty Mentor: Kimberlee Caldwell, Biological Sciences

Phenazines cause toxicity in C. elegans neurological models

Courtney Rentas, Arpita Ray, Guy A. Caldwell, Kim A. Caldwell

It is widely recognized that bacterial metabolites have toxic effects in animal systems. One of the common classes of metabolites produced by bacterial species are redox-active exotoxins called phenazines. Phenazines have been shown to be toxic to the soil invertebrate *Caenorhabditis elegans* by causing oxidative stress, paralysis and death. The aim of this study was to further investigate the toxicity of three phenazine molecules using *C. elegans* models for cellular stress that are associated with neurological diseases. We demonstrate that these compounds cause cellular stress using fluorescent markers. Another method for analyzing cell stress is by examining protein misfolding in cells. Here we report that phenazines cause enhanced protein misfolding in the body wall muscles of *C. elegans*. Worms exposed to these phenazines also caused additional sensitivity to dopamine neurons expressing wild-type alpha-synuclein, indicating a possible defect in protein homeostasis. Addition of an antioxidant failed to rescue the toxic phenotypes caused by these compounds. Taken together, our results show that phenazines, common environmental toxicants, caused cellular stress and protein misfolding in our worm models.

Cody Rickard, Mechanical Engineering

Faculty Mentor: Brian Jordon, Mechanical Engineering

Process Effects on the Microstructure and Strength of Dissimilar Friction Stir Welded Aluminum

The need for higher energy efficiency on modern-day vehicles has driven the transportation industry to seek for weight reduction by using lightweight materials on their structures. As such, aluminum alloys seem to be a solution as they possess higher strength-to-lightweight ratios when compared to the conventionally used steels. However, the problem arises on how to join these materials since conventional joining techniques, such as the arc fusion and resistance welding results are impractical and ineffective when used for these alloys. Therefore, friction stir welding (FSW) has emerged as a suitable technology for the joining of lightweight materials. On FSW a rotating tool consisting of a pin and a shoulder is plunged into a work piece. The rotating action of the tool generates enough frictional heat to produce a plastic flow of material around the pin and thus creates a joint. Additionally, this process does not require the use of shielding gases, and lacks the fumes and high distortions associated

with convectional welding. Furthermore, the FSW allows the welding of dissimilar materials, eliminating the undesirable weight, additional cost and stress concentration areas associated with the use of rivets and fasteners. Therefore, the aim of this research is to understand the process effects on the microstructure and strength of dissimilar FSW of AA6061/AA7050 Al alloys.

Meredith Rickard, Chemistry

Faculty Mentor: David Dixon, Chemistry

From Waste to Fuels and Feedstocks: Reduction of CO₂, Using Main-Group Catalysts

The staggering amount of carbon dioxide (CO₂) produced annually has global ramifications and creates technical restrictions that dictate the viability of potential solutions. While sequestration has been proposed as a solution to this problem, an alternative that offsets the costs involved in remediation is to convert CO₂ into value-added products as is done in photosynthesis. As CO₂ is the most abundant C1 feedstock on the planet, a mild route for its conversion into methanol (MeOH) would prove to be valuable. This project investigated the following steps using computational chemistry: (1) binding and activation of CO₂, (2) reduction of the activated complex by a hydrogen gas (H₂) carrier. A third step, the release of MeOH and water followed by coordination of another equivalent of CO₂, will be studied at a later date. This will be done using frustrated Lewis pairs (FLPs), which arise when an electron pair donor (Lewis base) and an electron pair acceptor (Lewis acid) are prevented from forming a stable adduct by the size of their respective supporting substituents, as the reactive site/complex. The above calculations, including bond dissociation energies (BDEs) of selected FLPs, FLP/CO₂ complexes, and FLP/CO₂ complexes upon addition of H₂, were performed using density functional theory and ab initio molecular orbital theory.

Yesenia Rivera, Capstone College of Nursing

Zoe Pappas, Capstone College of Nursing

Natalie Perry, Capstone College of Nursing

Maggie Pilsch, Capstone College of Nursing

Faculty Mentor: Michele Montgomery, Capstone College of Nursing

Samantha, Alabama: A Focus on Nutrition

A community is a group of people that reside in a common area or place. The three components of a community include the residents, location, and the function and activities of the community. A community assessment is used to assess these three components. We had the opportunity to conduct our own community assessment in Samantha, Alabama in order to analyze the overall health and wellbeing of its citizens and their surroundings. From our assessment, we identified three major health issues that posed a risk to Samantha's community. The first issue we assessed was the low number of exercise facilities available to the community thereby promoting obesity and a sedentary lifestyle. Poor road conditions, lack of sidewalks and inadequate lighting also contribute to the lack of physical activity. Lack of physical activity can lead to cardiovascular disease, diabetes, and hypertension. The second issue assessed in the community was the high promotion of tobacco products. With tobacco products being readily available, inexpensive, and highly promoted, the risk for cancer and pulmonary diseases are significantly increased. The third issue we discovered in the community was the lack of adequate nutrition. A designated grocery store was nonexistent and poor food options are easily accessible. The majority of their food came from the local Dollar General and BP gas station. Collectively these issues have potential to increase the morbidity and mortality rates.

Kaitlyn Robinson, Human Development and Family Studies

Kelly Wilson, Human Development and Family Studies

Faculty Mentor: Maria Hernandez-Reif, Human Development and Family Studies

Cortisol (stress hormone) levels from 6 months to 1 year and their relation to infant and toddler development

The Family Interaction Project is a longitudinal study designed to find variables in early childhood that predict later development. The current analysis looked at cortisol changes over time and how it related to development. Cortisol levels (collected from saliva samples) reflect an individual's stress level, with higher cortisol readings indicating higher stress. Cortisol and developmental information was collected at 6 months and 12 months of age. Results showed that cortisol remained stable from 6 months to 12 months. Over a morning session with no stressor present, cortisol levels remained stable at 6 months and declined at 12 months. At 6 months, higher cortisol levels correlated with higher cognitive skills but lower socio-emotional skills. At 12 months, higher cortisol levels correlated to lower socio-emotional skills measured at 6 months. Higher cortisol levels at 12 months also correlated to lower communication skills at both 6 and 12 months. These findings suggest that in the 1st year of life, children experiencing higher stress tend to display less optimal communication and socio-emotional skills. At 6 months of age, higher stress was moderately correlated with higher cognitive abilities.

Eric Roddy, Philosophy

Faculty Mentor: John Wheat,

Undergraduate Pre-Medical Education Reform

The research project deals with various models of undergraduate pre-med educational models. Various schools with unique and non-traditional programs are explored, and the models are compared with that of what is present at the University of Alabama. The students turned out from such programs will be analyzed and compared with those from a more traditional model. The feasibility of such programs at the University of Alabama is explored in addition to the advantages and disadvantages that it may present. The overarching goal with what the College of Community Health Sciences and Dr. John Whet is to develop the best doctors in the most efficient manner possible. At this point in the project, a finalized proposal is being created for presentation to the University of Alabama. The goal of the completed project is an educational model that will fit the needs of the students, the University of Alabama, and the regional medical community.

Matthew Rodriguez, Computer Science

Faculty Mentor: Richard Swatloski, Technology Transfer

Data Mining of Technology Transfer Information

The project consists of performing data mining from the Association of University Technology Managers (AUTM) database to gain meaningful information about the efficiency of the University of Alabama's Office for Technology Transfer (OTT). This includes identifying peer schools of comparable size, locations, funding and other aspects relevant to research value, performing analysis to determine the metrics best representing success of programs and a historical comparison across those institutions to provide context. The goal is to identify methods in which the UA OTT process and support infrastructure can be optimized within the current bounds while recognizing any shortcomings that can be addressed for future operations.

Hunter Rodriguez, Psychology

Faculty Mentor: William Hart, Psychology

Self-Handicapping Through Feedback Manipulation

Self-handicapping is a common reaction to situations that may jeopardize an individual's self-esteem. Self-handicapping occurs when a person believes they are likely to do poorly on a test of performance. In order to preserve their self-esteem they seek external variables outside of their personal ability with which they can explain their failure. This study, inspired by the classic 1978 Berglas and Jones

experiment, tested whether self-handicapping behaviors are also used to selectively attune to information about one's performance, not just a possible failure itself. To test this, participants were presented with an assessment using either easy or insoluble problems. Regardless of their actual performance each participant was told they achieved a high score. We then measured their willingness to receive accurate feedback on a second test of the same ability. We predicted that those given insoluble problems in the first test would be reluctant to receive accurate feedback on the second test because of its potential to contradict their previous high score. If they chose to receive less accurate feedback they could attribute failure to inaccuracy of the results rather than lack of ability. Our results confirmed the hypothesis: participants who received insoluble questions on the first test self-handicapped on the second test by choosing to receive less accurate feedback.

Huston Rogers, Electrical and Computer Engineering

Faculty Mentor: Keith Williams, Mechanical Engineering

Modernization of Previously Obsolete Industrial Robots

The purpose of this project is to develop new control hardware and software for a PUMA robotic arm. Independent control of each of the PUMA's six joints is realized with three RoboClaw motor controllers. An Arduino microcontroller is then used as a supervisory controller to provide setpoints for each of the RoboClaws. Applications of the retrofitted PUMA include using the arm as a demonstration device for promoting STEM fields, using the arm as a teaching device in mechatronics, robotics, and feedback controls education, and using the arm as a testbed for implementing new robotic feedback control algorithms.

Jonathon Romero, Physics and Astronomy

Faculty Mentor: William Butler, Center for Materials for Information Technology

Formation Energy of Full Heusler Alloys

The electronic structures of over 270 Full Heusler Alloys have been calculated in order to determine their characteristics with the goal of finding materials suitable for Magnetoresistive Random Access Memory (MRAM). The Heusler Alloys in the L21 structure were chosen because of their tendency to form half-metals. Half-metals are materials that for one type of electron spin act as conductors and for the other spin are insulators. The recent focus has been on calculating the formation energy of the Full Heuslers in order to begin predicting the stability.

David Roveda, Chemical and Biological Engineering

Faculty Mentor: Jason Bara, Chemical and Biological Engineering

The Synthesis of Rigid Bis(Imidazolium) Polymers for Use as Membranes

Polymers of varying structures may be used in the formation of membranes for carbon dioxide separations. In this project, bis(imidazolium) polymers were synthesized in order to determine if they could serve as functional membranes to achieve this separation. Initially, the bis(imidazole) subunits necessary for the polymerization were synthesized using various organic linkers. Following the condensation polymerization of these subunits, resulting polymers have been cast using a solvent-casting method combined with an ionic liquid to determine if a film will form. This film will then be tested for its capacity as a membrane. Thus far, polymers have been synthesized using both alkyl and aromatic groups to join the imidazole subunits. During the polymerization reactions and solvent castings, solvents with varying degrees of polarity as well protic versus aprotic natures were used to determine effects on the resulting polymers and films.

Leigh Rusevlyan, Telecommunication and Film

Danny Ryan, Telecommunication and Film

Faculty Mentor: Rachel Raimist, Telecommunication and Film

Black Warrior Film Festival

The Black Warrior Film Festival was created to celebrate student made films and give young filmmakers a chance to create and display quality work. In only its second year the Black Warrior Film Festival has helped establish the University of Alabama's Telecommunication and Film department as a very competitive film program while also making Tuscaloosa an emerging presence in the southern student filmmaking community. The film festival was created by a group of students with an excitement and passion for storytelling, southern culture, and filmmaking at the University of Alabama.

Elizabeth Russell, Human Development and Family Studies

Shannon Mysak, Human Development and Family Studies

Faculty Mentor: Maria Hernandez-Reif, Human Development and Family Studies

Comparison of Feeding Behaviors Between Breastfed and Bottlefed Infants

Videotapes of infants being breast or bottle fed were coded in 30 sec increments for the presence of the following infant behaviors: head turning, body movement, grasping, falling asleep, spitting out the nipple, happy, and fussing. The following maternal behaviors were also coded: mom grooming, petting or touching baby. Grasping or touching of mother during feeding was greater for breastfed (M = 68%) than for the bottlefed infants (M = 23%). Interestingly, there was greater grasping of other things (e.g., bottle) by the formula fed infants (M = 20%) compared to the breast fed infants (M = 1%). In addition, the breastfed infants (M = 8) spit the nipple out more than the bottlefed infants (M = 4). Perhaps this is because the breastfed infants have more control during feeding than the bottlefed infants. The greater grasping of mothers may suggest that breastfed infants are more attached to their mothers compared to formula fed infants who showed greater grasping of other things. However, there were no significant differences in the ways that mothers interacted with their infants during breast-or-bottle feeding. Additionally, the mothers completed a questionnaire on their perception of the infants' feeding behavior. Several trends emerged, including less responsiveness to food cues was negatively associated with infants' 1) greater movement of torso, 2) greater fussiness/crying, and 3) greater drowsiness.

Jordain Rutherford, Capstone College of Nursing

Kilee Saxe, Capstone College of Nursing

Heather Samford, Capstone College of Nursing

Rachael Schiller, Capstone College of Nursing

Faculty Mentor: Michele Montgomery, Capstone College of Nursing

Adult Obesity In Tuscaloosa County

An epidemic, by definition, is a rapid spread or increase in the occurrence of something. With over one-third of American adults being obese, and that number on the rise, there is clearly an obesity epidemic on our hands. Focuses are rapidly shifting from secondary and tertiary prevention or treatment of a disease once it has already occurred, to primary prevention, or preventing the disease from ever occurring. The cornerstone of disease prevention, particularly in the instance of obesity, is health promotion. Health promotion is the act of empowering individuals to take control of, and to improve, their health. Education is a major facet of health promotion due to widespread lack of knowledge and misunderstanding of health issues and disease processes. The purpose of this presentation is to illustrate a community assessment conducted in Tuscaloosa, as it relates to adult obesity. Included are the health assets and health issues of the community, information about the population and problem of focus, and an appropriate evidence-based intervention that emphasizes education.

Emily Schmidt, Physics and Astronomy

Faculty Mentor: Karen Burns, Physics and Astronomy

people.ua.edu

(I'm a physics major but my presentation is for the UA Center for Instructional Technology, where I work.) People.ua.edu is a simple but robust web development platform available to UA faculty members, departments, and organizations. I will present the front-end and back-end processes of web development at CIT's Multimedia Services office and showcase the departments and colleges we currently represent.

Samuel Schwarm, Metallurgical and Materials Engineering

Faculty Mentor: Subhadra Gupta, Metallurgical and Materials Engineering

A Statistical Optimization of Perpendicular Anisotropy and Damping for Ta-Inserted Double CoFeB/MgO Interface MTJ's

A statistical Design of Experiments was conducted on double-interface Ta-inserted CoFeB-MgO magnetic tunnel junctions (MTJ's). These MTJ's were deposited using a Shamrock planetary sputtering system. The thicknesses of the inserted Ta and the CoFeB electrodes were varied using Response Surface Methodology. The responses measured using magnetometry and ferromagnetic resonance were a) effective magnetization, b) damping constant and c) perpendicular anisotropy. The effect of annealing on the perpendicular anisotropy was also observed for these devices. As the Ta thickness is increased for fixed CoFeB thickness, the M-H loops indicate that the anisotropy is becoming perpendicular. After annealing, both magnetometry and FMR results show that the MTJ's indicate full perpendicular anisotropy. Interfacial perpendicular anisotropy, which can be extracted from the FMR measurements, scales with the inserted Ta thickness for both as-deposited and annealed samples.

Richard Seeber, Biological Sciences

Faculty Mentor: Ryan Earley, Biological Sciences

Clones and Crosses: Pursuing the Genetic Basis of Phenotypic Traits in Mangrove Rivulus Fish

Richard Seeber, Caleb Anderson, Genevieve Miller, Judson Wells, Sarah Brown, Ryan Earley

Genetics underpins nearly all of an organism's traits—from behavior to disease susceptibility—and directs the course of an organism's life from development to death. Controlled mating experiments allow tracing of phenotypic traits through generations. In vertebrates, this analysis is challenged by heterozygosity at most genetic loci. The mangrove rivulus, *Kryptolebias marmoratus*, the only known self-fertilizing hermaphroditic vertebrate, may provide a solution to this difficulty. Through self-fertilization, a heterozygote can produce entirely homozygous offspring. These homozygotes may self-fertilize, creating an isogenic lineage. Fish of different lineages exhibit vast differences in phenotypes. Creation of heterozygous offspring by crossing homozygotes of different lineages and subsequent comparison of offspring and parental phenotypes allows for determination of the genetic basis of various phenotypes. This understanding of our model's genetics could be translated to other vertebrate species due, in part, to the conservation of gene function among vertebrates. We are pursuing a method of stimulating production of unfertilized eggs, and thus, a reliable method of outcrossing by stressing hermaphrodites, changing their feeding regime, altering their environment, and exposing them to males.

Tina Sheikhzeinoddin, Civil, Construction and Environmental Engineering

Owen Killeen, Civil, Construction and Environmental Engineering

Faculty Mentor: Eric Giannini, Civil, Construction and Environmental Engineering

Better Bamboo Bikes

Bamboo is fast-growing plant that has been used as a building material for thousands of years. This resource has gone untapped in the United States, specifically in the southeast where the temperature is optimal for cultivation of certain species of bamboo. As the world moves towards more sustainable

construction methods and materials, bamboo has received increasing attention as a potential alternative building material. Currently, the state of Alabama has many sources of bamboo, the problem, however, is that little is known of the properties of various species grown in the state. This research is partnered with the Hale Empowerment and Revitalization Organization (HERO), a non-profit located in Greensboro, Alabama. The bike shop uses *Phyllostachys aurea*, commonly called Golden Bamboo, as a bicycle frame. Currently little is known about Golden Bamboo, and this research represents the first data on the mechanical properties of Alabama-grown bamboo. This information is essential in understanding and working with bamboo. Tensile and compressive strength data of Golden Bamboo and other locally grown bamboo will help HERObike understand the material that they are working with by providing a database of the range of strengths. Bamboo has highly-sought material properties and is an invaluable resource for societies around the world. This study will improve the quality of their bikes and could generate a new bamboo industry in the state of Alabama.

Meghan Shewmake, Psychology

Faculty Mentor: James Hamilton, Psychology

A Bogus Pipeline Study on Excessive Illness Reporting

Excessive illness behavior (EIB) refers to symptom reporting, doctor visits, and disability behaviors that are excess of typical reactions to an illness or injury. At the extreme, persons with somatic symptom disorders and factitious disorder engage in EIB to a degree that interferes with their lives and imperils their health. The causes of EIB are not well understood. The sensitivity of the subject matter also makes this topic hard to study directly. Therefore, I used the bogus pipeline procedure to elicit accurate self-reports of EIB. This procedure involves making subjects believe they are connected to a lie detector. The purpose of this study was to determine the extent of EIB and the reasons cited for engaging in EIB. 72 subjects completed four surveys dealing with symptom reporting and intentionally false illness behaviors. They were randomly assigned to complete the surveys connected to the lie detector, informed of the lie detector but not attached to it, or unaware of any lie detection issues. There were no differences between the three reporting conditions on subjects' survey responses. Nevertheless, subjects admitted high levels of EIB. Intentional EIB was related neither to insecure interpersonal attachment, nor to scores on a measure of somatization tendencies. The bogus pipeline manipulation failed, but this study did show that asking participants directly about engaging in excessive illness behaviors elicits a surprisingly high prevalence of EIB.

Grace Silverstein, Mechanical Engineering

Faculty Mentor: Jeremy Bailin, Physics and Astronomy

Detecting the 3-D Structure of Nearby Galaxies

The goal of this project is to study the feasibility of measuring the three-dimensional shape of several nearby galaxies of the Milky Way via the brightness of their red giant stars using the Hubble Space Telescope (HST) and the DECam at the Cerro Tololo Inter-American Observatory (CTIO). Astronomers measure distances to nearby galaxies by using algorithms to calculate the peak brightness of stars on the red giant branch (the "tip of the red giant branch" or TRGB) in the galaxy. Because these stars have the same intrinsic luminosity, their apparent brightness is used to directly calculate the distance. Using HST data, I implemented an algorithm to perform the TRGB calculations, generated synthetic samples of stars from the BaSTI online interface, and tested my system with several small sections of BaSTI data to determine whether it is feasible to obtain sufficiently precise distances. The research is ongoing. If the process is feasible, the variation of the distances obtained from different parts of actual galaxies observed via the CTIO will present a clear picture of the size and shape of the galaxy.

Laura Smith, Psychology

Katherine Love, Psychology

Faculty Mentor: Tricia Witte, Human Development and Family Studies

Conceptualizing Nonsuicidal Self-Injury as a Process Addiction

Several studies have indicated that Nonsuicidal Self-Injury (NSSI), harming one's own body without the intent to commit suicide, may have some addictive features. Addiction is broadly defined by three components: cravings and compulsions to use or execute the behavior, loss of control over use or over the behavior, and continuation of use or execution of the behavior despite negative consequences. The presence of these three components of addiction in nonsuicidal self-injurious behaviors has been investigated in this review. Findings indicate that all three components of addiction are present in nonsuicidal self-injurious behavior. Further supporting the conceptualization of nonsuicidal self-injurious behavior as a process addiction, findings showed a building tolerance and a change in neurotransmitter functioning during the duration of the nonsuicidal self-injurious behavior.

Mallory Smith, Chemistry

Faculty Mentor: Paul Rupar, Chemistry

Boron Containing Fluorenes

Conjugated materials have become an attractive area of research due to their optoelectrical properties and wide scope of applicability in solar cells and other organic electronic devices. Most widely used conjugated materials are electron-rich; electron-deficient conjugated systems are less common. Due to its empty p-orbital, the insertion of tri-coordinate boron into a conjugated polymer is an attractive technique to create electron-deficient materials. We are currently developing boron congeners of fluorenes and will report on their synthesis and characterization.

Jessica Smith, Human Nutrition and Hospitality Management

Faculty Mentor: Amy Ellis, Human Nutrition and Hospitality Management

Optifast: More than just a weight loss solution.

Purpose: Optifast 800 is an 8-week weight loss program that reduces an individual's total kilocalorie intake to approximately 800 kilocalories per day. Caloric restriction is accomplished by meal replacement with shakes and bars that are formulated to provide an appropriate blend of macronutrients and micronutrients. With energy intake so low, supervision of a multidisciplinary medical team is necessary. This is facilitated through weekly appointments to the clinic. The purpose of this study was to determine if 8 weeks on Optifast 800 will significantly improve blood pressure, as well as weight.

Methods: A retrospective chart analysis of 45 patients of the Optifast Clinic in Birmingham, AL was performed. Changes in weight and blood pressure over 8 weeks were determined by paired t-tests.

Results: Eight consistent weeks on the Optifast 800 Meal Replacement program not only reduced weight by an average of 17.4 pounds ($p < 0.001$), but it also led to a significant drop in both systolic and diastolic blood pressure ($p = 0.018$, and $p < 0.001$ respectively).

Conclusions: Eight weeks of total meal replacement by the Optifast Program appears to favorably influence blood pressure; however, further research is needed to determine its effects on body composition and other metabolic parameters.

Amber Smith, English

Faculty Mentor: Nikhil Bilwakesh, English

Closing the Distance of Far, Far Away: The Purpose of Fairy Tale in Maxine Hong Kingston's The Woman Warrior and Herta Müller's The Land of Green Plums

This paper focuses on the reinterpretation of fairy tales as tools by which to create and communicate cultural identity, particularly focusing on Kingston's *The Woman Warrior* and Herta Müller's *The Land of*

Green Plums. Looking at these novels as fairy tale adaptations, historical and pseudo auto-biographical texts, and what I deem “new fairy tales” in their use of fairy tale motifs, I also explore how such readings heighten the books’ political and cultural power. Namely, the use of fairy tales helps these books, which function as personal testimonies, go beyond their limited cultural audience to the larger world, and – eventually – point to a new more genuinely universal identity.

Steven Spellmon, Chemistry

Faculty Mentor: David Dixon, Chemistry

Reactivity of Aqueous +4 Cations

There is significant interest in how aqueous metal cations convert into colloidal particles. Electronic structure calculations were used to predict the properties of single metal +4 cations including the number of waters in the first solvation shell as well as the structures generated by loss of protons. The properties of the aqueous +4 cations of plutonium, cerium, hafnium, zirconium, and titanium were predicted. The calculations were done by using density functional theory including relativistic effects with effective core potentials. The calculations show that the number of water molecules in the first solvation shell depends on the number of hydroxides.

Danielle Springsteen, Telecommunication and Film

Kristen Bolden, Telecommunication and Film

Lauria Jenkins, Telecommunication and Film

Morgan Wagner, Telecommunication and Film

Faculty Mentor: Chandra Clark, Telecommunication and Film

New Media Plan for Red Cross of West Alabama

Throughout this semester, Our group has worked closely with the West Alabama Chapter of the American Red Cross. In order for them to reach more members of the community we have developed a new media plan that involves a new website, Twitter, Facebook and Instagram. We also are creating promotional videos and PSA's to put on their new website that will showcase all the Red Cross has to offer. The Red Cross is an important part of our community especially during times of natural disasters and it is important for people to see what services they have to offer and how they can help anyone going thru By helping them build their social media platform they are able to interact more with the community. The West Alabama Chapter of the Red Cross is so much more than just a building. It's a community on its own. It's built from diligent workers and caring volunteers. With this new media plan they are able to show off their new building and provide services they would not have been able to offer before.

Meghan Stallworth, Psychology

Faculty Mentor: Joan Barth, Institute for Social Science Research

Classmates, Sisters and Friends: The Effects of Micro Social Systems on Women's Future Life Goals

Little research has focused on women who choose to break the gender roles and enter into male dominated fields such as Science, Technology, Engineering and Mathematical (STEM). The current study investigates the factors that might contribute to a woman choosing to major and work in these male dominated fields. This study proposed that groups of women who are more supportive of non-traditional gender roles encourage each other to enter into and stay in the STEM fields. We hypothesized that these "support microsystems" influence career and life goals by supporting or countering pre-existing cultural norms for gender roles. College students (493 male, 356 female) who were enrolled in upper level courses in male (e.g., Engineering) or female dominated (e.g., social work) majors completed a survey in class concerning social support, their expectations for their future selves (career, marriage, starting a family), and gender stereotypes about men and women in their major.

Results indicated that women in male dominated majors had more social support from friends, family and classmates compared to men in male dominated majors and women in female dominated majors, supporting our microsystem theory. Furthermore, women in male dominated majors viewed their female classmates as less conforming to traditional gender roles compared to women in female-dominated majors.

Allison Stelling, English

Faculty Mentor: Elizabeth Wilson, Curriculum and Instruction

The Effect of Hope on High School Student Achievement and Perspective

The intent of the aforementioned study is to establish whether or not a correlation exists between hopeful thinking, as established by Charles Snyder, and academic achievement in high school students. The correlational study will examine the relationship between high and low GPAs and high and low hopeful thinking scores in high school students. The researcher's primary hypothesis is that high hopeful thinking scores will often lead to higher GPAs; thus, if hope is a teachable critical thinking skill, as argued by Charles Snyder, testing students hopeful thinking skills could help target at risk students more accurately than test scores alone. In order to test this hypothesis, the researcher will present students from a local High School with the opportunity to participate in a brief survey intended to gauge a student's ability to think using both pathways thinking skills and agency, in which they will also self-report their grade point averages. The researchers intends to receive minimally 100 surveys in order to then establish the correlation between hopeful thinking and academic success. The survey being used will assign students a hope score based upon how they answered the questions in the survey. The survey aims to establish the correlation between hopeful thinking and academic achievement, and then to consider the impact of hopeful thinking on student perceptions of success, personal achievement, educational importance, etc.

Jordan Stone, Human Development and Family Studies

Faculty Mentor: Tricia Witte, Human Development and Family Studies

Attitudes Toward Dating Violence Among College Students

Intimate partner violence (IPV) is a prevalent problem on college campuses today, and attitudes condoning violence in relationships have been shown to exacerbate this problem. Several factors may influence an individual's attitudes toward dating violence, such as gender and personal experience with IPV. Some research has shown support for gender differences in accepting attitudes. In addition, research shows that college students in violent dating relationships tend to be more accepting of dating violence than those who are not a part of violent relationships. The purpose of this project is to determine the link between involvement in IPV and the acceptability of dating violence behaviors by both male and female students. Based on the literature, it is hypothesized that female students will perceive IPV as less acceptable than males, and that those involved in violent relationships will perceive the behaviors as more acceptable than their peers of the same gender, not involved in violent relationships.

Brent Strickland, Health Science

Derek Owen, Health Science

Faculty Mentor: Lori Turner, Health Science

Careers in Health Education and Health Promotion

Among the nation's growing healthcare system, numerous employment opportunities exist for people pursuing careers in medicine, nursing, and other popular health-related professions. However, little research has been conducted on the various positions available for those studying health education, health promotion and public health. Our project aims to provide helpful information for those seeking

degrees and/or employment opportunities in public health fields. This project provides a detailed summary of public health positions currently available in the United States including settings and agencies where health educators work. The goal of this project is to supply information for individuals seeking careers in educating and guiding others toward preventing illness and living healthy and fulfilling lives.

Erica Sucher,

Faculty Mentor: Javonda Williams, School of Social Work

The Power of Stigma: Correlates of HIV Positive Inmate Segregation among the Recidivism and Occupancy Rates in Alabama Prisons

The human immunodeficiency virus (HIV) is one of the world's most feared diseases. Infected persons suffer unbearable weakness, grueling loss of body fat, persistent fevers, depletion of their immune system, and emotional distress by the discrimination and demeaning stigmas from society. This virus is devastating, and tremendously misunderstood. It is a tragedy that misconceptions of HIV are common in society, however it is deplorable that until recently the fallacies of this virus were institutionalized in the Alabama's Department of Corrections (ADC). In recent times South Carolina and Alabama were the only states to segregate their HIV positive inmates. In December 2012, the HIV segregation policy was ruled to be a violation of the Americans With Disabilities Act and Section 504 of the Rehabilitation Act. It was reported in the ADC's 2012 annual report that the average inmate was 38 years old. Therefore, I will be using Erik Erikson's developmental stage, generativity versus stagnation, to reflect on the HIV segregation policy in prisons. Care and contribution are vital to a middle adulthood life. I hypothesis that the HIV segregation policy in correctional facilities not only had adverse effects on HIV positive inmates' wellbeing, but inadvertently increased the state's recidivism rates therefore subsequently impacting the occupancy rates of Alabama Prisons.

Phillip Sullivan, Consumer Sciences

Faculty Mentor: Elizabeth Wilson, Curriculum and Instruction

How Generational Cycles Affect Educational Advancement

The importance of this study lies within the value of evaluating ways in which we can ensure that each generation is more educated than the next. The purpose of this study is to decipher what factors hinder educational advancement within families, and the role that a parent's education level plays in the educational fate of their children. To complete this study, I will interview three willing participants to provide insight about their experiences as a child who grew up with parents who did not go to college. The study will be performed to decipher which factors encouraged them to break the generational cycle in their families, and how they will translate those factors into future development of the next generation. I will be constructing a qualitative phenomenological design for this research project based on observations regarding this subject matter.

This project is being performed strictly for greater understanding of the essence of the experiences of the participants. Each participant will be asked twelve interview questions at a location of their choice to provide further insight about their experiences. Each question will fall under one of three categories: linguistic nature, family structure, or parental expectations. Theses three categories will provide necessary information about the participants' backgrounds to provide further insight about this topic.

Momoko Suma, Criminal Justice

Faculty Mentor: Ariane Prohaska, Criminal Justice

The comparison of the homelessness in Japan and the United States

**International focus*

I will compare the situations of homeless people in Japan and the U.S, two of the greatest economic powers in the world. Although economically strong, according to the Organisation of Economic Co-operation and Development (OECD), the poverty rates of these countries are among the highest in the developed world, and in both nations have resulted in problem of homelessness. The poster will show the commonalities and differences of each country's definition of homelessness, and how these definitions shape the public policies enacted to support the homeless, including supports by both government and nonprofit organizations in Japan and the U.S. I conclude that the definition of homelessness is underdeveloped in Japan compared to the United States, and this results in fewer supports for the homeless in Japan.

Christine Talley, Human Nutrition and Hospitality Management

Faculty Mentor: Laura Reed, Biological Sciences

Genotype-by-diet interaction effect on blood sugar in Drosophila

Metabolic syndrome, MetS, is an increasingly prevalent disease in the United States. MetS consists of an array of symptoms, including obesity, insulin resistance, and high triglyceride levels that can lead to type 2 diabetes and cardiovascular disease. While diet and genetics play individual factors in the disease, genotype-by-diet interaction is thought to play a role in MetS, as well. We put genetic crosses of *Drosophila melanogaster* on either a normal or high-fat diet to test for differences in trehalose (blood sugar) levels in a controlled environment. We found significant effects of genotype, diet, and genotype-by-diet interactions on the levels of trehalose observed.

Logan Tarbox, Information Systems, Statistics and Management Science

Elizabeth Roberts, Information Systems, Statistics and Management Science

Faculty Mentor: David Hale, Information Systems, Statistics and Management Science

Alabama Birding Trails Mobile App

The Birding Trails of Alabama mobile application was developed for the state of Alabama. The application includes site overviews, directions, amenities, frequently sighted birds, nearby sites, and birding tips. Sites are grouped into regional trails for ease of use. We completed an existing iOS application and developed an Android application from start to finish. The application will promote tourism and knowledge about the beautiful nature sites around the state.

Kathryn Taylor, Communication Studies

Faculty Mentor: Meredith Bagley, Communication Studies

Pentadic Criticism: America IS Beautiful

Pentadic criticism is rooted in Kenneth Burke's notion of dramatism, the label Burke gives to the analysis of human motivation through terms derived from the drama. The two simple assumptions of underlying dramatism are (1) language use constitutes action, not motion and (2) humans develop and present messages in much the same way that a play is presented. The two basic steps used in the pentad method are (1) labeling the five terms of act, agent, agency, scene, purpose in the artifact; and (2) applying the ratios to identify the dominant term. The act is the major action that takes place, agent is the person or thing doing the action, agency is how the person or thing did the act(s), scene is where the action takes place, and purpose is what the rhetor suggests the agent intends to accomplish by doing the act. In this method I will be answering the research question of "What is the significant pentadic term in this method?" or possibly "What are the implications of the agency emphasis in a message to diversity?"

Sarah Tharani, Health Science

Alex Clausen, Biological Sciences

Faculty Mentor: Jason Scofield, Human Development and Family Studies

Children's Trust in Testimony in the Formation of Opinions

Children often rely on the testimony of others when learning factual information. For example, previous studies show that children favor the testimony of a speaker who has been factually accurate over one who has been factually inaccurate. However, no studies have examined how testimony might influence the formation of opinions. In Study 1, 3- and 4-year-olds observed factual testimony from two speakers, one who accurately named familiar objects and one who inaccurately named familiar objects. The speakers then gave conflicting opinions about a separate novel object. Finally, children were asked to form their own opinion about that object. Unlike previous studies, Study 1 showed that children did not favor the previously accurate speaker when forming a new opinion about the object. It is possible that the testimony of the speakers was ignored because children did not believe that factual testimony was relevant when forming an opinion. It is also possible that the testimony of the speakers was ignored because children did not believe that any testimony was relevant when forming an opinion. Study 2 (data collection ongoing) distinguishes between these possibilities. Three- and 4-year-olds observe opinions from two speakers, one who holds commonly held opinions and one who holds uncommonly held opinions. The speakers then give conflicting opinions about a separate novel object. Finally, children are asked to form their own opinion about that object.

Maxton Thoman, Biological Sciences

Faculty Mentor: John Higginbotham,

Fit Sprint: A Healthy Gaming Initiative seeking to contain the spread of Childhood Obesity

With the rising rates of metabolic diseases in the United States reaching near epidemic proportions, and at a time when the childhood obesity rate hovers at 18.6 percent in Alabama alone, community-based participatory initiatives and technologically geared programming are increasingly utilized containment mechanisms. Therefore, the healthy gaming initiative, "Fit Sprint," was created under the Project UNITED initiative with the ultimate goal of enticing K-12 students into developing a greater understanding of their diet and maintaining healthy eating habits. Through an entertaining, quick and easy gaming application that requires users to input their lunch contents, "Fit Sprint" assigns basic health scores to each food entry, allowing for the collection of individual nutritional data. Once implemented within K-12 schools, said data will be tracked for each individual participant, allowing for a quantitative record of how "Fit Sprint" and other Project UNITED initiatives impact student food selection, nutritional intake, and correlating clinical data, so as to evaluate the relative efficacy of each program.

Zachary Thomas, Biological Sciences

Alex Uptain, Biological Sciences

Elise Kahn, Biological Sciences

Faculty Mentor: Janis O'Donnell, Biological Sciences

Modeling aberrant behavior of autism spectrum disorder

Autism and Autism Spectrum Disorders (ASDs) are a cluster of neurological developmental syndromes characterized by a wide range of symptoms including repetitive behavior, motor dysfunctions, and social behavior and communication. Current research suggests strong genetic factors with many different loci underlying phenotypic variability in ASD. Among these, defects in the gene UBE3A, which encodes the enzyme ubiquitin-protein ligase E3A, have been heavily implicated in several of these dysfunctions. We have shown that Dube3a, the Drosophila homolog, maintains the molecular basis of neuronal dysfunction (Ferdousy et al. 2011). To the consequences of these UBE3A mutations, we have employed three behavioral assays: Grooming/repetitive behavior, social interaction/spatial distribution, and mating/communication. Multiple mutant strains of the dUBE3A have been assayed to confirm the

presence of aberrant behavior in all three behavioral assays. We are currently using these behavioral strategies in the comparison of various *Drosophila* lines from the *Drosophila* Genetic Reference Panel (DGRP). The goal of this research is to discover various polymorphisms that give rise to behavioral variation in the attempt to create a network of loci underlying specific behavioral abnormality.

Authors: Matthew Lollar, Rami Ajjuri, Lawrence Reiter, Janis O'Donnell, Zachary Thomas, Alex Uptain, Elise Kahn

Zach Thompson, Metallurgical and Materials Engineering

Faculty Mentor: Greg Thompson, Metallurgical and Materials Engineering

Site-Specific Sample Extraction Using a Focused Ion Beam for Atom Probe Tomography

Cutting-edge field-ion microscopes, such as the local electrode atom probe, analyze in three dimensions volumes that are smaller than one-thousandth of the thickness of a human hair. Atom probe tomography field-evaporates individual atoms from the tip of a needle-shaped sample, which should have a radius of less than 100 nm. This nanometer-sized sample has to be cut and extracted from a centimeter-sized bulk sample material that can be a rod, a coupon, or any other geometry. This cutting is accomplished in an electron microscope equipped with an ion gun that uses Ga ions to cut micron-sized sample wedges from centimeter-sized bulk sample materials. The micron-sized sample wedge is then cut into smaller sample blanks that are subsequently sharpened into the final needle-shaped samples using Ga ions.

First, a protective Pt pad is laid over the region of interest (ROI) to prevent contamination by Ga ions used for cutting. Then, an area around the ROI is trenched out to form a wedge that is cut out of the bulk sample and extracted by welding it to a micromanipulator. This wedge is then mounted onto 1-2 micron-thick pillars that are on a sample holder, which can be placed in the atom probe. Then, micron-sized sample blanks are cut off from the wedge. Finally, these sample blanks are sharpened into needle-shaped samples that can be studied in an atom probe. The final sample that is analyzed in an atom probe has a radius of less than 100 nm.

Samantha Tilson, Chemical and Biological Engineering

Faculty Mentor: Yonghyun Kim, Chemical and Biological Engineering

The Effect of Y-27632 on the Propagation of Cancer Stem Cells

Cancer is currently the second highest cause of death in the United States. It is hypothesized that much of the resistance to existing therapy and cause for relapse is due to the presence of cancer stem cells (CSCs). CSCs are a small subpopulation of cancer cells within a tumor that can self-renew and differentiate into various heterogeneous tumor cells that constitute the entire tumor and are thought to be the source of tumor regeneration after treatment. The goal of this project was to explore the effects of Y-27632, an inhibitor to the ROCK pathway, on U87-MG glioblastoma tumorspheres and MDA-MB-231 breast cancer mammospheres. When grown in serum-free media, these cancer cells form spheroid aggregates which contain higher percentage of CSCs. We hypothesized that Y-27632 would increase the number of CSCs grown in vitro. Furthermore, it was postulated that the inhibitor would improve dissociation and cloning efficiencies. Indeed, our data show that supplementing the CSC media with Y-27632 increases the total number of spheres and the total number of CSCs. We also characterized the expression of known stem cell markers in the cancer cells grown with the inhibitor using various molecular and cell biology techniques. In conclusion, our data show that Y-27632 has an overall positive effect on tumorsphere formation and is poised to have promising application for CSC culture and for future CSC-specific drug development.

Sarah Elizabeth Tooker, Communication Studies

Mary Sellers Shaw, Communication Studies

Haley White, Communication Studies

Faculty Mentor: Meredith Bagley, Communication Studies

A Campus Culture: Addressing Diversity Issues in the University Greek System

The purpose of this study is to identify key strategies to address diversity issues on a college campus. The literature review serves a collection of the various research available concerning higher education and diversity. The implications of this research were then applied more specifically to the University of Alabama. This project is important because the University of Alabama has a history of racial division; however, this campus now has the opportunity to embrace its diversity and work to bring students and faculty together for long-term, sustainable change. This project's mission is to increase dialogue among students, faculty, and administration about racial issues to move forward as a community. The research question is - What communication techniques can be used to improve diversity relations on a college campus? This study based its methods upon three communication strategies: complicity theory, social identity theory and the transformational leadership model. The application of each of these strategies revealed that interaction is important in developing a student's openness to diversity. The implications of this research show that developing inclusive communication tactics is necessary for student development, particularly on the University of Alabama campus.

De'Anna Trunnell, Biological Sciences

Ryan Colaianni, Biological Sciences

Faculty Mentor: Janis O'Donnell, Biological Sciences

Early Exposure to the Herbicide Paraquat May Increase Risk of Parkinson's Disease

Epidemiological studies have shown that there are potentially non-genetic risk factors associated with the onset of Parkinson's disease (PD), the second most common neurodegenerative disorder in the world. These risk factors include environmental agents, such as pesticides and herbicides, which are concentrated throughout rural communities in the United States and exposure to these chemicals has been linked to a greater chance of developing PD. Since the symptoms of this progression neurodegenerative disorder become present much later in life, there have been limitations to these epidemiology findings. These include inadequate sample sizes, ambiguous history of exposure, and a broad variability of life experience post-exposure. Research using model organisms has become a powerful tool for studying such aspects of toxicology. *Drosophila melanogaster* shares analogous neurological structure to the human brain and has been established as a valid model for studying human PD. We are able to expose these organisms to the herbicide, paraquat, at an early age in the life cycle and observe the effects of this exposure later in their life through behavior and molecular assays. Through this study, we hope to better understand how exposure to paraquat in early life affects the potential of developing Parkinson's Disease.

Lynda Truong, Chemistry

Faculty Mentor: Stephen Woski, Chemistry

Cyanocarbazoles as Universal Base Candidates

The natural variation and degeneracy of genetic code often complicates the design of oligonucleotide primers and hybridization probes. The design of these important biological tools can be facilitated with the realization of a stable and indiscriminate base analogue. When incorporated into DNA such a universal base should pair non-selectively with any of the natural bases, should not destabilize the double helix structure, and should maintain functionality as a substrate for DNA polymerases. We describe efforts toward the synthesis of four new N-2-deoxyribonucleosides: 3-cyanocarbazole, 3,6-dicyanocarbazole, 2-cyanocarbazole, and 2,7-cyanocarbazole. We hypothesize that the residues with largest dipole moments will behave as superior universal bases. This will be evaluated by incorporating

these residues in synthetic DNAs and examining the stabilities duplexes form with complementary DNA strands.

Marie Tucker, Communicative Disorders

Faculty Mentor: Angela Barber, Communicative Disorders

Autism Spelling Project

One's ability to spell is a window into underlying metalinguistic skills as it is linked to critical academic and language proficiencies. While previous research indicates structural language impairments in some children with an Autism Spectrum Disorder (ASD), very little is known about their spelling abilities or the underlying linguistic processes that contribute to spelling. The purpose of this case study was to explore the effectiveness of multi-linguistic instruction for improving decoding and spelling in a 12 year old boy with an ASD. Spelling data was obtained through the administration of the Spelling Performance Evaluation for Language & Literacy-2 (SPELL-2) (Masterson, Apel, & Wasowicz, 2006). From recommendations in SPELL-2, six spelling patterns were chosen as intervention targets. These patterns were addressed using SPELL-Links to Reading and Writing, A Word Study Curriculum (2nd ed.) (SPELL-Links 2; Wasowicz, Apel, Masterson, & Whitney, 2013), and a spelling probe was administered during the fourth session in order to monitor progress. Element and word scores for baseline and probe measures were derived via the Computerized Spelling Sensitivity System (CSSS) (Masterson & Apel, 2010, 2012). Spellings were analyzed using measures of morphemes, syllables, and frequency of errors. After the use of a multi-linguistic word study approach, results included greater spelling accuracy with targeted word patterns and a shift to more linguistically sophisticated spellings.

Cooper Vajner, Chemical and Biological Engineering

Faculty Mentor: Hung-Ta Wang, Chemical and Biological Engineering

The Thermoelectric Property Characterization of the PEDOT: PSS-Te Nanowire Composite

Thermoelectric generators possess the capability to harness a thermal gradient as a means of generating electricity. Polymer- inorganic thermoelectric composites have been a major focus of researchers for advancements in energy generation. In this experiment a microcircuit was fabricated to characterize the thermoelectric properties of the PEDOT: PSS- Tellurium nanowire composite polymer. The Seebeck coefficient ($S = -\frac{\Delta V}{\Delta T}$) and the electrical conductivity ($\hat{\sigma}$) are obtained to generate the power factor [$Pf = (S^2)(\hat{\sigma})$]. At 300K the Seebeck voltage is 196.6 μ V/K, the electrical conductivity is 5.37 Siemens/cm, and the power factor is $2.08E+05 [(\hat{\sigma}V^2) S/cm \cdot K^2]$. These results reveal the transport behavior of the composite in certain conditions and foreshadow future experiments toward innovation.

Tori Vines, Advertising and Public Relations

Aimee Lindamood, Advertising and Public Relations

Payton Brown, Advertising and Public Relations

Faculty Mentor: Theresa Henley, Advertising and Public Relations

How to Make Mary Kay More Appealing to Women 18-25

This study looks at the perception of Mary Kay among 18-25 year old women as well as how to appeal to them. Conclusions were drawn from the amalgamation of primary and secondary research. Primary research forms used were surveys, focus groups and concept testing. Secondary research identified the average target consumer is a white hyper-connected female of a demand culture mindset with an income of \$29,000 and some college education. The responses from the 1,307 surveys showed a general lack of awareness and appeal of Mary Kay among 18-25 year-old consumers. Mary Kay was named 13% of the time in unaided free recall of makeup and skincare brands. When respondents ranked top ten makeup and skincare brands, Mary Kay was consistently placed last in both categories. Opinions of Mary Kay were indicated as being positive among 37% of surveys taken. Focus group word association

responses described Mary Kay as: old, inconsistent, inconvenient, and personal. Responses in focus groups also indicated various misconceptions of Mary Kay. When viewing ads with models, 82% of women have negative reactions. Focus groups responses and concept testing results indicated that the target found bold ads, with short "empowering" headlines, that feature products to be appealing. In conclusion, this study's findings suggest that, despite Mary Kay's current lack of appeal, Mary Kay can be appealing to 18-25 year-old women by using empowering terse messages, bold colors and a focus on the product.

Amanda Volk, Chemical and Biological Engineering

Faculty Mentor: Dr. Dave Nikles, Chemistry

Multifunctional Gold Nanoparticles

Nanoparticles designed for the treatment of cancer are emerging as promising chemotherapeutic agents because of their multifunctional characteristics. Currently, in this project we are focusing on the synthesis of micelles containing gold nanoparticles for controlled chemotherapeutic drug release. The golden nanoparticles are being developed via a precipitation method with the capping agent Oleylamine. From the addition of 11-Mercaptoundecanol and its successive polymerization to PCL combined with PEGylation, a diblock polymer micelle will encompass a semicrystalline core containing gold nanoparticles and the chemotherapeutic drug, Doxorubicin. Prospectively, the gold nanoparticles will be able to be heated via laser, thereby melting the semicrystalline core of the micelle to release the chemotherapeutic drug. On top of controlled release, we are also aiming to localize cancer therapy by targeting the micelles to malignancies using an RGD peptide. On top of acting as a means of targeted chemotherapeutic drug delivery, through heating the particles, the targeted cancer can be treated with hyperthermia therapy.

Alexandra Waits, Biological Sciences

Faculty Mentor: Ryan Earley, Biological Sciences

*Temperature Effects on Sex Steroids and Gene Expression in the Hermaphroditic Fish *Kryptolebias marmoratus**

Temperature plays a major role in sexual development and differentiation in the hermaphroditic, self-fertilizing mangrove rivulus fish (*Kryptolebias marmoratus*). This experiment examined how temperature affects testosterone (T) and estradiol (E2) levels as well as the relationship between these two steroid hormones. We hypothesized that temperature would influence hormone production and the activity of enzymes involved in sex hormone synthesis pathways. Fish of two genetically distinct lineages were placed in tanks maintained at 20°C, 25°C, and 30°C for 3 weeks in order to test temperature effects. Hormones were extracted via water both before and after the experiment and then assayed to determine hormone levels. We demonstrated that higher temperatures cause a general increase in steroid synthesis but that the ratio of estradiol:testosterone decreased at the extreme temperatures, implicating some change in the activity of aromatase, the enzyme that converts testosterone to estradiol. The project shifted to focus on the expression of genes that code for enzymes involved in the sex steroid synthesis pathway. PCR was run in order to determine the sequence of the aromatase gene in rivulus. From this, primers for quantitative PCR have been made and tested in order to see if they would amplify rivulus aromatase. With these primers, quantitative PCR will be performed to determine how temperature exposure during adulthood influences gene expression related to sex hormone synthesis.

Sergei Wallace, Physics and Astronomy

Faculty Mentor: Claudia Mewes, Physics and Astronomy

Micromagnetic investigations of spatial fluctuations of the first order perpendicular anisotropy in thin films

Magnetic materials exhibiting perpendicular anisotropy are being investigated for magnetic random access memory and other spintronics applications. Materials with perpendicular magnetic anisotropy are often treated as a single macrospin model with an effective anisotropy. It is often sufficient to just use the first order perpendicular anisotropy term. For certain materials, the second order term is also assumed based on a phenomenological approach, though without any model for its physical origin. Similar to Slonczewski's argument for explaining the biquadratic exchange coupling (Phys. Rev. Lett. 67, 3127 (1991)), the aim of this project was to explore the origin of higher order anisotropy terms based on a spatial inhomogeneities of the first order term across the material. Using micromagnetic calculations of thin films, it is indeed shown that spatial fluctuations of first order perpendicular anisotropy constant K_1 on a sufficiently small length scale lead to a second order anisotropy constant K_2 . This result was also understood by looking at the deviations in the angles of the spins across the material when in the presence of an applied magnetic field. Further, the effective anisotropy is often assumed to be independent of the applied magnetic field. Yet in a series of simulations with increasing applied fields, the second order anisotropy term in these thin films was shown to decrease. These results, along with plans for future work, will be presented.

Tommi Walters, Capstone College of Nursing

AuBrey West, Capstone College of Nursing

Blake Stafford, Capstone College of Nursing

Claire Turner, Capstone College of Nursing

Faculty Mentor: Michelle Montgomery, Capstone College of Nursing

Access to Healthy Lifestyle Choices

Community health is aimed at the identification, implementation, and evaluation of interventions to improve the overall health status of a demographic area's population. Lifestyle choices are a key point affecting this status of lifestyle and well-being. These choices can lead to a positive or negative outcome. Proper physical activity, nutrition, and social behaviors all play a part in health quality, but that is easier said than done for certain communities. Access to healthy lifestyle choices influences these decisions when they are not readily available. This presentation will illustrate a community assessment done in Vance, Alabama. Our assessment identifies proper resources, healthcare, nutrition, and deficits within this community. Access to healthy lifestyle choices was found to be severely limited and evidence based interventions and outcomes were identified to address this concern.

Kelly Ward, Journalism

Faculty Mentor: George Daniels, Journalism

Beat Writer Football Bloggers who "Feed the Beast": A Study of Corporate Strategy in Sports Blogging

The study focuses on the relationship between the newspaper owner and the work of the sports beat writers, who also blog. Forty days' worth of content produced by six reporters at three newspapers was analyzed. The topics of 551 blog posts were compared to stories by the same writers published in the newspaper during the 40-day period.

Of the six bloggers, three from the Gannett Company, the nation's largest newspaper chain, produced stories and blog posts for Mississippi's largest newspaper, The Clarion-Ledger (Jackson), and Kentucky's largest newspaper, The Courier-Journal (Louisville). The three other bloggers were employed by Advance Digital Media, which owns Alabama's largest news web site, al.com and the state's three largest newspapers, which recently converted to a three-day-a-week publication cycle. The company also owns mlive.com, but closed its daily newspaper, The Ann Arbor News, five years ago.

The findings were that the majority of blog posts between December 30, 2013 and February 7, 2014 were about football. Of the six bloggers, those with Advance Digital Media produced substantially more blog posts compared to their counterparts from Gannett, who had dozens of newspaper stories printed during the same period. The beat writers at al.com<<http://al.com>>, who also blog, produced fewer than five newspaper stories each over the 40-day period.

Hannah Ward, Telecommunication and Film

Brandon Refour, Telecommunication and Film

Lena Hardy, Telecommunication and Film

Alex Karr, Telecommunication and Film

Faculty Mentor: Chandra Clark, Telecommunication and Film

Tuscaloosa One Place

Tuscaloosa One Place is a Human Resource center that offers the Tuscaloosa community parenting help, marriage counseling, after school care, and much more. I have worked diligently along side 3 other hard working students to make sure that Tuscaloosa's One Place is being promoted in the best way possible on all multimedia platforms. We started with promoting their annual marriage banquet. This banquet honors 7 nominated couples from the Tuscaloosa community for their strong marriage. We edited together a 30-minute video of all the couples' interviews along with pictures of their families and the couple's favorite song gently playing in the background. We have also transformed Tuscaloosa One Place's social media interaction. We have promoted all events on Facebook and Twitter and directed all post to the website. We made them an Instagram to reach the college target audience. Our current project we are working one are their website and their yearly report. We want the website to be easier to navigate while at the same time making sure that everything Tuscaloosa One Place has to offer is on there. We want to make sure that there are a lot of visuals that are appealing to the eye. With the annual report decided to add headings, subheadings, bullet points, and pictures to make sure that their good deeds jumped off the page.

Robert Ward, Biological Sciences

Faculty Mentor: Juan Lopez-Bautista, Biological Sciences

A Molecular Investigation of Distromatic Ulva (Ulvophyceae, Chlorophyta) from Central Chile

**International focus*

Ulva (Ulvophyceae, Chlorophyta) is a genus of green macroalgae dispersed across the world in varying environmental conditions. Ulva species hold great economic and ecological importance, and are notorious for causing green tides in eutrophic conditions. These algae have been extremely difficult to identify on a morphological basis due to morphological plasticity, cryptic diversity, and the overall simple morphology that lacks diagnostic characters. The arduous task of identifying Ulva at the species level produced a plethora of over 500 different species names for this genus with only about 100 actually being recognized taxonomically, and only 35 having a molecular species concept. We investigated samples collected from two locations off the coast of Chile. One of these locations is Concepción, the type locality of *Ulva nematoideae* Bory de Saint-Vincent. The following six distromatic species had been assigned to Chile: *U. fasciata* Delile 1813, *U. lactuca* Linnaeus 1753, *U. lobata* (Kützting) Setchell and Gardner 1920, *U. taeniata* Setchell and Gardner 1920, *U. rigida* C. Agardh 1822, and *U. nematoideae* Bory de Saint-Vincent 1828. We used molecular data based on the chloroplast markers *rbcL* and *tufA* to test species hypotheses that had previously been assigned to this country. Our analysis revealed a new report of *U. rigida* in Chile, and provided evidence to reduce *U. stenophylloides* into a synonym with *U. nematoideae*

Eric Wenzinger, Biological Sciences

Adam Lazarus, Biological Sciences

Faculty Mentor: Janis O'Donnell, Biological Sciences

Pilot Studies for a Whole Genome Screen for Autism-Related Gene Networks

Genome sequencing studies suggest that hundreds of genes are linked to the development of Autism Spectrum Disorders (ASDs). Mutations in one gene in particular, UBE3a, are known for their involvement in two ASDs, Angelman's Syndrome and classical autism. Over-expression of transgenic human UBE3a or the closely related Drosophila protein dUbe3a in the eye causes defects eye structure. We are screening a collection of wild population Drosophila lines called the Drosophila Genetic Reference Panel (DGRP) in a whole genome screen for alleles that enhance or suppress the eye phenotype. For this study, transgenic Ube3a females are mated to males of the DGRP strains, and the eye phenotypes are evaluated for modified eye phenotypes. Because the genomes of all 200 DGRP lines have been sequenced, we can perform a genome wide association study (GWAS) in order to expose a comparatively small functional network of genes from the large pool of candidate genes provided by sequencing studies. The functions of the genes found in this screen that also have homologous relatives in the human genome will be analyzed by detailed genetic analysis using the extensive resources of transgenic and mutant strains of Drosophila.

Morgan Whitaker, Chemistry

Faculty Mentor: David Nikles, Chemistry

Polymer Coated Magnetic Nanoparticles: Formation and Usage for Cancer Therapy

Magnetite nanoparticles were made by the decomposition of iron(III) oleate in refluxing 1-octadecene. The alcohol group at the terminus of a poly(ethylene glycol-b-caprolactone) diblock copolymer was reacted with 3-isocyanatopropyltrimethoxysilane to give a silane-terminated polymer. The polymer was bound to the surface of the magnetite particles through the silane functional group. This gave magnetite particles with a diblock polymer brush bound to the surface. The particles were easily dispersed in water due to the hydrophilic poly(ethylene glycol) block. In water the polycaprolactone block formed a semi-crystalline hydrophobic shell around the magnetite. Pyrene, a hydrophobic fluorescent probe, was reversibly bound to the polycaprolactone phase. Doxorubicin, a cancer drug, was also bound to the polycaprolactone phase.

Will Whitham, Psychology

Faculty Mentor: Beverly Roskos, Psychology

Wayfinding in Urban and Non-Urban Environments

A number of factors contribute to one's ability to navigate from place to place (aka wayfinding), including gender, sense of direction, familiarity with environments, and strategies used to navigate. However, wayfinding research is largely done in urban settings, and little is known about wayfinding in rural environments. The present research investigates how variables shown to be involved with wayfinding performance in urban environments relate to wayfinding performance in non-urban environments. Participants (135 students; 70 women) learned a route in either a virtual city or a virtual rural environment, with performance measured as number of turning errors. Then they navigated to a predetermined landmark in the most efficient way possible, and performance was a measure of efficiency. Afterward, a demographic survey was administered to determine the gender, sense of direction, navigation strategies, and hometown of the participant. There were no differences between the two environments when learning them, but participants were less efficient in the rural environment than in the urban environment. It may be that participants can better conceptualize urban environments because they have used navigation aids such as maps or GPS in these environments but not in rural environments. For other variables that affect wayfinding performance, the typical variables predicted learning (i.e., turning errors): gender, strategy use, and sense of direction, but none predicted efficiency.

Meghan Wilgus, Information Systems, Statistics and Management Science

Benjamin Romano, Computer Science

Luke Colburn, Computer Science

Faculty Mentor: Chris Sims, Computer Science

Severe Weather Training and Familiarization Using Virtual Reality Technology

A key component of surviving a severe weather event is preparedness. The impact of surviving such an event can lead to long-term physical and mental problems that can destroy the quality of life for storm survivors. The world of virtual reality provides an interesting approach to both better educate and treat the psychological issues associated with such events.

Researchers at the University of Alabama plan to create an immersive environment that can be used to familiarize participants with the steps they need to take during a serious weather event. In this environment, participants will be placed in a virtual world designed to approximate familiar environments - such as their home or school - along with weather guides that would walk participants through the simulated weather event. Throughout the simulation, these guides will describe what is occurring and lead the participant through the steps needed to ensure safety during a storm.

Due to the relatively low cost of the Oculus Rift and the ease with which virtual environments can be created, this technology is a natural fit for the classroom and the therapist's office. Simulated storm environments can help therapists and educators to (1) prepare participants to safely survive a severe weather event, and (2) address symptoms of phobia and PTSD of individuals dealing with the trauma of surviving a severe weather event.

Alina Wilhelm, Capstone College of Nursing

Lesley Wildes, Capstone College of Nursing

Emily Williams, Capstone College of Nursing

Hannah Williams, Capstone College of Nursing

Faculty Mentor: Michele Montgomery, Capstone College of Nursing

Lack of Access to Healthcare in Windham Springs, AL

Examining a community's level of health starts through observation of its inhabitants, available resources, surroundings, and environment. When assessing a community's health one should observe for multiple aspects within these levels. The community's culture, the distance to available health resources, access to healthy food options, and quality of the environment are a few things to consider. We began through the use of windshield surveys and then recruited the help of internal sources. It is important to have internal sources from within the community to help promote change and plant a project that will continue to flourish long after the promotion has been implemented. Once issues affecting health had been pinpointed, health promotion can follow. This presentation will discuss our findings of a local community in Tuscaloosa County. We have identified multiple issues but have chosen to focus in on what we feel is the most crucial concern. The lack of health care providers was found to be the priority issue. Since individuals do not have decent access to health care within their community, we can assume that most individuals cannot take off work or travel further away to attain certain health screenings. This lack of availability lowers the overall standard of health. We will talk about ways to increase the availability of health care through evidence-based interventions, which will move the community towards a higher level of overall health in the years to come.

Kindle Williams, Chemical and Biological Engineering

Katherine Donaldson, Chemical and Biological Engineering

Faculty Mentor: Stephen Woski, Chemistry

Molecular Electronics: Synthesizing the Technology of the Future

As part of a project involving molecular scale electronic devices, we are exploring the synthesis of potential rectifiers. Our target molecules contain electron-rich dimethoxybenzene donor rings and electron-poor quinone acceptor rings separated by single bonds. We first optimized the reaction to generate 4,4'-dibromohemibiquinone, the primary precursor molecule. This product was then converted to aminohemibiquinone, the template for further substitution. It is possible that adding lone pair-containing functional groups to aminohemibiquinone derivatives would allow the molecule to bond directly to the surface of an electrode as well as retain the electron-withdrawing properties of the quinone ring. The proof-of-concept reactions attempted for substitution were alkylation and acylation. Alkylated and acylated products were purified and analyzed to confirm their presence and determine structure. The synthesis reactions for the precursor molecules were scaled up, and a new product was synthesized with the addition of a cyanobenzoyl substituent. This product was then purified. HOMO/LUMO calculations were performed for each of the molecules synthesized to this point. Further testing is required to determine if and how these or other substituents will allow the molecule to bond directly to a gold surface. If this is achieved, it is possible that our molecular electronic components could one day replace their silicon-based diode counterparts.

Regina Williams, School of Social Work

Jeremy Howard, School of Social Work

Faculty Mentor: Javonda Williams, School of Social Work

Oppression is Linked: Issues facing the general LGBT population

The purpose of this research assignment is to identify the unequal opportunities among the LGBT community on the campus of the University of Alabama. It is important to examine these issues that surround both racial and economic justice that hinders this particular group. Some issues include: racism, employment discrimination, immigration, and equal student body participation opportunities. We plan to use current resources, interviews, questionnaires, and statistics in order to research and present this social issue. The research proposal will be based on the Young Adult stage (Intimacy vs. Isolation). We will determine how having non-relationships with other individuals can affect one's well-being.

Leighton Wilson, Mathematics

Faculty Mentor: Shan Zhao, Mathematics

An Exploration of Various Operator Splitting Schemes for Solving the Nonlinear Poisson Boltzmann Equation

The Poisson-Boltzmann (PB) model is a widespread and effective approach for electrostatics analysis of biomolecules. However, the nonlinearity associated with the PB equation introduces major difficulties when solving the equation numerically. This work explores the viability of various operator-splitting methods for solving a nonlinear PB equation in a pseudo-transient continuation approach. Within this framework, analytical integration of the nonlinear term in the PB equation was employed to suppress the nonlinear instability. To verify our schemes, a simple spherical-case analytical solution to the PB equation was employed. In our numerical benchmarks using this case, the steady state solutions of these operator-splitting schemes using a range of different initial values all converge to the time invariant analytical solution, suggesting a high degree of stability, particularly over existing explicit Euler schemes whose stability is highly dependent on initial values. When applied to actual biomolecules, the schemes maintained stability for even very large time increments. One particular additive operator splitting scheme displayed a higher rate of convergence than the other schemes. To further refine this method, Richardson extrapolation was applied, producing a highly stable, efficient, and relatively accurate method for biomolecular simulation in the PB framework.

Edward Woodall, History

Faculty Mentor: Josh Rothman, History

Research Possibilities of a Runaway Slave Ad Database

This project is part of a larger project in which runaway slave ads published in Alabama newspapers are scanned, documented, and transcribed. The goal of this presentation is to use the ads published in the Tuscaloosa papers, The Independent Monitor and The Flag of the Union, to demonstrate the kinds of information that researchers will be able to glean from our database when it is complete. Such information ranges from larger statistical trends to insights into the mindset of slaveholders.

Andrew Wrist, Aerospace Engineering and Mechanics

Faculty Mentor: Paul Hubner, Aerospace Engineering and Mechanics

A Comparison of Various Free Leading Edge-Membrane Wing Configurations in Low Reynolds Number Flow

This investigation compares the wake characteristics of membrane airfoils with various boundary conditions in low Reynolds number flow ($Re \sim 50,000$). Specifically, the research examined wake profiles developed using hotwire anemometry for membranes with vibration limiters located at the leading edge, trailing edge, and 25, 50, and 75 percent of the chord length. The method for limiting the vibrations at various locations involved the fixture of a 3D printed "batten" or "clip" at the aforementioned locations along the membrane. The subject membrane airfoil was a product of a combination of previously proposed methods for construction using aluminum plates and silicone rubber. In addition to the wake profiles, spectral energy and frequency data are also examined in the investigation. Results indicate that the increase in size of a membrane's wake for a free leading edge configuration is an effect of the free leading edge as opposed to the implemented boundary conditions. Further results will be detailed in the poster presentation.

Jeffrey Wysong, Mathematics

Faculty Mentor: Rob Morgan, Management and Marketing

STEM Student Retention

For our study, we focused on the STEM to MBA program. This program centers on undergraduate students in STEM (Science, Technology, Engineering, and Mathematics) disciplines who earn their bachelor degree(s) while getting their MBA (Masters in Business Administration) just one year after. In this study, the main goal was centered on whether retention rates of STEM students in the STEM to MBA program differed from those of STEM students outside of the program. To measure these retention rates, we analyzed data on students enrolling at Alabama in a STEM major since 2011. In this analysis, we controlled for extraneous factors such as home state and test scores to determine possible correlations between different variables and retention rate. Studying these different retention rates is important because it allows us to determine ways to address factors that drive whether students stay in or leave these STEM disciplines. In a time when there are more and more vacancies in STEM related jobs, it is crucial to retain students in this particular area of study.

HAOMING YAN, Chemical and Biological Engineering

Jia Yue, Chemical and Biological Engineering

Faculty Mentor: Hung-Ta Wang, Chemical and Biological Engineering

Mechanical Property Measurements of Bismuth Telluride Two-Dimensional Nanosheets

Two-dimensional (2D) nanosheets of bismuth telluride (Bi_2Te_3) have shown a potential for future applications in electronics, thermoelectrics, and heterogeneous catalysis. Understanding their mechanical properties has become a scientific need in order to further their applications. In this work, we used atomic force microscopy (AFM) in contact mode to probe 2D nanosheets of Bi_2Te_3 , suspended

on an array of circular holes (diameter~2 μm). We either mechanically exfoliated commercial Bi_2Te_3 flakes into 2D nanosheets by commercial dicing tapes, or directly transferred as-grown Bi_2Te_3 2D nanosheets by homemade elastic poly(dimethylsiloxane) (PDMS) stamps. We will demonstrate the direct measurement of mechanical properties for calculating the Young's modules of these Bi_2Te_3 2D nanosheets. (Yan and Jia contributed equally to this work)

Mary Young, Music

Faculty Mentor: Andrea Cevasco, Music

A Comparison of Therapeutic Music Professionals Used in a Medical Setting

Abstract: The purpose of this study is to examine the training and qualifications of therapeutic music professionals used in a medical setting. This includes Board Certified Music Therapist, Certified Music Practitioners, Harp Therapist, and Music Healers. It will include an analysis of each profession's credentials, history, membership, course work, and clinical training as presented on each organization's website and through published research. The outcome of this project is provide a distinction between each of these professions in order to educate other healthcare professionals.

Shuwen Yue, Chemical and Biological Engineering

Faculty Mentor: David Dixon, Chemistry

Computational Studies of the Conversion of Biomass to Biofuels

Computational studies relevant to the conversion of biomass to biofuels and intermediates for the chemical industry have been performed to develop reactivity predictors. Density functional theory and the G3MP2 composite correlated molecular orbital theory levels were used to predict the acidities and basicities in the gas phase as well as pK_a 's and pK_b 's in aqueous solution. This method has been carefully benchmarked against experimental data and has been applied to more than 100 key intermediates in the conversion of biomass-derived glucose to biofuels. Excellent agreement exists between the available experiment and theoretical results.