Amy Ackerman, New College  
Faculty Mentor: Martina Thomas, New College  
*Civic Engagement and the Development of Collaboration between Community Organizations*  
The presenter, a community engagement intern, used a Girl Scout program to work with the Beacon House in Walker County, Alabama, a home for girls in the DHR system. The program engaged the girls on topics of anti-bullying and self-esteem. The presenter saw an opportunity to create a sustainable program by creating a curriculum of resources with program samples and train women at Hope for Women, an organization that helps women become drug-free and independent, to become the mentors and volunteers. The poster will discuss the execution of this program and the significance of why this program will be important to both organizations.

Alison Adams, Biological Sciences  
Faculty Mentor: Laura Reed, Biological Sciences  
*QTL affecting genotype-by-diet interactions of pupal body weight*  
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 pupal weight. 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 pupal body weights.

Brianna Adams, English  
Faculty Mentor: Yolanda Manora, English  
*Mapping Oppression: A Geocritical Reading of Naylor’s The Women of Brewster Place*  
This paper analyzes the fictional space in Gloria Naylor's novel The Women of Brewster Place (1982) through a geocritical lens and considers the extent to which Brewster Place functions both as a carrier of identity and as an iteration of existing power structures throughout the novel. While several critics (Sarah Vinson, Rocio Davis, Karen Walker) have noted the novel's emphasis on community and collective memory and have identified Brewster Place as a space of both oppression and of potential liberation, little work has been done to connect these themes back to the built environment of Brewster Place through a geocritical lens. First articulated by French theorist Bertrand Westphal in 2007, geocriticism is an interdisciplinary literary theory which draws from other fields such as geography, architecture, urban planning, and philosophy in order to examine the relations between people and their environment. In this paper, I examine how the place Brewster Place shapes identity formation and serves as a representation of political power structures. Then, by considering the novel itself as a built environment, I apply concepts common to urban planning and to geocriticism to argue that the novel's physical attributes-its form and structure-reflect the text's attempt to strike a balance between opposing binaries such as the individual and the community and European and African identity.

William Alexander, Communicative Disorders  
Faculty Mentor: Angela Barber, Communicative Disorders  
*Analysis of parent competence who have children with ASD through Project ImPACT intervention*  
Previous research indicates that children with an Autism Spectrum Disorder (ASD). have far better outcomes when their parents feel confident about the intervention methods (Kasari et al., 2010).

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Parents are more likely to feel invested and confident in their child’s intervention when they are included in the intervention itself, rather than passively observing a therapist providing the intervention (Ingersoll et al., 2006). However, little research has examined which particular aspects of parent-implemented ASD interventions empower parents to feel most confident about working with their child to improve communication. Project ImPACT (Improving Parents as Communication Teachers) is an intervention curriculum that equips parents with routines and activities to help promote social-communication for their child with ASD and, therefore, serves as an ideal intervention to examine preferred intervention techniques with parents. The purpose of this research is to analyze which aspects of intervention delivery are most preferred by parents who have young children with ASD enrolled in Project ImPACT intervention. Semi-structured interviews using the Parent Treatment Satisfaction Scale and the Parent Sense of Competency Scale will be conducted with parents involved in Project ImPACT sessions. Questions asked pertain to overall confidence associated with parenting a child with an ASD, the parents’ confidence while implementing intervention techniques, the vernacular the clinician uses that helps empower the parents, and the type of presentation model the parents prefer (i.e. coaching, observation, demonstration). Seven families are currently enrolled in the Project ImPACT intervention study and will be asked to participate in this interview. The data collected from these interviews will provide future clinicians information on how their teaching style is affecting the parent’s confidence in targeting intervention methods in the hope and, thus, may impact their relationship with their child.

Husam Ali, Chemical and Biological Engineering
Faculty Mentor: Nicole Powell, Psychology
Analysis of Aggression and Popularity in Children
Sociometry is the measurement of social relationships. In this research, students from multiple different schools filled out a questionnaire asking about their relationships between classmates. The questions range from who is the most liked child, who is the least like child, and who teases the most. Using this sociometric data will allow the researchers to understand the interactions between classmates. After taking the sociometric data, it is run through a statistical analysis program. This program then reveals the correlation between popularity and aggression. In addition to comparing popularity and aggression, the relationship between boys and girls are compared against each other. Aggression is known to be a main component in children misbehaving. By using the correlation between aggression and popularity, it may help in determining why children misbehave.

Liz Alley, Management and Marketing
Faculty Mentor: Chip Brantley, Journalism
Call from Selma Researching the unsolved murder of James J. Reeb, a Boston pastor who was killed in 1965 outside a restaurant in Selma while in Alabama to participate in civil rights protests. No one has ever been convicted of Reeb’s murder, and the case has not been exhaustively reported. We have worked to present this story and the broader context of the Civil Rights Movement, Selma in 1965, and the reaction of the nation in a web-based narrative to be published in April 2015.

Lauren Anderson, Political Science
Faculty Mentor: Dana Patton, Political Science
Family Leave Policy
I will be presenting my policy brief research regarding paid family leave. I will be researching multiple aspects for the policy proposal: such as parental, familial, and maternal leave, and deciding on an appropriate time frame for said leave. I will research existing policies in other countries, the economic effects in those countries, and the government structure of successful policies similar to the United

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States to formulate the best implementation. However my ultimate goal is to create a paid family leave policy that can be taken equally by the heads of the family unit to share responsibilities for newborns, child care, and other potential personal reasons. My policy brief will be presented on a poster by framing the context and importance of the problem, existing policy attempts, and policy recommendations.

**Rahni Argo-Bryant**, Telecommunication and Film
Faculty Mentor: Sim Butler, Communication Studies

*The Culture of Comic-Con: Planning as an Extension*

I spent a week in San Diego, California studying the culture surrounding Comic-Con International in July 2014, the largest fan convention in the United States with over 150,000 attendees. In my report I argue the immersion into the world of Comic-Con is extended into the planning before the convention and to an extent the online communities reporting on Comic-Con as well. The method of study of the culture used was Ethnography, a form of study that involves careful observation and participation of a specific culture to learn about the social and cultural lives of the group. Particular aspects of Ethnography used were artifact collection, observation and participation, and ethnographic interviews. The results I found were that Comic-Con attendees did in fact participate in the culture of Comic-Con long before they even got there. Some planned extensively with color-coded spreadsheets with all the panels they wanted to attend. Others used online resources such as blogs dedicated to the convention. The overall consensus was that everyone did participate some way in the culture before they got to the convention through planning for it, regardless on the quantity or style of planning. The culture of Comic-Con extends further than the actual event and the planning process leading up to the convention is actual participation in the culture. A convention so impactful houses so many fandoms at once and how they all convene provides a unique look into fan studies at large.

**Hannah Armstrong**, Psychology
Faculty Mentor: Stanley Brodsky, Psychology

*Attractiveness Bias Effect on Expert Witness Credibility and Juror Decisions*

In this study, we examined how the perceived attractiveness of an expert witness affected mock jurors' perceptions of male and female expert witness credibility (n = 261). The study also investigated how a juror's personality traits may affect their judgements of attractiveness and credibility. Our findings show that the attractiveness of an expert witness may not play as big of a role in juror judgment as originally thought. However, while male expert witness credibility remained stable across attractiveness conditions, females with medium rated attractiveness were viewed as more credible than the low or high female conditions. This finding is consistent with literature suggesting female expert witnesses face a credibility deficit in the courtroom compared to males. Two personality traits (agreeableness and conscientiousness) were found to influence mock jurors' ratings of overall expert witness credibility. Implications for theory and practice are discussed.

**Randy Arnold**, New College
Faculty Mentor: William Doty, Religious Studies

*Willoughby Disk Amplification*

Between 900 a.d. through 1600 a.d. the Eastern Woodlands People lived within a rich complex of art, symbolic iconography, ritual, and cosmology. Although much of the meaning is lost, the mythologies of related cultures that have survived, point toward the belief systems of Mississippian culture. Commonalities and large mythic motifs likely point toward past belief systems. Individual mythologies collected or remembered, on the other hand, often resemble folk stories or teaching tales, which do not
link to the pre-Columbian past in Eastern North America as readily. The dissemination of mythic stories weakened the original power of the symbols. A myth such as "The Sphinx Moth and the Old Coyote" points toward the sacred symbol, sphinx moth, and still retains some of the original mythic elements, but the power of the original is removed, yet stories such as the Cochiti tale "the origin of death" retain the quality of myth as a "deep truth." These myths retain symbol and point to deeper structure. Examined together, mythic motifs reveal both belief systems in past culture as well as deep structure within ourselves. Although the original mythic structure may never be understood, patterns emerge from the pieces. This is the theme that I explore and amplify through comparative mythology and religious traditions, as well as archetypal symbols and motifs. Examining mythic structures alongside current research models allows one to amplify the past along with the present.

Hayden Arnold, Chemical and Biological Engineering
Faculty Mentor: David Dixon, Chemistry
*Initial Steps in the Formation of Plutonium(IV) Oxide and Hydroxide Nanoclusters*
There is significant interest in the formation of plutonium based colloids as these structures can impact separation systems for fuels and waste from nuclear reactors as well as lead to clogging of transfer lines. Optimization of these types of systems has the potential to both make and save money for these industries that utilize plutonium based colloids. Electronic structure calculations are being used to predict the initial steps in colloid formation starting from aqueous Pu(IV). The aqueous Pu(IV) clusters shed protons as they convert solvated water molecules to oxides (O2-) and hydroxides (OH-) which enable clusters of Pu(IV) to form in the presence of selenates and sulfates. The results are compared with those from similar calculations on Th(IV) for which experimental and computational data is available. Currently, calculations for a number of plutonium monomers and dimers have been performed. Calculations are underway for additional monomers and dimers as well as for trimers.

Jason Arterburn, Economics, Finance and Legal Studies
Faculty Mentor: Peter Brummund, Economics, Finance and Legal Studies
*Racial Homophily and Wage Discrimination: Evidence from Brazil*
*International focus*
In Brazil, different employers often ascribe different racial classifications to the same worker. Researchers find that these subjective classifications account for 40 percent of the raw racial wage gap after controlling for pre-market individual characteristics. This project examined how the racial composition and racial heterogeneity of managerial and supervisory staff affects both employer-reported racial classification of workers and firm- and plant-level wage discrimination across the formal Brazilian labor market. I use data collected from 2004 to 2013 in the Relaçao Anual de Informações Sociais (RAIS), which covers all establishments or persons in Brazil who have maintained an employment relationship at any point during each listed year. This research expands upon audit studies that observe racial homophily in hiring practices, investigating how employer-employee racial correspondence affects wage discrimination across a national labor market. This work is among the first to explore how racial access to organizational power structures affects wage discrimination.

Allison Artman, Political Science
Faculty Mentor: Dana Patton, Political Science
*Increasing financial literacy among America’s Youth*
Traditionally, American public schools held little responsibility for the financial education and literacy of youth, while parents held almost all the responsibility. Financial literacy rates among adults are low which contributes to unstable personal finances. Consequently many parents are under qualified to

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instill financial skills in their children, thus a shift of this responsibility onto public schools is necessary. A small shift in responsibility from parents to schools has occurred. This shift is characterized by an increasing number of public high schools requiring or offering a course related to economics or personal finance. However, financial literacy among those who participated in an economics or personal finance courses in high school remain low. To increase rates of financial literacy, responsibility for the financial education and literacy of youth must shift further into the hands of the public school system. This can be accomplished using interactive lessons and integrating financial education through both primary and secondary school curricula.

**Dustin Atchison**, History
Faculty Mentor: Cory Callahan, Curriculum and Instruction

*The Exploration of History in the Elementary and Middle School Classroom: Teaching History to Gifted Students*

My research focuses on how history is taught to elementary and middle school students. Much of my research is focused on how gifted children are exposed to the subject. When examining gifted students' exposure to history within these classrooms, I also examine how much time is put toward the subject, what resources and methods are employed, what content areas are covered, and how all of this supplements the standard elementary and middle school curriculum. I look at existing literature to understand how gifted students are classified and how they learn. My project's scope is also limited to Alabama and the differences within gifted instruction.

**Olivia Atkinson**, Political Science

**Tiana Rivas**, Political Science

Faculty Mentor: Dana Patton, Political Science

*Gender Bias in Politics*

We hope to gain a better understanding of unconscious gender bias in politics. We pose the question, Are politicians who are women taken as seriously as politicians who are men? Our purpose is to see if female politicians are shown as much respect and given as much credibility as their male counterparts. It is our hope that through this study, voting citizens will become more aware of gender bias in their voting habits. Our hypotheses are that women are not taken as seriously and shown as much respect as their male counterparts, and policies they support or write are not viewed with as much respect as those of men. Furthermore, we hypothesize that women are not seen as competent as men to hold high elective offices. This study is important because it may uncover unconscious gender biases in political voting. To answer our research question, we survey 150 students.

**Jordana Baraad**, Psychology

Faculty Mentor: Matthew Jarrett, Psychology

*Attention-Deficit/Hyperactivity Disorder (ADHD) and Mindfulness*

Attention-deficit/hyperactivity disorder (ADHD), a neurodevelopmental disorder commonly persisting into adulthood, is characterized by executive functioning (EF) deficits. New research is investigating a co-occurring symptom domain reflecting drowsiness and decreased alertness and activity. Little is known regarding how these symptoms, collectively termed sluggish cognitive tempo (SCT), respond to treatment. For ADHD treatment in general, there has been increased empirical interest in mindfulness meditation, although no studies of mindfulness as a standalone treatment have examined its effects on SCT in adult cases. This study aims to assess the efficacy of mindfulness meditation for ADHD and SCT symptoms and EF deficits, in an adult ADHD sample. Adults with ADHD (n = 8) will complete a pre-waitlist assessment (4 hours) and 2 subsequent assessment sessions (4 hours each at post-waitlist and

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weight, improvement of respiratory function, and a variety of other factors. In conclusion, this review indicates that walking is a beneficial intervention in improving hypertension. It is effective in that it promotes lifestyle change, rather than a temporary intervention.

**Kevin Battles, Physics and Astronomy**  
Faculty Mentor: Jeremy Bailin, Physics and Astronomy  
*Galactic Warps in Smoothed-Particle Hydrodynamic Simulations*  
We investigate the origin and evolution of galactic warps formed in n-body smoothed-particle hydrodynamic (SPH) galaxy formation simulations utilizing a cosmological constant and cold dark matter (ΛCDM) cosmogony. The origin of galactic warps is not entirely known; however there are a few possibilities: angular momentum contributions from satellite galaxies moving through dark matter halos, galactic interactions such as mergers, etc. We analyze the evolution of the angular momentum of the three families of particles in the simulations (gas, stars, dark matter) and its origin. This wide variety of analyses allows us to investigate if the origin of structure in these galaxies is a local phenomenon or if it comes from the large scale structure of dark matter filaments on cosmological scales. Therefore, the investigation of the origin of the galactic warps will not only give insight into the origin of warps in galaxies, but also provide a further understanding of galactic formation and evolution.

**Madison Beck, Chemical and Biological Engineering**  
Faculty Mentor: Marco Bonizzoni, Chemistry  
*Towards immobilizing polymeric chemosensors on a solid surface*  
Our research group focuses on the study of reversible intermolecular interactions of branched charged polymers called poly(amidoamine) (PAMAM) dendrimers. These are large, highly charged polymers that are water soluble and capable of encapsulating smaller organic molecules in solution. On the basis of this expertise we previously developed analytical assays for the detection of phosphate anions in water that are relevant for biological, environmental, and public safety applications. However, those assays operated in solution, which decreased their ruggedness and portability. We report here on the progress of our attempts to move the assay to a solid support to improve those characteristics. We attempted to immobilized the large dendrimers on a solid surface such as a plastic microwell plate or a dipstick, while retaining their sensing abilities. Different methods were investigated, including the use of a biotin-avidin linkage with a polystyrene plate, as well as the use of a pre-treated plate that bonds with the primary amines on the dendrimers' surface. The degree of immobilization of the dendrimer was measured using fluorescent dyes, and absorbance and fluorescence measurements. Ultimately we intend to develop a solid-supported assay to test for anionic contaminants in environmental applications, such as the measurements of organophosphates and inorganic phosphate in agricultural runoff.

**Simon Bedoya, Civil, Construction and Environmental Engineering**  
Faculty Mentor: Mark Elliott, Civil, Construction and Environmental Engineering  
*Tailored, Scalable, and Modular Solutions: Integrating novel sources with UV LEDs for Safe Water*  
Ultraviolet (UV) light-emitting diodes (LEDs) are emerging as an energy efficient and environmentally benign alternative to currently employed mercury lamps for disinfection of waterborne pathogens in diverse applications and settings, such as water and wastewater treatment and reuse. Despite the anticipated advantages, many technical questions remain with respect to optimizing UV LED treatment for practical long term use in the field. In order to further bridge the knowledge gap of these technical questions, the four pathogens were targeted in this research were E. coli B, E. coli C3000, MS-2, and PRD-1 Microbial reductions were accomplished by using a collimated beam of the targeted wavelength in a 5 mL petri dish containing our pathogen. Wavelengths of 231-nm, 262-nm, 282-nm and 369-nm

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were targeted for use individually as well as paired sequentially in order to determine the most effective combination for microbial inactivation. In order to measure the resulting effectiveness of the microbial reduction in comparison to the EPA standards, a Single Agar Layer (SAL) procedure was used for measurements of viral reductions while IDEXX Colilert test kits for coliform reduction counts. Through our procedure, we were able to effectively meet EPA target reductions for the bacteria and viruses using the 262-nm and the 282-nm wavelengths. The 369-nm wavelength appeared to be ineffective at the doses thus far attempted while the 231-nm wavelength results are still in progress.

Amanda Bennett, English
Faculty Mentor: Trudier Harris, English
Through the Eyes of Another: Representations of African American Women in Native Son and Invisible Man
This project examines the concept that the prominent Black female characters in Invisible Man and Native Son are either reduced to antebellum stereotypes or, more controversially, act as agents provocateurs who undermine Black men. To form my argument, I researched the Mammy and Jezebel archetypes and analyzed how Ellison and Wright use these stereotypes to develop the identities of their novels’ central Black female characters. I also used Ellison and Wright's application of these tropes to argue that the publication chronology of their novels are critical to understanding the overly simplistic construction of the Black female public identity during the mid-twentieth century and the Civil Rights Movement.

Ramya Bheemanathini, Capstone College of Nursing
Emily Motes, Capstone College of Nursing
Alyssa D’Addabbo, Capstone College of Nursing
Emily Frazier, Capstone College of Nursing
Victoria Walters, Capstone College of Nursing
Abbie Friday, Capstone College of Nursing
Taylor Wharton, Capstone College of Nursing
Faculty Mentor: Michele Montgomery, Capstone College of Nursing
Primary Prevention of Elrod/Echola, Alabama
The purpose of primary prevention is to help avoid given health care problems. Primary prevention helps to teach individuals about heath and community safety. In a rural community, it is vital to implement safety measures because they lack various resources due to location. Due to the lack of access to hospitals and emergency services, basic life support can dramatically impact the safety of the community. CPR, cardiac pulmonary resuscitation, requires adequate knowledge on how to use proper technique. As such, CPR quality varies widely between systems and locations. Victims often do not receive high-quality CPR because of provider ambiguity in prioritization of resuscitative efforts during an arrest. Therefore, as primary prevention, implementing free training sessions will be helpful in achieving an increase in survival rates. These training sessions can be held in the community center, which is central to this location. Improving the quality of CPR as our primary preventative measure will lay a foundation for further teaching about various other safety measures in the community. This presentation will illustrate health promotion and safety measures related to the demographics in the Elrod/Echola community.

Ruth Bishop, Biological Sciences
Faculty Mentor: Laura Reed, Biological Sciences
Identifying pupal-weight modulating genes which interact with diet in Drosophila melanogaster

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Metabolic Syndrome (MetS) is a cluster of conditions including high blood pressure, high blood glucose and lipid levels, and insulin resistance, all of which increase one's risk for heart disease, stroke and diabetes. In order to understand the relative contributions and the interaction effect of one's genes and environment with respect to MetS phenotypes, we used Drosophila melanogaster as a model for studying quantitative traits such as weight, glucose levels and triglyceride levels. In this particular study, we applied Quantitative Trait Loci (QTL) analysis to identify genes correlated with both diet-specific expression and pupal weight. After screening and selecting 20 gene candidates, we performed RT-PCR to determine the expression of these genes in larval samples fed either a normal or high-fat diet. By identifying pupal weight-modulating genes with significant interaction effects with diet, we are able to better understand the complex interplay between Drosophila genes and diet with respect to pupal weight and potentially identify orthologous genes in humans.

Joshua Blackwell, Biological Sciences
Faculty Mentor: Janis O'Donnell, Biological Sciences
Inhibition of the neuroinflammatory response confers increased survival in a Drosophila Parkinson's disease model
Prolonged neuroinflammation and microglial activation are implicated in the development and progression of multiple neurodegenerative diseases, such as Parkinson's disease (PD), Alzheimer's disease, and amyotrophic lateral sclerosis. In a Drosophila model of PD, flies that ingest the herbicide paraquat experience increased oxidative stress and exhibit movement disorders arising from the degeneration of dopaminergic neurons. The oxidative stress introduced by paraquat feeding elicits a pro-inflammatory response from immune cells called plasmatocytes. These mononuclear phagocytes in Drosophila function as analogs of vertebrate microglia and act as the primary immune cells in the brain. When activated in response to oxidative stress, plasmatocytes promote inflammation through a variety of mechanisms, including the upregulation of nitric oxide synthase (Nos) and the associated release of reactive oxygen species. To determine the contribution of plasmatocytes to neurodegenerative pathology, we fed paraquat to Drosophila with reduced plasmatocytes and differentially compromised immune activation signaling pathways and examined survival. We found that with decreased neuroinflammatory activation, susceptibility to paraquat is diminished and survival is increased. These findings suggest that the actions of plasmatocytes contribute to the pathology of paraquat insult in the Drosophila PD model.

Matthew Blazer, Electrical and Computer Engineering
Houston Lamb, Electrical and Computer Engineering
Julius Brown, Electrical and Computer Engineering
Faculty Mentor: Yang-KiHong, Electrical and Computer Engineering
Reconfigurable Miniature Ferrite Antenna
In the world of modern technology, mobile devices and computers continue to decrease in size. Therefore, electronic components, including antennas, need to be miniaturized. Our goal is to design and construct a miniaturized reconfigurable ferrite antenna for use in mobile devices such as cell phones, laptops and tablets. Currently, a cell phone can contain up to seven antennas, each of which takes up valuable space in the device. The design of a ferrite antenna that uses a varactor diode in combination with a PIN diode leads to the construction of a reconfigurable antenna that will achieve maximum gain while configuring to a wide range of frequencies. The proposed antenna design utilizes a 40mm x 10mm ferrite substrate. This antenna has an overall size of 40mm x 60mm. By utilizing a ferrite with high permeability and low permittivity, an efficient ferrite antenna can be built. This project intends to construct a state of the art reconfigurable antenna that has a frequency range from 840Hz to 2.4GHz.
while also minimizing the size of the antenna. Therefore, by implementing a single reconfigurable miniaturized ferrite antenna into a device, high performance and reliable wireless communication can be achieved while simultaneously minimizing size and complexity.

**Jamie Bowman**, English
Faculty Mentor: Albert Pionke, English

*The Sacred Oxford University: Incorporating the Totemic with Bildungsroman in the Oxford Novel*

This project positions the Victorian university novel as a form of Bildungsroman that challenges the overwhelmingly secular focus of current theories of the genre. Taking The Adventures of Mr. Verdant Green, Tom Brown at Oxford, and Loss and Gain as my objects of analysis, I supplement Franco Moretti’s notion of Bildungsroman with Emile Durkheim’s concept of the totemic to argue that, for nineteenth-century students at Oxford, recognizing and positioning themselves with respect to the university as a manifestation of the sacred forms a crucial part of their self-development. The conclusions of the analysis point to a revitalization of the Bildungsroman genre and a greater signification of the Oxford novel subgenre. My presentation will consist of a close examination of the protagonist Verdant Green, laying the foundation for connections in character development and totemic adoration to Tom Brown and Charles Redding. These ties portray an overarching progression in the perspective of Oxford University as a sacred entity.

**Mackenzie Branco**, New College
Faculty Mentor: Catherine Roach, New College

*A "Woof! Woof!" Worldview: Creating Comprehensive Educational Materials for the American Dog Owner*

Knowledge of canine body language and behavior should not be limited to professionals in the veterinary or animal training fields, but extended to all who interact with dogs on a daily basis. The aim of this study is to provide a no-nonsense, scientifically-based profile of how dogs view the world, from the capabilities of their senses to their body language and communication methods. Once this profile is built from academic sources, an informative, creative, and potentially humorous video from the point of view of a dog will be produced, along with a brochure for use in animal shelters, veterinary offices, and pet stores, targeted at both veteran and first-time pet owners alike.

**Jason Britchcow**, Computer Science
Faculty Mentor: Conor Henderson, Physics and Astronomy

*Physics and Astronomy Configuration of an Open Science Grid Tier 3 Computing Cluster for use as part of the CMS Experiment at CERN*

This research project involves the configuration of the RC2 computing cluster, which is active on the University of Alabama campus, to act as a Tier 3 cluster on the Open Science Grid (OSG) infrastructure. The need for such a facility is motivated by UA researchers in the Physics Department who are collaborating with the CMS experiment as part of the Large Hadron Collider at CERN. An OSG Tier 3 cluster at UA will allow these researchers to share data and resources with their international collaborators and to better perform computationally-intensive research at the CERN collider. This will in turn boost productivity on research projects by eliminating the need to send complex processes to run on remote data. To accomplish this, all of the OSG requirements need to be installed correctly without interfering with the existing system, and the host firewall must be adjusted to allow the cluster to communicate with the grid. In addition, the CMS experiment requires specific software for the processes

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to run properly. After these obstacles are overcome, the cluster will benefit researchers utilizing the OSG both locally and remotely.

**Kaitlin Burchett**, Psychology  
Faculty Mentor: John Lochman, Psychology  
*Gender Differences in Social Information-Processing as related to Different Functions of Aggression in Pre-Adolescent Youth*  
Much of the existing literature on aggression and its expression focuses on boys, and there are significant gaps in research on gender differences in aggression. Existing research shows that certain steps of social information-processing (SIP), specifically hostile attribution bias and aggressive response planning, are related to aggression. The purpose of this study was to determine if gender differences exist in the relationship between these social information-processing variables and the two forms of aggression: proactive and reactive aggression. A secondary data analysis utilizing correlations and regressions was conducted using data from the control groups of research conducted as part of the Coping Power Program. Based on mixed findings in existing literature, the presence of gender differences in the relationship between hostile attribution bias and reactive aggression was a research question to be investigated in this study. It was also predicted that there would be gender differences in the relationship between aggressive response planning and proactive aggression. Results revealed that two models of the relationship between SIP variables and aggression were significantly moderated by gender. In the first model, gender and hostile attribution interacted to predict reactive aggression; in the second model, the same variables interacted to predict proactive aggression.

**Eric Burke**, Mechanical Engineering  
Faculty Mentor: Marcus Ashford, Mechanical Engineering  
*Thermodynamic Property Analysis to Reduce Vapor Emissions in Automobiles*  
Liquid fuels in engines, like in all things, must vaporize before combustion can occur. These vaporization dynamics play a critical role both in drivability and emissions for automobiles. My project is to characterize the vaporization behavior of gasoline-like fuels. The results of this experimentation serve two purposes; the first is for better fundamental understanding of these processes, most of which are not fully understood. Secondly, empirical relationships are being established that will form the basis of a new sensing technology and new methods of advanced engine control. Current experimentation involves modeling of five component hydrocarbon fuels. These fuels are run through a distillation machine and compared to the distillation of standard gasoline. By finding an accurate component mixture for gasoline, the density, vaporization, and other thermodynamic properties can be established. Analysis of these properties will lead to the creation of a vapor capturing technology. When gasoline vaporizes, some vapor is lost through exhaust. When these vapors mix with nitrogen oxides in the air, ozone, a notable greenhouse gas, is formed. This technology will reduce exhaust vapors by capturing the hydrocarbons for condensation. After condensation has occurred, the fuel can be inserted back into the engine for combustion. Through continuous capture of exhaust, the greenhouse gas emissions will be greatly decreased, achieving a major goal in the automotive industry.

**Maranda Burns**, Health Science  
Faculty Mentor: Adam Knowlden, Health Science  
*Descriptive Analysis of Sleep Quality, Physical Activity, and Mental Distress in College Students*  
**Background**  
College students are often prone to higher stress levels due to changing sleeping patterns, poor dietary habits, and academic responsibilities. Physical activity is hypothesized to interact with psychological
distress and may reduce the stress experienced by college students. Sleep is also a critical component of adequate health. The purpose of this study was to determine the relationship between physical activity, sleep, and psychological distress levels. Methods. A self-report instrument comprised of the Kessler-6 Psychological Distress Scale (K-6), the International Physical Activity Questionnaire (IPAQ) and the Pittsburg Sleep Quality Index (PSQI) was administered to a cross-sectional, convenience sample of undergraduate college students attending a large Southeastern university. Respondents were grouped into categories of low, moderate, and severe mental distress using established cut-points. Data from the IPAQ was calculated in Metabolic Equivalent of Task units (METs). PSQI global scores were used to group participants into good sleep quality or poor sleep quality. Results. The K6, IPAQ, and PSQI questionnaires are useful for evaluating the mental distress, physical activity levels, and sleep quality of college students. Conclusions. Physical activity and sleep may play a role in preventing and controlling mental distress in college students and should be considered in designing interventions to reduce stress.

Rachel Burton, Theatre and Dance
Faculty Mentor: Lawrence Jackson, Theatre and Dance
The Influence of Rudolf von Laban on Dance Movement Therapy
Born in the late 1800s and working up to his death in 1958, Rudolf von Laban influenced numerous people and fields of study, including dance therapy, through his concept of effort and his notation system for movement, called Labanotation. In 1966, the American Dance Therapy Association was founded by some of Laban’s pupils, such as Irmgard Bartenieff (Levy 300-301). As a profession, dance therapy is rooted in modern dance and psychoanalysis. Continuing, Laban had a few notable successors who not only contributed to his work but also introduced it to the field of dance therapy by integrating it with psychoanalytic theories. There is currently a lack of compiled research on how Laban’s concept of effort was modified and applied over the years to fit the needs of dance therapists. In order to track Laban’s influence on dance therapy, I will conduct research which examines the evolution of Laban’s concept of effort into psychoanalytic theories. Laban’s influence in dance therapy culminated in the creation and application of the Kestenberg Movement Profile around the 1970s. This research will aid in providing a concise and complete account of Laban’s influence in dance therapy, consequently helping to preserve an accurate portrayal of its history.

Olivia Byrd, Electrical and Computer Engineering
Faculty Mentor: Dawen Li, Electrical and Computer Engineering
High Performance Organic Thin Film Transistor Fabrication via Temperature Gradient
6,13-bis(trisopropylsilylethynyl) (TIPS) pentacene crystalline growth from simple drop cast typically forms crystal anisotropy with poor aerial coverage which leads to device-to-device performance variation. A temperature gradient technique which preferentially orients crystal growth was employed to address these problems, however it introduced thermal cracks in the resulting film. Therefore, poly(α-methyl styrene) (PaMS) was blended with TIPS pentacene to relieve the thermal stress associated with the temperature gradient crystal growth and effectively eliminate the development of thermal cracks. TIPS pentacene/PaMS organic thin film transistors (OTFTs) demonstrated a remarkable enhancement in device performance, delivering a 7-fold mobility increase compared to pristine TIPS pentacene.

Gregory Cabot, Electrical and Computer Engineering
Faculty Mentor: Sushma Kotru, Electrical and Computer Engineering
Electrical Properties of Metal/Ferroelectric/metal Thin Film Capacitors
Metal/ferroelectric/metal thin film capacitors were deposited on a platinized silicon substrate using chemical solution deposition and sputtering. PLZT, a ferroelectric material commonly used for optical

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devices, and more recently for photovoltaic applications, was chosen for the purposes of this study. Three electrodes Pt, Au, and Al with different work functions were used as top metal electrodes. The effects of work function of top metal electrodes on the electric properties of these capacitor structures were investigated by measuring the capacitance-voltage and polarization-voltage of the three capacitor structures. The results show that the electrical properties of the MFM structures were found to vary as the work function of the top metal electrodes is changed. The highest values, 6752 pF for capacitance, 72.8 µC/cm² for polarization, and 1745 for permittivity were obtained with Pt as top metal electrode.

Kayla Caine, Psychology
Madeline Schweers, Communicative Disorders
Faculty Mentor: Tricia Witte, Human Development and Family Studies
The Relationship between Dissociation and Sexual Assault in College Students
Since the early 1900s, the fields of psychology and psychiatry have discussed the relationship between traumatic stress and dissociation. Sexual assault survivors have been shown to exhibit dissociative symptoms, particularly those found in clinical populations. However, there is limited research on sexual assault survivors in non-clinical populations. The goal of this research project was to investigate whether college students who have been sexually assaulted experience more dissociative symptoms when compared to those who have not been sexually assaulted. An on-line survey with questions about trauma and dissociation (Dissociative Experiences Scale) was completed by 445 undergraduate students from the Introduction to Psychology subject pool. Approximately 9.5% (n=40) of the participants reported being sexually assaulted prior to completing the survey. Results indicated that participants who had previously experienced some form of sexual assault scored higher on the Dissociative Experiences Scale than those who had not been through such trauma. Results have important implications for college counseling centers.

Laura Canaday, Biological Sciences
Faculty Mentor: John Yoder, Biological Sciences
Exploring conserved enhancer activity of homologous wingless sequences between Drosophila melanogaster and virilis
In the species of Cyclorrhapha Diptera terminal segments of male flies fail to develop. Our genetic analyses in Drosophila melanogaster show this morphology is a direct result of repression of the wingless gene (wg). Understanding the genetic basis of wg repression will establish hypotheses about the evolution and maintenance of wg. To investigate how wg repression occurs and which transcription factors are responsible, we have identified an enhancer that directs wg expression. Genetic evidence shows several proteins are required for proper enhancer activation, while male-specific repression is mediated downstream of the transcription factor Doublesex (Dsx). Analyses of potential binding sites within this enhancer reveal a conserved pair of Dsx binding sites that suggest abdominal wg repression is the result of direct regulation by Dsx. The goal of this project is to determine whether the function of this enhancer is conserved among Drosophila species and to test the regulation of wg by Dsx. We have cloned and characterized a homologous DNA fragment from the species D. virilis. We have introduced site-specific mutations to the putative Dsx binding sites. The analyses presented show the D. virilis fragment directs identical expression to its D. melanogaster homolog, but ablation of the Dsx binding sites does not alter reporter expression. These analyses confirm a deeply ancestral function to this enhancer but predict that some other factor directly represses wg expression.

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use, there is evidence showing that adults might reason more rationally when they use a foreign language (Keysar, Hayakawa & An, 2012; Lev-Ari & Keysar, 2010). These findings leave open intriguing questions: Would bilinguals make the same decisions in each of the languages they speak? Would they judge people and situations differently depending on the language they are using? The overall objective of this research project is to investigate whether the use of a second language affects decision-making and judgments in bilingual adults, in order to be able to provide new insight on how to promote better and more effective thinking.

Derek Carter, Economics, Finance and Legal Studies
Faculty Mentor: Peter Brummund, Economics, Finance and Legal Studies
Comparative Economic Analysis of Alabama's Black Belt Region
The main issue this research seeks to address is the unique cycle of poverty in Alabama's Black Belt Region and the lack of development policy within the region. Specifically, I will develop a broad economic profile of the Black Belt Region based on numerous economic indicators. This profile will be used to identify two economically similar regions globally. Furthermore, the differences in development policy between these two regions and the Black Belt region will be analyzed.

Bethany Carter, Political Science
Faculty Mentor: Wayne Urban, Education - Educational Leadership, Policy and Technology Studies
Classical Education: Historical Roots and Modern Revival
The goal of this study is to examine the recent resurgence of primary schools adhering to a classical philosophy of education derived from Greco-Roman tradition, which once was standard in American and Western education before decreasing in popularity around the 20th century. Due to the paucity of pre-existing research on these new classical schools, this study uses surveys to determine how teachers, administrators, board members, and other shareholders in classical education define and implement classical education today. These surveys provide an introductory programmatic description of classical education including what distinguishes classical education from other types of education philosophies, the rationales behind starting classical schools, the sources upon which classical schools have based their teaching, and how classical schools measure their success. These surveys also introduce complexities about modern classical education when adjusted according to the type of organization, school, or position within classical education represented by the respondent. For this reason, the ultimate aim of this study is to act a starting point for future research on classical schools to further examine these complexities and questions about classical education today.

Michael Carton, Metallurgical and Materials Engineering
Faculty Mentor: Subhadra Gupta, Metallurgical and Materials Engineering
Study of Heusler growth with a focus on MTJ applications
Heusler alloys have recently drawn a large amount of attention because many of them are half metallic, meaning they are 100% spin polarized. We have fabricated Fe2CoSi, Fe2CrSi, & ratios of the two alloys to optimize their perpendicular anisotropy. Furthermore we have prepared thin films of these alloys with an MgO barrier to optimize the layer thickness. Lastly we have made Magnetic Tunnel Junctions using these films to study their transport properties.

Cole Cecchini, Biological Sciences
Faculty Mentor: Debra McCallum, Psychology
Investigating the use of energy drinks at the University of Alabama

*The information presented here is intended to represent exactly what was submitted by the student. Errors can occur in the transfer process.*
In response to high rates of energy drink use among college students, we are studying the role they play in students’ lives. We assess the reasons energy drinks have become popular and students’ perceptions of what benefits they provide. We want to further understand if students are aware of the health risks of energy drinks and employ the Health Belief Model (HBM) and Theory of Planned Behavior (TPB) to determine what factors are involved in their consumption. When energy drinks were first introduced, associated health risks were not widely publicized. However, incidents have occurred that have made the public more aware of the risks (increased heart rate and blood pressure, and insomnia) of the high doses of caffeine that are in these drinks. A survey was designed to assess students’ intake of energy drinks, and to assess the constructs in the HBM and the TPB as they relate to energy drink consumption. Two populations of UA students will participate in the survey. A general student sample will complete a survey assessing usage patterns, and a sample of Psychology 101 students will complete a lengthier survey including items measuring TPB and the HBM constructs. In sum, this project provides current data that measure factors in the HBM and the TPB to determine if students are aware of the health risks associated with their consumption, and if understanding the risks alters their decision making about their use of energy drinks.

**Siddhartha (Neil) Chakraborti**, Economics, Finance and Legal Studies  
Faculty Mentor: Robert Reed, Economics, Finance and Legal Studies  
*Can We See Clearly Now? The Effect of Central Bank Transparency on the Predictability of Monetary Policy*  
*International focus*  
This project aims to examine the relationship between central bank transparency and the effectiveness of monetary policy across different countries, from 1998-2010. We try to study this phenomenon by running regressions of economic productivity (measured in terms of growth of real Gross Domestic Product(GDP)) and inflation on variables such as growth of nominal GDP and transparency, to see how expected values deviate from observations; that is, if more transparent countries tend to have more predictable monetary policies than less transparent ones. From this, we would also like to determine if the growth level of the economic productivity itself or changes in inflation have anything to do with the predictability of monetary policy. Since this is a worldwide study, we’d also like to see if there are any country-based effects for what we may be observing, and thus would like to examine for country as well as geographical region-based effects. Finally, we would like to account for other measures of the sturdiness of a country’s economic, banking, and financial systems to see if these indicators have additional effects.

**Katie Chapman**, Capstone College of Nursing  
Faculty Mentor: Paige Johnson, Capstone College of Nursing  
*Smoking Cessation in Adolescents in Coaling, Alabama*  
The single most preventable cause of death and disease in adolescents is smoking. Smoking negatively affects almost every organ, leading to a lifetime of healthcare issues such as cancer, stroke, and heart disease and is attributed to 443,000 deaths per year in the United States. Because 80% of smokers have their first cigarette by age 18, it is crucial to discover a successful intervention to combat smoking in adolescents. The purpose of this project is to identify an age appropriate, inexpensive, and simplistic smoking cessation intervention targeted at adolescents. To accomplish this project, we conducted a windshield community assessment of Coaling, Alabama, identified the strengths and weaknesses of the community, selected an applicable Healthy People 2020 objective to work towards, and researched an evidence-based intervention to combat the issue. Due to the high smoking rate (22%) and availability of cigarettes in the community, we chose to combat adolescent smoking. The evidence-based practice
intervention "Do u smoke after txt?" provides a solution to the Healthy People 2020 objective TU-2.1: Reduce use of tobacco products by adolescents. This intervention incorporates smoking cessation into everyday life through an activity most adolescents perform daily, texting on a mobile device. Results from the research show this intervention to be more effective than traditional smoking cessation programs with 28% cessation rate at 6 weeks compared to 13% in the control group.

Evan Chavers, Biological Sciences
Faculty Mentor: Janis O'Donnell, Biological Sciences

Toxicological and Developmental Effects of Polyacrylic Acid Coated Iron Oxide Nanoparticles in Drosophila

Toxicological and Developmental Effects of Polyacrylic Acid Coated Iron Oxide Nanoparticles in Drosophila

Evan A. Chavers¹, Ben W. Henderson², Ramil Ajjuri¹, Yaolin Xu², Yuping Bao² and Janis M. O'Donnell¹ Dept. of Biological Sciences, University of Alabama¹ Dept. of Chemical and Biological Engineering, University of Alabama²

As biomedical applications for nanoparticles grow, so too does the need for a comprehensive understanding of their toxicology. Recent studies have revealed a range of deleterious effects of gold, silver, and aluminum nanoparticles. This study focuses on the potential toxic effects of polyacrylic acid (PAA) coated iron oxide nanoparticles (IONPs) on Drosophila melanogaster. The toxicity of the IONPs was assessed for its effects on larval development, adult reproduction, and immune response in the fruit fly. We found that exposure to lower concentrations of PAA-coated IONPs during the 2nd instar larval stage resulted in a higher larval mortality rate than exposure to higher concentrations. Additionally, exposure to the nanoparticles during the 2nd instar brought about reproductive defects in adults that caused a reduction in fertility. We found that those dosed with low concentrations exhibited morphological abnormalities in ovarian cells. Our investigation into these toxic effects and the tendency for lower doses to yield more injurious effects shows that exposure to PAA-coated IONPs activates Drosophila's innate immune response.

Christopher Chockley, Computer Science
Jonathan Orbeck, Computer Science

Faculty Mentor: Jeffrey Carver, Computer Science

The Analysis of Code Review in Open-Source and Commercial Software Development Environments

Code Review is one of the most important, and most often ignored, parts of the software engineering process. With maintenance being one of the most costly parts of a software’s life cycle, Code Review helps us to deliver cleaner, more functional products. With these thoughts in mind our research attempts to take a closer look at Code Review and how developers in different environments utilize it. Under our graduate student, Amiangshu Bosu, and supervising professor, Dr. Jeffery Carver, we have been working to aggregate and analyze the results of several Code Review focused surveys sent to developers in both open source development environments and the more structured world of commercial software development for a major company. Our initial efforts involved coding the data presented to us using data analysis software and reconciling our differing opinions on what exactly the surveys were conveying. Currently we are in the process of analyzing this data in the hopes of finding correlations between how the different developers have responded to the survey. From this we hope to uncover what the currently accepted practices and procedures of Code Review are and how they are valued among current working professionals in the fields of commercial software and open source development.
According to the World Health Organization health promotion is the process of enabling people to increase control over, and to improve their health. It involves the implementation of activities, interventions, and or education with means to establish a positive change in the knowledge of health, lifestyle, and overall health. In order to promote health in a specific community, it must first be assessed. A community health assessment is the foundation for improving and promoting the health of community members. It is done to identify factors that affect the health of a population and determine the availability of resources within the community to adequately address these factors. After needs and resources are determined, evidence-based health promotion interventions can be identified then personalized to fit the community's specific needs. This presentation will illustrate a community assessment of Northport, AL in Tuscaloosa County. Data from the CDC reveals that rates for both Chlamydia and Gonorrhea are higher than state and national averages among adolescents and young adults aged 15-24 years old. This presentation will target preventing an increase in the rates of all STIs in adolescents aged 15-19 years old. The selected intervention would be the implementation of "Be Proud! Be Responsible!" which is designed to give adolescents the knowledge, motivation, and necessary skills to aid in the reduction of risk for both STIs and HIV/AIDS.

Megan Cole, English
Faculty Mentor: Karen Spector, Curriculum and Instruction

Secondary Teacher Preparation and Reported Self-Efficacy
The purpose of my research is to examine the relationship between teacher preparation and self-efficacy in order to better understand the factors that contribute to teacher self-efficacy. Psychologist Albert Bandura defined self-efficacy as one's belief in one's ability to succeed in specific situations (Bandura, 1977). His research showed that self-efficacy effects how individuals approach goals, tasks or challenges, and according to his theories, individuals with a high sense of self-efficacy are more likely to view difficult tasks as something to be mastered rather than to be avoided (Bandura, 1982). Lower levels of teacher self-efficacy are linked with higher rates of burnout and higher referral rates for disciplinary issues. My study examines teacher preparation and mediating factors using a demographic profile and the Teacher Self-Efficacy Scale in an effort to determine if there is a significant relationship between the preparation secondary teachers receive and their reported self-efficacy, and if the relationship is mediated by subject taught or demographic variables.

Megan Cole, English
Faculty Mentor: Deborah Weiss, English

Admiration and Archaism: Historiography and Feminism in the Works of Catharine Macaulay and Mary Wollstonecraft

*International focus
The British Enlightenment is often thought of largely as philosophical writings by men, but women authors also wrote texts that shaped Enlightenment thought. My research focuses on understanding the Enlightenment by examining the contributions of women, specifically those of Catharine Macaulay and...
Mary Wollstonecraft. Macaulay's work was largely based in historical analysis. Evaluating societies by their treatment of women, she pointed out ways in which England had failed to progress when compared with prior civilizations. She called for a return to the reverence and influence women had in ancient Rome in order to improve society. Wollstonecraft also focused on women's history, but she was most concerned with the rights and education afforded individual women. To her, no civilization was worthy of emulation. She used history to show how society had fallen away from the natural order of the world, in which both sexes would be treated equally. Her vision for the future was one of radical equality. The works of Macaulay and Wollstonecraft are some of the most significant contributions of women to the Enlightenment. They show how female historiographers used history to write about women in the past and advocate for women of the future. Both allow us to consider that the history of the Enlightenment comes to us today incomplete. In excluding women's contributions, we misunderstand history and the role of women in the development of modern systems of thought.

Jamie Collins, Human Nutrition and Hospitality Management
Melissa Dever, Human Nutrition and Hospitality Management
Lauren Foreman, Human Nutrition and Hospitality Management
Caroline Grosch, Human Nutrition and Hospitality Management
Darby Prescott, Human Nutrition and Hospitality Management
Leigh Taylor, Human Nutrition and Hospitality Management

Faculty Mentor: Lori Greene, Human Nutrition and Hospitality Management

Food perception of low-income individuals and its impact on the purchasing and consumption habits of healthy and unhealthy foods: A Review

Lower income individuals have an altered perception of healthy food options and lack access to those foods. Food perception is defined in this review as a factor that influences the purchasing and consumption of healthy or unhealthy foods. Lower income individuals encounter the following barriers that may contribute to altered food perception such as time constraint, accessibility, convenience, media influence, perishability, and cost. Eleven peer-reviewed articles were reviewed and compiled to assess specific variables that contribute to altered food perception in low income individuals. The articles included were published in the last ten years. Lower income individuals are likely to be more financially conscious when purchasing groceries than other populations. Fluctuation in cost and the increased perishability of healthy foods deter this population from these purchases. Likewise, the consistency in cost and longer shelf life of unhealthy food options persuades this population towards purchasing these foods. Because healthy food options are not easily accessible to the target population, they are unlikely to purchase healthy food options. Due to the limited demand for healthy foods, unhealthy foods are primarily advertised. Increasing the availability of healthy food options in existing food suppliers and initiating regulation of unhealthy food advertisement could be two possible solutions to altered food perceptions in low income individuals.

Molly Cook, Biological Sciences
Faculty Mentor: Ryan Earley, Biological Sciences

Do Acidified Environments Alter Aggressive Behavior in Mangrove Rivulus Fish?

Aggression allows animals to secure access to food and territories and is tightly linked to fitness. Acidified environments are the result of human-induced elevation of greenhouse gases and pollutants. Acidified environments affect the anti-predator responses of fishes, but no studies have examined how acidification might influence aggression despite the fact that acid environments alter neurotransmission in circuits that control both behaviors. In unexposed environments, the neurotransmitter GABA binds its receptor and elicits inhibitory behavior such as avoidance. In acidified environments, ionic gradients in

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the brain change and when GABA binds its receptor, excitatory responses, such as approach or attack result. We hypothesize that such neurochemical changes will enhance levels of aggression expressed by treated individuals due to acid-induced neural excitation. We will expose mangrove rivulus fish to environments mimicking present-day acid levels and projected acid levels over the next 100 years: control (pH 8.15), low acidification (pH 8.0), and high acidification (pH 7.8) treatments. Aggressive behavior towards a model opponent will be quantified before and after exposure to examine the impacts of acidification on behavior. Understanding how acidification affects aggression in fish will help us determine how subtle human impacts on the environment can change the behavior of organisms, which may affect individual fitness and, over time, population dynamics.

Nichole Corbett, New College
Faculty Mentor: Catherine Roach, New College
Phenomenal Women
After being bombarded with micro aggressions due to the combination of both my race and gender I decide to create a documentary that interviewed women of color like me and their experiences at the University of Alabama. Inspired by the I, Too am Harvard movement, I strove to create a sense of unity within UA while also pointing out factors that can be improved upon. The strength of these women within this documentary is inspiring and I wish to share their courage and stories with the rest of the student population. I think that this documentary will help educate students who have grown accustomed to seeing racism on this campus and do nothing about it. I named the documentary after a popular poem by Maya Angelou because I felt these women emboldened me in the very same way that poem does for black women. I merged social activism with my depth study of directing. It allowed me to utilize the skills I've learned from journalism, film classes and Race and gender classes. Throughout the creation of this documentary, I feel like my skill level in videography, interviewing and understanding the intricacies of racism evolved and grew. When I began I wanted to revolutionize the way people viewed the University of Alabama. However, now I want this documentary to be for the students. I want students to watch this documentary and learn what their peers are going through and help make the environment of the university a safer place for people of color.

Molly Cory, Psychology
Trent Robinson, Psychology
Getting Lost in Outdoor Environments
The goal of this study is to investigate people's metacognition on getting lost. We were interested in the external and internal factors people ascribe to getting lost and the strategies people use to find their way after getting lost. 398 PY 101 students from the University completed an online questionnaire that asked them to remember a time they got lost in an outdoor environment and report why they got lost as well as how they eventually found their way. The most common reason why people got lost was being unfamiliar with the environment (36.6%). Other reasons included disorientation (20.1%), committing wrong actions (18.6%), using unclear directions (18.3%), and confusing environments (15.6%). For how participants found their way after getting lost, the most prominent strategies included asking someone and using directions. The reported reasons why people got lost and how they got out were also assessed together to determine their relationships. Our questionnaire suggested that most participants are able to attribute their getting lost experiences and their wayfinding behaviors, implying self-report questionnaire is a useful tool. The reported reasons for why they got lost are largely consistent with previous laboratory studies, but also indicate some interesting nuances that were not investigated by previous studies.

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primarily evaluated through colony PCR, with approximately 50% of the colonies testing positive. Future efforts will focus on improving the plasmid with a target of novel plasmid platform suitable for broad application amongst Clostridium strains, which will significantly improve research efficiency for the construction of butanol fermentation mutants.

**Lauren Curtner-Smith**, Human Development and Family Studies
Faculty Mentor: Mary Elizabeth Curtner-Smith, Human Development and Family Studies

*Corporal punishment, a comedy of errors: The case against corporal punishment as viewed through media and editorial cartoons*

“There was an old woman who lived in a shoe. She had so many children; she didn’t know what to do. She gave them some broth without any bread; she whipped all their bums and sent them to bed.”
Joe Joseph Ritson

The nursery rhyme, “Old Woman Who Lived in a Shoe” implies that parents who do not know how to discipline their children resort to spanking. In this paper, I present the historical and current trends in parents’ use of corporal punishment, the research findings regarding the effects of corporal punishment, reasons why parents use corporal punishment, and advice about how experts can help change parents’ practice of corporal punishment. I include visual media and editorial cartoons to help illustrate the major points.

During the period of colonial America, Puritan colonists were strongly influenced by the doctrine of John Calvin who believed that children needed strong punishment to correct behavior. Corporal punishment is still prevalent. There are many reasons parents today use corporal punishment with kids, including the belief that it is not harmful, the belief that it is effective in deterring misbehavior, and it is quick and easy. Parents who spank model aggression as a way to get someone to do something against their will. Children who are spanked become depressed when the very person who is supposed to provide protection and security instead incites fear and insecurity. This paper also reviews recommendations for reaching parents and getting them to commit to not hitting their children.

**Casey Dalton**, Chemistry
Faculty Mentor: Shanlin Pan, Chemistry

*Au NP electrode for enhanced hydrazine electrochemical oxidation*

Hydrazine can be utilized as an alternative to liquid hydrogen as a fuel source in hydrogen fuel cells. Hydrazine must first be oxidized to release the hydrogen, leaving behind diatomic nitrogen. Electrochemical activities of hydrazine are investigated using catalytic nanostructured electrode made of Au nanoparticles (NPs). Au NPs are electroplated on to ITO glass from a gold cyanide solution to create an electrode capable of fully oxidizing hydrazine. SEM measurements and dark-field microscopy are used to confirm the presence of Au nanoparticles on the ITO surface, prior to oxidation potential measurements. Oxidation measurements for hydrazine oxidation are taken and the potentials generated are measured and compared to that of bare ITO to determine the efficiency of Au NPs as catalytic substrate.

**Haley Davenport**, Communicative Disorders
Faculty Mentor: Angela Barber, Communicative Disorders

*Parent Vs. Self-Report of Social Difficulty in College Students with an ASD Diagnosis*

The current study includes 10 students enrolled in a college transition and support program for degree-seeking students with an ASD diagnosis at a major public university. As part of the program, students meet 2-3 times per week with a therapist-mentor, complete 4 hours of study hall per week within the program, and participate in regular group meetings with other program participants. Each student is

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administered a battery of measures at summer orientation and toward the end of each Fall and Spring semesters during their college career. The study focuses on the Social Responsiveness Scale, Second Edition, Informant and Self-report administered at summer orientation. Participants were recruited through the University of Alabama ASD College Transition and Support Program, which provides individualized services to help students develop appropriate skills for self-advocacy, daily living, and social interactions that will contribute to their success as independent adults. UA-ACTS seeks to provide support for the transition into a large, traditional university campus and to guide students towards achieving their goals for the future. Also, the program seeks to promote awareness and understanding of ASD throughout the campus community through education, training, and collaborations with University programs, faculty, staff, and students. This project has been accepted for a poster presentation at the International Meeting for Autism Research, which will be held in Salt Lake City, UT

**Megan Davidson,** Curriculum and Instruction  
Faculty Mentor: Melisa Fowler, Curriculum and Instruction  
*Victorious Through Sight Word Recognition*  
This action research consists of a case study, where a low performing student has been exposed to Dolch sight words through the use of colored popsicle sticks and an iPad application. The student manipulated and listened to several sight words on the Pre-Primer Dolch sight word list, and significantly increased his Progress Monitoring scores in the area of reading. This study proves the effectiveness of implementing direct instruction through the use of the popsicle sticks and the iPad application. This case study may prove beneficial for several low performing students, who are not meeting the benchmark for the specified grade level. Overall, this case study suggests there is victory in the life of a low performing student with the aid of direct instruction on Dolch sight words.

**Andrew Davis,** Biological Sciences  
Faculty Mentor: Laura Reed, Biological Sciences  
*The effects of a high fat diet on glucose concentration in Drosophila melanogaster*  
Insulin resistance is one of a cluster of phenotypes associated with metabolic syndrome in humans, and it can lead to diabetes as well as associated health complications such as obesity or neuropathy. Drosophila melanogaster share metabolic homologies to humans that allow for their study to produce useful data concerning changes in body composition as caused by perturbations in diet. In this study, stress was applied to many different genetic lines of Drosophila in the form of a high fat diet, which can be analogized to the modern Western diet. The hemolymph glucose concentration of third instar larvae was then assayed and data across all of the genetic lines was analyzed to evaluate the effect that genotype, diet, and genotype by diet interaction had on the concentration of glucose in the larvae. Our results suggest that all three factors play a role in the concentration of hemolymph glucose in Drosophila, with a surprisingly strong genotype by diet effect on phenotype. This study has promise in the future of personalized diet plans based on an individual's genome.

**Hunter Dean,** Biological Sciences  
Faculty Mentor: Janis O'Donnell, Biological Sciences  
*The Effects of Positively Charged Iron Oxide Nanoparticles on Survival and Fertility in Drosophila melanogaster*  
Polymer-coated metal oxide nanoparticles have recently become a focus in medical research. Their size and magnetic properties make them strong candidates in developing treatments based on magnetic resonance imaging, drug delivery with time-controlled release, magnetic hyperthermia, and tissue repair. Much of this focus has recently shifted toward use of iron oxide nanoparticles (IONP) due to
suggestions that iron oxides may be safer for biological applications than comparable particles made with nickel, cobalt, or other metal oxides; however, this safety is also subject to changes in the surface coatings of the particles. The majority of literature addressing this toxicity focuses on work performed in cell culture, but these studies often poorly represent the effects of different organ systems and innate immunity on the distribution and physiological properties of internalized nanoparticles. This study utilizes the fruit fly Drosophila melanogaster as a whole organism model to elucidate the mechanisms of IONP toxicology. IONPs with a positively charged coating were fed over a 24 hour period to Drosophila larvae. Fed larvae were then assayed for immune activity, survival through adulthood, and reproductive capability. Interestingly, no deleterious effects were discovered on survival at any tested concentration; however, both genders saw concentration-dependent losses of reproductive fecundity.

John Deeble, Mathematics
Faculty Mentor: Jeffrey Lozier, Biological Sciences
Evolutionary Parameter Inference In A Bumble Bee Complex
Bumble bees often show high levels of phenotypic variability that can make investigation of evolutionary patterns, such as species status, time of species divergence and migration rates, challenging. In the central to western United States, there are three populations of a bumble bee species, Bombus bifarius, with differing physical traits. The westernmost population, B. bifarius nearcticus, has black bristles on its thorax, while the easternmost population, B. bifarius bifarius has red bristles. The intermediate population, also currently part of the B. bifarius nearcticus subspecies, has an intermediate phenotype of small amounts of orange on its thorax. This research was performed to better understand the evolutionary relationships among these three color patterns. Particularly, this research focuses on determining whether or not this intermediate trait was a result of gene flow between B. bifarius bifarius and B. bifarius nearcticus C., or whether it was a result of convergent evolution. A selection of genome-wide single nucleotide polymorphisms (SNPs) was obtained from members of all three populations, then a Site Frequency Spectrum of these SNPs was generated. This Site Frequency Spectrum was fed into a Monte Carlo-styled coalescent simulator under different model 'templates' to find maximum likelihood approximations of evolutionary parameters such as population sizes, divergence times, and migration.

Carly Dethrage, School of Social Work
Faculty Mentor: Javonda Williams, School of Social Work
Bowlby’s Theory of Attachment in third world countries
*International focus
The purpose of this study is to understand the effects of preventable diseases on attachment between a caregiver and their child in third world countries. Because many third world countries provide environments for pathogens to thrive and spread, and access to routine immunizations is limited, there is a high infant mortality rate. This study will focus on how the mortality rate impacts a mother's desire to bond with her child, because the risk of losing the baby is too high. This would be measured by indicators such as: Does the child have a name yet?, Does the child make eye contact with the caregiver regularly?, Does the child "melt into" the primary caregiver when they are held (lays head on shoulder; holds on when held; faces primary caregiver rather than away)? Does the child displays age appropriate anxiety at temporary separation from primary caregiver, but is easily reassured?

Kenya Donovan, Human Development and Family Studies
Faculty Mentor: Maria Hernandez-Reif, Human Development and Family Studies
The Family Interaction Project- The Factors of Development in Children

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The first few years of a child's life are the optimal time for development. Children's brains develop exceedingly fast with the help of nerve connections from close proximity interactions. This critical period of a child's development extends to the latter years and sets a foundation of learning. This current study will focus on social, cognitive, and physical development of young children based on data from parents at home and teachers at The University of Alabama's Children's Program. The study will further explore features of gender, socio-economic status, and race. Data are calculated through various assessments and physical measurements; both obtained every six months. The first resource is a Background Questionnaire enquiring the parents' age, education, occupation, physical attributes, marital status, and questions related to pregnancy. The next evaluation is accumulated through the Developmental Profile questionnaire (DP-3) completed by the teachers. The profile is scored in five fields: Physical, Adaptive Behavior, Social-Emotional, Cognitive and Communication. The final measurement is the Communication and Symbolic Behavior Scale which asks the teacher if they witness certain behaviors that could impact the child's ability in learning how to talk. This study will provide data that allow us to examine three categories of development: advanced, average, and delayed. Investigating these factors can contribute to development improvements in young children.

**Katharine Drake**, Capstone College of Nursing  
**Taylor Averette**, Capstone College of Nursing  
**Amanda Chambers**, Capstone College of Nursing  
**Jordan Norris**, Capstone College of Nursing  
**Jordan Lowell**, Capstone College of Nursing  
**Rachel Herrington**, Capstone College of Nursing  
**Alicia Phillips**, Capstone College of Nursing  
**Faculty Mentor:** Leslie Cole, Capstone College of Nursing  
**When In Doubt: Show Restraint**

Patient safety is the main focus of the healthcare provider when a patient becomes confused. Restraints are used in an attempt to keep them from harm; however, restraint use can cause harm rather than prevent it. Restraints also take away a patient's basic right to free movement. Serious complications include skin breakdown, incontinence, and poor circulation to extremities. Restraint practices at a healthcare facility were observed to be inadequate for patient safety, a vital priority, and nurses should continue to progress toward the highest quality of nursing care. Interviews with nurses were conducted, hospital restraint policy examined, and hospital policy was compared to national guidelines. Evidence based practice advises use of alternative interventions before restraint use. International guidelines stress that education can increase knowledge, change attitudes, and assist nurses in caring for patients. The hospital policy is lacking education on restraint prevention, alternatives, and ways to reduce overall use. A poster demonstrating how to prevent restraint complications is displayed on the unit reinforcing the importance of safe restraint use. Elements of the poster include specific signs of skin breakdown, reminders to provide a call light, and recommendations for ambulation. These measures aim to empower nurses with the knowledge to perform their jobs with excellence.

**Michael Dunn**, Civil, Construction and Environmental Engineering  
**Faculty Mentor:** Alexander Hainen, Civil, Construction and Environmental Engineering  
**Feasibility of coordinated traffic signal control in low-speed signalized corridors: a case study on the campus of The University of Alabama**

This project involved the use of traffic simulation software to model the Hackberry Lane corridor on the campus of The University of Alabama. The goal was to be able to coordinate the four traffic signals in this corridor, allowing for more efficient movement of traffic through campus. The corridor was first

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modeled in PTV VISSIM, a micro-simulation software, and then optimized in Synchro to determine the theoretical resonant cycle length. Modeling the corridor in these software packages allowed for testing of the traffic signal performance under different configurations. Data was collected for the signals running in four different arrangements: an uncoordinated state and three different cycle lengths. These three cycle lengths were the optimal cycle length as determined through Synchro simulation, five seconds less than the optimal, and five seconds more than the optimal. The use of simulation was also particularly effective in accounting for a new exclusive pedestrian phase at the Hackberry/McCorvey intersection. This approach can be used to assess the feasibility of a background cycle length in low-speed urban conditions, thus minimizing delay to users of all transportation modes.

**Ann Durand**, Political Science
Faculty Mentor: Dana Patton, Political Science
*An In Depth Look Into the Gender Pay Gap and Proposed Solutions*
This research project will look into the causes of the gender pay gap. The gender pay gap is problem in our country as well as world wide. The research will sort out what causes the pay gap as well as propose an original solution to the problem while explaining why certain measures proposed or put into place have not been successful.

**Samantha Durfey**, Biological Sciences
Faculty Mentor: Carol Duffy, Biological Sciences
*Doxycycline-Induced Reactivation of HSV-1*
Herpes simplex virus type 1 (HSV-1) is known to cause cold sores and vision loss in humans. After infection of epithelial cells, HSV-1 invades nearby neurons where it establishes a lifelong quiescent infection whichreactivates periodically. Reactivated HSV-1 usually travels back to the epithelium; however, the virus can also infect the brain. Evidence has accumulated indicating a role for recurrent HSV-1 reactivations/infections in the development of Alzheimer's disease. Our long-term goal is to develop an experimental system in which to study the contribution of recurrent HSV-1 reactivations to the development of Alzheimer's. The first step in developing this system is the generation of a recombinant virus in which reactivation can be tightly controlled. VP16 is a viral protein known to play a key role in HSV-1 reactivation, making it an ideal target for control. We engineered a recombinant virus with the VP16 gene controlled by a doxycycline-inducible promoter and the VP22 gene fused to GFP. We tested this recombinant virus in neuron-like differentiated Tet-On PC 12 cells. After establishment of quiescent infection, reactivation was measured using fluorescent microscopy and immunoblotting. Our results show our recombinant virus can be reactivated by doxycycline in a dose-dependent manner. Future studies will use this virus in an animal model to correlate recurrent virus reactivation/infection with cognitive defects associated with Alzheimer's.

**Demi Eckhoff**, Human Nutrition and Hospitality Management
Faculty Mentor: Amy Ellis, Human Nutrition and Hospitality Management
*Feeding Tube Intervention in Patients with Duchenne Muscular Dystrophy: A Literature Review*
Introduction: Duchenne muscular dystrophy (DMD) is a muscle wasting disease usually diagnosed in childhood. In the later stages of the disease, many patients incur masticatory problems and dysphagia, leading to many complications. Purpose: The aim of this review is to evaluate evidence base for gastrostomy tube implementation in the DMD population. Methods: Eight relevant articles from peer-reviewed journals were identified using PubMed. Results: Most DMD patients in their late adolescent years reported prolonged mealtime, choking and/or food sticking in throat, increasing the risk for aspiration. Many patients used a feeding tube because of weight loss or dysphagia, but most did not get
a G-tube before their early twenties. After placement, a majority of the patients gained weight. G-tube intervention appeared helpful in most cases but there is limited evidence to show the optimal time for placement. The Academy of Nutrition and Dietetics advises clinicians to evaluate patients for certain characteristics to screen early for undernutrition but due to changes in musculature many of these indications do not apply in the DMD population. Conclusion: Evidence suggests enteral nutrition to be beneficial in the DMD population. Usually by the time of intervention, patients are severely undernourished. Further research is imperative to determine whether earlier intervention may positively impact nutritional status before the risks outweigh the benefits.

Karen Ekeh, Geography
Faculty Mentor: Sara Tomek, Education - Educational Studies in Psychology, Research Methodology and Counseling

Gender and Achievement: Are boys falling behind?
The purpose of this study is to determine whether or not there is a link between the growing emphasis on the achievement levels of girls and the decreased level of success experienced by boys at similar ages and grade levels. Today, there is a larger number of female high school and college graduates than male graduates. There is also a larger number of female than male valedictorians. This research will examine testing data at both the fourth and eighth grade levels over the course of ten years to examine any trends in educational achievement related to gender as measured on standardized tests.

Samuel Evans, Advertising and Public Relations
Keelin McNamaara, Advertising and Public Relations
Amanda Hydrick, Advertising and Public Relations
Chandler Dare, Advertising and Public Relations
Ashley Robbins, Advertising and Public Relations
Faculty Mentor: Yonghwan Kim, Telecommunication and Film

Cell Phone Usage and Relationship Satisfaction
This research examines the effects of cell phone usage on relationships with significant others. Through conducting a survey, we want to see the general view people have of cell phone usage during time spent with the significant other, which apps or activities produce the more negative connotations, and if there are any personal characteristics of the significant other that affects the outcome. Our hypothesis is that the longer amount of time a person spends with their significant other, the less likely they are to be affected by their significant other using their cell phone in time spent together, and people who are extroverted are less likely to be affected by cell phone usage in a relationship.

Mary Fair, Music
Faculty Mentor: Andrea Trotter, Music

The Effects of Melodies Sung in Higher versus Lower Keys on Infants' Heart Rate, Oxygen Saturation, Respiration Rate, and Behavior States: A Preliminary Analysis
The evidence-base of use of music with premature infants started in the early 1990s as a form of early intervention in the Neonatal Intensive Care Unit (NICU). A past and recent meta-analysis on music for premature infants indicated statistically significant effects, especially for positive physiological responses, decreased length of hospitalization (LOH), weight gain, feeding, and decreased stress responses (Standley, 2003; Standley, 2012). As of now, the effects of presenting songs in different vocal ranges have not been studied in depth. The purpose of this study is to examine the effects of recorded songs presented in both higher and lower keys (ranges) on heart rate, oxygen saturation levels, respiration rate, and behavior states of premature infants weighing less than 1500 grams, ages 27-32
weeks gestational ages. Six infants have participated in the study thus far. A within subjects design, alternating higher versus lower ranges of songs is used. A repeated measures anova is used, examining differences by gender and by gestational age of infants. Infants' behavior states, heart rates and oxygen saturation levels are recorded and analyzed for both quantitative and qualitative data. Results thus far have indicated no statistically significant difference in the oxygen saturation levels and heart rates of infants receiving music in low keys than those receiving music in higher keys. More research is needed to confirm these results.

**Madison Farley**, General Studies in HES  
Faculty Mentor: Lori Turner, Health Science  
*Reducing Osteoporosis-Targeting College-Aged Women*  
Background/Purpose: Osteoporosis is a progressive disease that causes the bones to become weak and brittle. Preventative behaviors in younger years can help reduce susceptibility to osteoporosis in later years. The purpose of this study was to test a computer-based osteoporosis prevention program among college-aged women. Methods: Healthy women (n=153) aged 19-25 years were recruited. Participants completed a short survey regarding their knowledge and behaviors related to osteoporosis. The survey measured perceived susceptibility to osteoporosis, perceived severity of osteoporosis, perceived barriers to recommended calcium intake, perceived barriers to adequate vitamin D consumption, self-reported calcium intake, and self-reported vitamin D consumption. Participants were randomly divided into three groups. Two groups received separate interventions, while the third received no form of intervention. Group 1 consisted of 52 participants, group 2 had 51 participants, and group 3 consisted of 50 participants. One month later, all participants completed another web-based survey similar to the baseline survey. Results/Conclusion: The intervention increased awareness of their susceptibility to osteoporosis, as well as increased education regarding ways to reduce osteoporosis risk.

**Meghan Fay**, Curriculum and Instruction  
Faculty Mentor: Melissa Fowler, Curriculum and Instruction  
*How do my teaching actions influence my students’ learning?*  
The population of English Language Learners in today's schools is quickly growing and so is the achievement gap between these students and native English-speaking students. The study seeks to examine the effectiveness of implementing small group mathematics instruction to aid struggling English Language Learners. The purpose of the strategy is to close the achievement gap caused by a lack of understanding of mathematics concepts taught in the classroom during whole-group instruction. The study focuses on two English Language Learners in a fourth grade classroom. The strategy was implemented over a ten-day period and test scores were collected at the beginning and end of the study to examine the effectiveness of the strategy. The study concludes that the small group instruction helped improve test scores, build confidence in the students, and initiate their involvement in the classroom.

**Carrie Fisher**, Biological Sciences  
**Meagan Reif**, Biological Sciences  
Faculty Mentor: Stephen Secor, Biological Sciences  
*Impact of Incubation Hypoxia on Digestive Energetics and Performance for the Snapping Turtle*  
Snapping turtles incubated as eggs under hypoxic (10% O2) conditions exhibit a decrease in growth rate independent of food intake compared to turtles incubated under normoxic (21% O2) conditions. Thus we explored effects of incubation environment on turtle physiology comparing pre- and postprandial metabolic rates, specific dynamic action (SDA), pancreatic function, and intestinal morphology and

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function of turtles incubated as eggs under hypoxic and normoxic conditions. Incubation environment had no significant effect on turtle standard metabolic rates, however hypoxia-incubated turtles experienced a 23% greater postprandial metabolic scope and a 45% greater SDA and SDA coefficient. We examined fasted and fed (catfish meals approx. 5% of turtle body mass) turtles to explore the effects of incubation conditions on digestive form and function. We found little difference in the mass of most organs between fasted and fed, and between hypoxic- and normoxic-incubated turtles, with the exception of the small intestine. Small intestinal mass did not differ in incubation conditions, but was significantly heavier for fed turtles. Regardless of incubation condition, fed turtles possessed thinner serosa, whereas hypoxia-incubated turtles maintained enterocytes with larger volumes. Neither pancreatic trypsin nor amylase activities varied among treatments. Similarly, the activities of aminopeptidase and maltase lack significant differences among fed/fasted or hypoxia/normoxia treatments.

**Matthew Fister**, Aerospace Engineering and Mechanics  
Faculty Mentor: John Baker, Aerospace Engineering and Mechanics  
*Application of Particle Swarm Optimization to Theoretical Rocket Performance*  
Results of a study into the optimization of theoretical rocket performance using the particle swarm optimization (PSO) technique are presented. PSO is a biologically-inspired metaheuristic algorithm for finding optimal solutions to nonlinear multivariable problems. PSO was originally motivated by the social behavior observed for birds, bees, ants, and fish. Rocket performance was modeled using an identical framework to that of NASA’s Chemical Equilibrium with Applications (CEA) software, a standard for analyzing liquid propellant rocket engines. For this study, the specific impulse (a rocket performance metric) was optimized as a function of the oxidizer to fuel ratio as well as the contraction and expansion ratios of the converging-diverging nozzle used to accelerate the products of combustion to supersonic speeds. C++ was used to code the PSO/rocket propulsion model. The PSO component of the model was validated by comparison with numerous benchmark optimization tests. The rocket performance component of the model was validated by comparison with CEA. Optimal conditions, for various fuel-oxidizer combinations, are presented. Future work will include expanding the model to optimize more complex, multidisciplinary astronautical systems.

**Ben Flores**, Communication Studies  
Faculty Mentor: Katheryn Seigfried-Spellar, Criminal Justice  
*Masks and Machetes: The Arthur Pendragon Case Study*  
This presentation will be a case study on the types of communications used during the Arthur Pendragon threat that occurred at the University of Alabama during the time frame of September 21st, 2014 to September 30th, 2014. An overview of the Arthur Pendragon case will be provided as well as a discussion of the various definitions of cyber terrorism and cyber-based threats. A detailed analysis of the types, quality and frequency of communications will be presented from all parties involved, including Arthur Pendragon’s initial post to the University, law enforcement agencies, student body, and the media’s response to this threat. Specifically, a timeline of events will be created to show the flow of communications during this time frame, as well as an appendix of the types of communications used. By conducting a content analysis of the social media posts, news media reports, and official University of Alabama email communications, this presentations will demonstrate how a cyber-based threat became an active part of the University of Alabama’s students’ lives in a matter of posts, not minutes.

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**Zach Flynn**, Mechanical Engineering  
Faculty Mentor: Vinu Unnikrishnan, Aerospace Engineering and Mechanics  
*Experimental Modeling of Biofidelic Tissue Phantoms for Surgical Applications*  
Based on the idea of silicone based breast implants and other prosthetic implants, biomechanically precise tissue phantoms would be indispensible for surgical planning as well as for biomedical testing applications. In the current research effort, an artery is computationally modeled and 3D printed. A silicone based material simulating the mechanical properties of the artery is created using the 3D printed model. Extensive mechanical testing is performed on this surrogate model and surgical intervention techniques such as sutures are simulated. The results of this novel investigation will be presented at the conference.

**Anna Forrister**, Anthropology  
Faculty Mentor: Philo Hutcheson, Education - Educational Leadership, Policy and Technology Studies  
*50 Years of All Deliberate Speed*  
This research examines the role that the legal system plays in education using a case study of a landmark education decision that ended de jure segregation in a southern state. Almost a decade after Brown v. Board of Education was decided, the schools in this state had yet to desegregate and a lawsuit was filed in 1963. Because of interference from the state government, the attorneys for this case were able to ask the court to issue a desegregation order for the entire state. This was successful and it caused a massive change in the school system of the state. Data will be collected from interviews with key participants of the case, such as attorneys and judges. They are able to offer an insight into the case and the mindset of the state at the time. From conducting interviews, I hope to be able to gain a deeper understanding of how the court system is able to shape education, not only in this state, but across the country.

**Desiree Foy**, New College  
Faculty Mentor: Ellen Spears, New College Creativity & Expression  
*Creativity and Expressions*  
At Northington Elementary there's a lot of the "I don't want to be here" sentiment. Sick of the same routine, aware of "let's do this busy work to kill some time" tradition in the classroom. The lack of interest was hard to miss. Instead students sang songs from the radio, talked about who they liked and didn't like, the struggles faced by their families, fighting, who stole pencils. These students shared with me their world and I wanted them to have the best experience they could. I wanted them to be fulfilled and engaged like the children I met at The Marietta Johnson Organic School in Fairhope, AL during a visit. I would listen to them, and they would open up to me and I discovered things I wanted to share with them. During this time, I was taking several New College courses that were helping to shape this new experience; like Public Leadership and Eternal Way. For instance, In Public Leadership, I was learning about community and how to cultivate that and then I would share my insights with students at Northington through my words and actions. In hindsight, I can see I was gaining this sense of value and self-worth through my experience at Northington. I teach a group of about 20 fourth graders about principles and virtues, nutrition, mindfulness, yoga. I find ways to make them excited about learning by finding and sharing meaning through lessons and discussions.

**Sawyer Foyle**, Chemistry  
Faculty Mentor: David Dixon, Chemistry  
*The Structure and Stability of Irx(CO)y(NHC)z Clusters*  
Iridium clusters catalyze a range of reactions including oxidation, hydrogenation, C-H activation, cycloaddition, cycloisomerization, and ring-opening reactions. The low energy isomers of iridium clusters

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with carbonyls and N-Heterocyclic carbenes (NHCs), Irx(CO)y(NHC)z complexes (x = 1, 2, 4) were investigated using density functional theory and coupled cluster theory. For IrL3 and IrL4, as NHCs were substituted for CO's, the CO ligand dissociation energies (LDEs) increase and the NHC LDEs decrease. Two unique isomers for Ir2(CO)y(NHC)z with C2v and D3d were predicted. The CAM-B3LYP functional gave the best agreement with the reliable CCSD(T) approach for the small clusters and was used to predict the energetics of the larger Ir4(CO)y(NHC)z clusters. Most dissociation energies for Ir4(CO)y(NHC)z clusters were ~30 to ~60 kcal/mol with the NHC LDEs usually larger than the CO LDEs. The differences in isomer energies and LDEs are mostly due to the electronic and steric effects of the NHCs. Research sponsored by the Department of Energy, Office of Basic Energy Sciences

Meghan Freeman, Capstone College of Nursing
Monika Roden, Capstone College of Nursing
Alexa Kenney, Capstone College of Nursing
Kathryn McCollum, Capstone College of Nursing
Lauren Downey, Capstone College of Nursing
Emily Courter, Capstone College of Nursing
Marlee Owen, Capstone College of Nursing

Faculty Mentor: Leslie Cole, Capstone College of Nursing

Coming Clean: Reduce Infections with Daily Chlorhexidine Baths

Problem: Although bathing a patient everyday does not require a doctor’s order, it is still an important hospital intervention that leaves the patient clean and helps prevent infection and pressure ulcers. One facility does not currently have a patient bathing policy. We observed the use of soap and water, while chlorhexidine was available but not always used. Purpose: We began to research articles about the use of daily chlorhexidine baths to find out the positive affects instead of the use of soap and water every other day. Method: We reviewed both the bathing policies in the hospital and the official online guidelines. We also observed the baths the staff were performing and then compared the three different resources. Results: Although we were unable to evaluate the results of our outcomes, we would like to come back in four months to evaluate if schedules have been put in place for daily bathing. We would also make sure that the staff is properly educated regarding chlorhexidine. Future Research: We would also like to compare the amount of nosocomial infections and pressure ulcers at the start of our interventions verses four months later. If the outcomes show that the implementation of daily chlorhexidine baths reduce the number of nosocomial infections and pressure ulcers, this could have a large impact on hospital policies as well as comfort and care of patients.

Jordan Fuhrman, Physics and Astronomy
Faculty Mentor: Paulo Araujo, Physics and Astronomy

Metallic Tip Production For Near-Field Raman Spectroscopy

Near-Field Raman spectroscopy is a growing field in optics of materials. In order to perform Near-Field Raman spectroscopy, one needs to utilize metallic gold tips, which, when illuminated by a laser light emitting at around 632 nm, experience plasmonic oscillations driven by the oscillating electric field composing the light source. Since the metallic tip is expected to be very close to the sample to be studied (~ 2 nm), the electromagnetic waves generated by the plasmonic oscillations work as a new light source which can excite the sample with evanescent and propagating waves, therefore going beyond the classical limit of spectral resolution. In Near-Field, the new spectral resolution is determined by the metallic tip diameter. These metallic tips are produced by an electrochemical process that consists of a gold wire reacting with an acid, forming a cone at the end of the wire. The shape of this cone, as well as its diameter’s apex, will be strongly related to this electrochemical process. However, the current

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method of production is inefficient, and results in a low percent yield of usable metallic tips. This is an ongoing project that looks into possible alternatives that could increase the percent yield, such as introducing use of a computer program to reduce human error. These tips will then be used to conduct Near-Field Raman spectroscopy and study properties of bi-dimensional materials such as graphene, and single-walled carbon nanotubes.

**Kathryn Gallagher,** American Studies  
Faculty Mentor: Karla Gower, Advertising and Public Relations  
*The Effect of Social Media on Crisis Management*  
The use of social media is growing in its popularity as well as its impact. According to Pew Research Center, 74 percent of online adults use social networking sites. Users share their personal thoughts, beliefs and experiences online in order to connect with others. Thus, organizations would benefit from understanding the significance of social media in crisis management. I examined crises within the past two decades such as the BP oil spill, Bank of America's change in debit card policy, and the recent NFL violence scandals to study how social media has influenced public relations crisis management.

**John Gambril,** Biological Sciences  
**Margaret Guice,** Biological Sciences  
**Kyera Actkins,** Biological Sciences  
Faculty Mentor: Julia Cherry, Biological Sciences  
*Effects of Restoration Technique and Sea Level Rise on Soil Characteristics of a Tidal Marsh at Weeks Bay, Alabama*  
Coastal wetlands provide a number of important ecosystem services, but are increasingly vulnerable to loss or degradation from environmental changes, including sea level rise. Restoration is one mechanism by which these services can be reestablished in our landscape, but approaches should be chosen to minimize cost and maximize function and resilience to sea level rise. We performed a field experiment in Weeks Bay, Alabama to examine the effects of sea level rise and vegetation planting techniques on tidal marsh properties. As part of the study, we examined differences in soil characteristics, including bulk density, percent organic matter, and carbon and nitrogen content. These results, combined with other measures of ecosystem structure and function, will be used to develop effective land management programs for the Weeks Bay National Estuarine Research Reserve and other tidal marshes of the northern Gulf of Mexico.

**Jessica Gandy,** Political Science  
**Scott Whitehouse,** Political Science  
Faculty Mentor: Dana Patton, Political Science  
*Perception of Women in Non-Traditional Leadership Roles*  
The purpose of this study is to evaluate the public’s perception of women in non-traditional leadership roles. Our objective is to better understand gender bias in different leadership positions and how the genders are perceived in those roles. We will conduct a survey through an online platform. Our hypothesis is that amongst all genders, women are not viewed as competent to hold non-traditional leadership roles. This knowledge is important & useful to help understand the public view women in leadership roles, and the affects of this study can help to answer questions about subjects like wage equity and women’s role in society. We survey 150 students to answer our research question.

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Jian Gao, History
Faculty Mentor: Ana Corbalan

*International focus

The Chinese Peruvian community today is the largest Chinese community in Latin America, consisting of 10%-15% of the current Peruvian population. Moreover, among all the Chinese overseas communities around the world, the Chinese Peruvian community is marked by its high degree of integration into its hosting country, evidenced by its influential enterprises, political activism, and social contribution. Nevertheless, in retrospect, when the Chinese Peruvians landed in Peru in 1849, they were solely menial coolies who were ridiculed by the local Peruvians as Macacos which literally means "monkeys" in Portuguese. Furthermore, during the late 19th and early 20th century, the Chinese Peruvians were viewed as execrable Yellow Perils by many Peruvians. However, around the 1980s, the prevalent sobriquet of the Chinese Peruvians became Paisanos which literally means "fellow countrymen". This change of sobriquet indicates that the Chinese Peruvians became highly integrated into the Peruvian society. This presentation will elucidate the process of Chinese Peruvians from being Macacos and Yellow Perils to ordinary citizens, and from being ordinary citizens to Paisanos who participated in national politics and contributed to the Peruvian society.

Gwen Gardiner, Psychology
Faculty Mentor: Alexa Tullett, Psychology

*International focus

People’s cultural environment can influence their systems of belief about how the world works. The present study tries to explore the role culture plays in shaping people’s beliefs by comparing Indian and American college students. Multiple measures were used to assess people’s beliefs about order and control in their environment and their preference for structure in relation to their religious beliefs. Participants (N= 220) were shown a series of snowy pictures, half of which contained an image, and asked to describe the picture if they saw anything. They were also given the Locus of Control (LOC), Personal Need for Structure (PNS), and a religion questionnaire. Both groups differed significantly for almost all of the assessments. Overall, Indian students were better at accurately detecting images, and had a higher need for structure, while American students were more religious. Within the LOC, Indian students had a strong positive correlation between Chance and God control, suggesting that Indian students may not perceive random events as a completely independent occurrence. However, both groups rated internal control as the strongest overall source of influence, suggesting that while the role of outside agents may differ by context, internal power is still the dominant belief. Overall, this study provides evidence that cultural backgrounds can influence our perception and beliefs about control and structure in our environment.

Allexa Gardner, Economics, Finance and Legal Studies
Faculty Mentor: Paan Jindapon, Economics, Finance and Legal Studies

*International focus

The economic benefits and harms of genetically modified crops have been disputed since their inception. GM crops like Bt corn and Roundup Ready wheat have become fairly commonplace in the United States. The mass production of these crops has impacted the trade of agricultural products to other countries, especially the EU. Over the past decade, EU countries have developed regulations that

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require separation of GM crops and non-GM crops, which create an added cost to their production. One of the biggest disputes in research regarding genetically modified crops and technology is the impact on the welfare of the average person. Currently, most of the biotechnology being created is funded and being researched by privately owned institutions. These firms have intellectual property rights on most of the technologies necessary to produce GM crops causing a monopolistic hold on agricultural markets and their profits. While intellectual property rights provide incentives for innovation, some argue that these protections are detrimental to economic markets due to the inability of public organizations to undertake the same level of research with the lack of funding and risk of right infringement. The impact of GM crops on United States export of agricultural products as well as possible solutions to the privatization problem in biotechnology will be explored.

Sabrina Gerlich, Human Development and Family Studies  
Kelly Schaefer, Human Development and Family Studies  
Shemeka Phipps, Human Development and Family Studies  
Joseph Ledford, Human Development and Family Studies
Faculty Mentor: Maria Hernandez-Reif, Human Development and Family Studies
The Family Interaction Project: The Effect of Mealtime Habits on Infant and Toddler Physical Development
The purpose of this study is to determine the effect of dietary habits on the physical development of young children through the research conducted in the Family Interaction Project. The participants included infants and toddlers studied over a two year time period as well as the parents of the children. They provided data relating to the daily habits of their child in the categories of sleep, mealtimes, leisure, and social development through a questionnaire called the DFA (Daily Family Activity). Physical measurements, including height and weight, were recorded every six months in the participants' classrooms at the Children's Program. The parents were also asked to complete the DFA questionnaire during the time that these measurements were being taken. This study analyzed both the longitudinal and cross-sectional impact of the subjects' mealtime habits on their physical growth. Specific factors such as whether the infant was breastfed and selectivity in eating (i.e. pickiness) were compared with the physical measurements (height and weight). The data from the first cohort were studied across a two year time period to evaluate longitudinal effects while the data collected for the first time across four different cohorts were compared. These measures could help predict future childhood obesity for the participants as the Family Interaction Project continues.

Jesse Gettinger, Chemistry  
Faculty Mentor: David Nikles, Chemistry  
Synthesis and Characterization of Block Copolymers for a Magnetically Triggered Drug Delivery System  
The triblock terpolymer, CH3O-(CH2CH2O)120-(COCH2CH2CH2CH2O)40-(COCH3O)37- H was prepared in a two stage process. First, a poly(ethylene glycol-b-caprolactone) diblock copolymer was prepared by the tin-catalyzed, ring-opening polymerization of ε-caprolactone from the alcohol terminus of poly(ethylene glycol) monomethyl ether, Mn ~5,000, then the triblock was prepared by the tin-catalyzed ring-opening polymerization of lactide from the alcohol terminus of the caprolactone block. Polymer micelles were made by solvent evaporation of THF in ultrapure water. The critical micelle concentration was 1.35 mg/L. Doxorubicin was trapped in the core with a loading of 13.8% and an encapsulation efficiency of 33.3%. The rate of thermally triggered release of the doxorubicin was determined at 37 °C, a temperature below the melting point of the polycaprolactone core and at 57 °C, above the melting point. The release rate at 57 °C was higher and 82.5% of the doxorubicin was released after 45.5 hours.
Al-Karim Gilani, Chemical and Biological Engineering  
Faculty Mentor: Cassandra Ford, Capstone College of Nursing  
*International focus  
Co-creating the Serbia Fellowship Experience allowed one to explore community and institutional resources in another country. This multi-year, multi-organization educational experience required many extended trips to the Balkan nation and prompted a prolonged project in which one could see how diverse groups of people interacted with each other and what repercussions the past Yugoslavian histories have on current society. Ethnic and international tensions have manifested themselves into society, but common humanity continues to be revealed by a national drive to cooperate in reaction to economic issues and pre-European Union membership constraints. Collaborative programs such as the one created at UA serve to provide bridges between people of disparate backgrounds so as to exchange information, ideas, and knowledge between different peoples, in order to promote dialogue for healthy international relations.

Olivia Gobble, Chemistry  
Faculty Mentor: Kevin Shaughnessy, Chemistry  
Palladium-Catalyzed Chemo- and Regioselective Cross-Dimerization of Two Terminal Alkynes  
Conjugated enynes are found in a number of biologically active compounds such as oxamflatin and NNC 61-4665. Conjugated enynes are typically obtained via a Horner-Wadsworth-Emmons reaction of a propargyl aldehyde or the coupling of a pre-functionalized alkene with an alkyne. The most efficient route to obtain enynes would be by the direct coupling of two different alkynes. This would result in fewer synthetic steps with less waste generated. However, this reaction often results in a number of different chemo- and regio-isomers. Our group has recently developed a method for the selective dimerization of two alkynes to give one major isomer. Utilizing a palladacycle derived from di-tert-butyleneopentylphosphine, phenylacetylene and propargyl alcohols or amines are coupled in a head to head fashion to produced trans enyne structures.

Brian Goodell, Chemical and Biological Engineering  
Faculty Mentor: David Nikles, Chemistry  
Synthesis of MnBi Nanoparticles for High-Energy Permanent Magnets  
As rare earth metals become increasingly scarce in the global market, this research endeavored to ascertain whether MnBi nanoparticles could serve as a new, viable source of high-energy permanent magnets. Ferromagnetic particles were produced through a two-stage approach: 1) nucleation followed by 2) heterogeneous deposition on the nuclei. Varying the reaction time and chemical species used for nucleation influenced the particle compositions. Additionally, several procedures were evaluated to determine an effective method of particle isolation.

Jessica Goodman, Political Science  
Siobhan Greene, Political Science  
Faculty Mentor: Dana Patton, Political Science  
College Students’ Knowledge of Domestic Violence  
The purpose of this study is to find what University of Alabama students know about domestic violence and abusive relationships through an online survey of 150 students. In order to grasp how to best prevent and address this type of violence on a college campus and the surrounding neighborhoods, it is essential to understand the students’ knowledge about domestic violence and relevant legislation. By

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finding out the areas where students lack the most knowledge and understanding, educators and legislators are more equipped to create policies and programs to attack this problem. Ultimately, understanding the knowledge levels of students will help to protect them from intimate partner violence. This study hopes to prove that laws enacted to protect college students are effective and that students are aware of the help they are offered.

**Rob Grady**, Civil, Construction and Environmental Engineering  
Faculty Mentor: Zheng O’Neill, Mechanical Engineering  
*Development of an Energy Model for UA Residential Hall*  
In 2011, buildings consumed 40% of the energy and represented 40% of the carbon emissions in the United States. This is more than any other sector of the U.S. economy, including transportation and industry. The University of Alabama has been under extensive expansion over the last decade, adding over ten residential halls in that time. With a growing on-campus student population, enhancing building efficiency represents one of the easiest and most immediate ways to reduce carbon emissions and heating/air-conditioning costs. The University of Alabama spent nearly $15 million on electricity in 2013. Building energy modeling has recently received increased attention as a tool to help reduce building energy consumption by providing access to efficient design and operation strategies without exhaustive field testing.

**Ansley Griffith**, Geological Sciences  
**Collin Williams**, Geological Sciences  
Faculty Mentor: Fred Andrus, Geological Sciences  
*Preliminary multi-axial growth analysis of Panama rhodoliths for paleoclimate reconstructions*  
*International focus*  
Rhodoliths are a benthic, free-living form of coralline red algae that can calcify continuous growth layers for over 50 years and are used as a proxy for paleoclimate records (Darrenougue et al., 2013). One concern with using rhodoliths for climate reconstruction is that their thalli, or branched structures, are exposed to inconsistent light as they roll on the seafloor, potentially causing uneven growth. To study this problem, rhodoliths were collected from Isla San José in the Archipiélago de Las Perlas, Panama via SCUBA diving. Rhodoliths were then stained with Alizarin Red Stain to mark their current growth layer and placed in mesocosms under ambient seawater conditions except for the addition of LED lighting to simulate more natural sunlight exposure. Rhodoliths were kept in the mesocosms for 6 months (Apr-Sept 2014), seawater was replaced approximately every 20 min., and rhodoliths were turned every two weeks to simulate movement. To analyze their growth variation, thick sections were made to image the growth bands in three axes (long [A], intermediate [B], and short [C]). Preliminary observations indicate that the longest axis, A, grows the most compared to the other axes, and that there is no direct relationship between the growth of the rhodoliths and their position to the mesocosm light sources. Variations in growth rates will further illuminate the understanding of rhodolith turnover and its influence on using rhodoliths as indicators of past climate change.

**Sarah Griswold**, Religious Studies  
Faculty Mentor: Merinda Simmons, Religious Studies  
*Out in the Open*  
As part of an independent study, I’m studying classifications of race, religion, and especially gender (amongst other categories that pop up from time to time) in entertainment, with True Detective being my main case study. The role of misogyny and violence against women is readily apparent in the series. I’ve chosen to focus on the interest in intentionality, particularly in the various power structures that

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develop as a result of certain gender-based classifications. To some extent, this topic includes violence against women and misogyny, but it is not limited to that and it often appears in much more subtle ways. For example, it's easy to identify a sexualized, dead female body as misogynistic. It is harder to pick out exactly how the male characters in the series perform dominance on a regular and consistent basis. This is partially because, as viewers, we have become desensitized to these subtle assertions of power. This is no surprise, since the process of power structures becoming normalized is precisely how hegemony works. The performance of dominance only works because those being dominated have been subjected to this performance several times before. True Detective makes an excellent case study for this topic as it contains a lot of contrast between different groups and classifications (white/non-white, male/female, etc.).

Matthew Grybas, Mechanical Engineering
Faculty Mentor: Paul Hubner, Aerospace Engineering and Mechanics
Charge Capacity of Piezoelectric Membrane Wings
Micro air vehicles (MAVs) have small wings often fabricated with flexible frames and membranes. These membranes flex and vibrate. Piezoelectric films (materials) have the ability to convert induced stress or strain into electrical energy. Thus, it is of interest to investigate if piezoelectric films can be used as a structural member of an MAV wing and generate both lift and energy. Both a shaker test and a wind tunnel test will be conducted to characterize and assess energy production and aerodynamic characteristics including lift, drag and efficiency.

Audrey Gunn, Psychology
Faculty Mentor: James Hamilton, Psychology
Rejection Makes Me Sick: Rejection Sensitivity Increases Symptom Reporting for Those with Insecure Attachment
Evidence suggests that people with an insecure attachment style report more medical symptoms than people with a secure attachment style. There are a variety of explanations for this relation, including the possibility that insecurely attached people have greater stress reactivity, or poorer coping mechanisms to deal with stress. Alternatively, people with insecure attachment have difficulty maintaining safe and stable interpersonal relationships. It is possible that they use exaggerated illness behavior to ward off rejection or criticism from others. The current study sought to test this second hypothesis. Participants were asked to complete typical measures of attachment and physical symptoms, but also a rejection sensitivity questionnaire. We predicted that the relation of attachment and symptom reporting would be accounted for by rejection sensitivity. The results of the study replicated the significant relation between attachment and symptom reporting. In addition we found that this relationship was significantly mediated by rejection sensitivity. That is, it appears to be the rejection sensitivity of insecurely attached people that is responsible for their increased symptom reporting. This finding supports the interpersonal theory of exaggerated symptoms reporting.

Elizabeth Guthrie, Political Science
Faculty Mentor: Daniel Levine, Political Science
Palestinian Refugee Camps
*International focus
My presentation will explore the economic, educational, and environmental aspects of three different Palestinian refugee camps (located in Lebanon, the West Bank, and the Gaza Strip respectively), using them as a microcosm for understanding the Palestinian refugee crisis more generally. It will survey quality of life issues, comparing the period of the camps' founding to that of the present day, and will
consider the negative impact of the camps’ lengthy existence on the environment, the lives of the refugees, and the region. The presentation will conclude with projections as to the future of camp life for Palestinian refugees.

Ryan Hacherl, Chemistry
Faculty Mentor: Carolyn Cassady, Chemistry
Mass Spectrometry of Biological Peptides
Biological peptides can be identified in solution by mass spectrometry. The mass spectrometer detects mass to charge ratios of samples and certain additives can be used to increase the charge state of the sample and the signal intensity. Acid addition in solution is a common method to encourage H+ addition to the peptide and increase its signal intensity. The addition of certain metal ions in solution has been shown to "supercharge" some peptides, dramatically increasing signal intensity through additional protonation. Twelve basic or neutral biological peptides were tested with additives of acid alone, Cr(III) alone, and acid plus Cr(III). In most peptides, addition of acid alone decreased signal intensity. This unexpected phenomena is currently being further investigated at multiple acid concentrations. Cr(III) was effective at supercharging six of these peptides, especially peptides with two basic residues and no acidic sites other than the C-terminus carboxylic acid group. One peptide possessed a more neutral amide group at its C-terminus and supercharged better than its carboxylic acid terminus equivalent, showing that acidic sites may decrease supercharging. Spacing between basic residues did not appear to affect supercharging performance contrary to the thought that charges cannot accumulate on basic sites in close proximity on a peptide. A second run of all peptides is currently in progress to confirm these findings.

Grace Hall, Chemistry
Faculty Mentor: Martin Bakker, Chemistry
Flow Properties of Hierarchically Porous Materials
Fixed bed reactors are widely used in the chemical process industry to make everything from gasoline to plastic precursors. Hierarchically porous materials (HPMs) are materials that have pore networks of multiple dimensions. For HPMs with pores on the nanometer and micrometer scales, how fast a given solvent flows through the HPM can be very dependent on the exact structure, the composition of the HPM and the nature of the solvent. The flow properties of HPMs made from silica and carbons with different structures, and different surface chemical compositions are being tested by measuring the rates of flow of water and hexane through columns of the HPMs. Experiments suggest that the silica has some small solubility in water that leads to dissolution and re-precipitation resulting in increases in resistance to flow. Flow of hexane through carbons made by a direct synthesis was found to be more rapid and reproducible than that for carbons made by a nanocasting approach. The effect of modifying surface chemistry on the flow rates of water and hexane through the different carbons is currently being investigated.

Tanner Hallman, Biological Sciences
Faculty Mentor: Laura Reed, Biological Sciences
The Effect of Founder Selection on Drosophila melanogaster in a High-Fat Environment
Through observation and previous research, it has been established that Drosophila melanogaster have poor survival in maladapted environments, such as a high-fat diet. We are conducting a long-term selection experiment on 15 genetically unique lines in order to compare survival, adult and pupa weights, and time for each new generation to turn over. The theory of decanalization suggests that environmental perturbation - the high-fat food - will shift them away from genetic stability and cause a

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Demi Hammond, Communication Studies
Faculty Mentor: Darrin Griffin, Communication Studies

*Hey Batter Batter…: Nonverbal communication at the plate*

As a college student with the best of my athletic days in the past, I have spent more time than I ever imagined on the audience side of the fence. For 12 years, I spent every waking moment in preparation for the next opportunity I got to play the game I loved - softball. Many years of playing competitive fast pitch softball gave me a keen sense to the small details of the game. For example, nonverbal communication is included in interactions that occur on the diamond. Rupnow & Stotlar (1982) found that coaches integrate nonverbal elements into the feedback they give to softball players. Another nonverbal element is the hitting stance of a batter and the placement of their feet. To examine whether it is possible to rely on these nonverbal cues to predict the direction in which a batter will hit the ball I will examine data collected while attending several University of Alabama softball games. At the start of an at bat (AB) I will make a prediction on the direction of the hit using the batter’s nonverbal communication. Ultimately the actual outcome when the batter hits the ball will be recorded. Statistical correlations between my predictions and fair balls hit by batters will reveal whether the nonverbal stance of a batter can leak information about the intended direction of the ball onto the field. Through a poster presentation I will display graphs and statistics that will give us insight about nonverbal communication in softball.

Tarif Haque, Computer Science
Faculty Mentor: Xiaoyan Hong, Computer Science

*Named Data Networking for Underwater Wireless Sensor Networks*

Though underwater environments pose significant challenges for observation and exploration, there exist widespread applications for underwater wireless sensor networks (UWSN), ranging from studying marine life to search and survey missions. We ultimately aim to build a distributed information system to support UWSNs. To achieve this, we apply a Named-Data Networking (NDN) architecture to UWSNs using acoustic communications, which are marked by lower bandwidth, higher latency, and higher error rates compared to terrestrial networks. In addition, floating nodes result in high network dynamics, and underwater nodes must be energy efficient. The ad-hoc, dynamic nature of underwater sensor networks suggests that an NDN approach, which retrieves data by name, instead of pushing data to a specific location like the traditional IP model, may alleviate some of these issues. To study the efficacy of our approach, we simulate an underwater monitoring application using an NDN based network simulator, and assess its performance.

Amy Hase, Human Development and Family Studies
Faculty Mentor: Nicole Powell Psychology

*Reducing the Positive Illusory Bias: An Analysis of the Value Affirmation Task*

Children with a positive illusory bias, an inflated view of their own social competence, tend to display the highest levels of aggression compared to peers. It is believed that these children become defensive when presented with negative information regarding their social standing and respond aggressively (White & Kistner, 2000). Previous research indicates that completing a value affirmation task may
reduce defensiveness and aggression in children (Thomaes, et al., 2009). Value affirmation tasks may be a uniquely appropriate tool to help children with an inflated self-view become open to threatening information and reduce their need to respond aggressively. One such value affirmation task requires participants to choose two or three values from a list, and write about why those values are important to them. This project seeks to examine the trends of the values chosen in relation to the effectiveness of reducing the positive illusory bias and aggression. Half of the values are context specific (e.g. try hard academically) and the other half cut across contexts (e.g. being religious). Participants are boys and girls, ages 12-15, recruited from a larger study examining group versus individual format of the Coping Power program. It is expected that children who choose cross-cutting values will have greater reductions in the bias and aggression. Findings from this study may contribute to the successful intervention for aggressive children with the positive illusory bias.

Megan Hathcock, Mechanical Engineering
Faculty Mentor: Paul Puzinauskas, Mechanical Engineering

Real-Time Dynamometer Control Optimization
The purpose of this project is to incorporate real-time analysis and advanced post-processing control strategies into a stand-alone dynamometer control optimization and data acquisition package in LabVIEW. To be certified, diesel engines have to pass the FTP (Federal Test Procedure) heavy-duty transient cycle emission testing. During the FTP cycle test a dynamometer is used to control either Torque or Speed. To pass the test, the engine must follow a linear regression for the entire 20 to 30 minute test. This program will increase testing efficiency by allowing users to see real time data and immediately know if the engine is failing. Additionally, the control will tune PID loops using post processing to determine an optimum control to minimize error and facilitate the engine to pass transient testing.

Thomas Hemmings, Mechanical Engineering
Ryan Nicholas, Mechanical Engineering
Faculty Mentor: Paul Allison, Mechanical Engineering

Spatially correlated nanoindentation, EDX characterization and distribution of IMCs in friction stir welded AL-to-Mg alloys
Spatially correlated nanoindentation, EDX characterization and distribution of IMCs in friction stir welded AL-to-Mg alloys T.C Hemmings1, R.A Nicholas1, O.G. Rivera-Almeyda1, P. G. Allison1, J. B. Jordon1, H. Rao1, O. Rodriguez1 Department of Mechanical Engineering, University of Alabama, Tuscaloosa, AL 35487 USA Abstract Recently, there has been an industry push in lightweight designs for the purpose of reducing our nation's dependence on fossil fuels. In this research, the influence of welding tool speed was studied on the formation of the IMCs Al12Mg17 and Al3Mg2 in a friction stir welded (FSW) aluminum-to-magnesium alloy. The nanomechanical properties obtained from nanoindentation were determined for FSW at an optimum tool speed, an upper bound tool speed, and a lower bound tool speed while the feed rate was held constant. Three different manufacturing parameters were analyzed by using nanoindentation spatially correlated to scanning electron microscopy (SEM) with energy dispersive X-ray spectroscopy (EDX). By using the EDX line scan feature on the SEM, the elemental analysis was obtained for each indent to determine microstructural changes correlating to the FSW nugget zone (NZ), heat-affected zone (HAZ), and thermomechanically-affected zone (TMAZ). Results indicate that the optimum tool speeds have much lower deviations in mechanical properties and compositions as expected.

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John Henderson, Biological Sciences
Faculty Mentor: Laura Reed, Biological Sciences

Population variation in phenotypic robustness to dietary perturbation

The model of canalization proposes that populations attempt to maintain equilibrium in the face of stress by gene by genetically adaptive mechanisms. It has also been shown that populations differ genetically when geographically isolated. This study explores how geographically isolated populations differ in response to the stress of a perturbing diet, and to measure the levels of decanalization due to this stress. We tested ten isofemale lines from each of four populations recently gathered from the wild. The populations represent a broad geographic range of Drosophila melanogaster's distribution. To measure decanalization, we will analyze pupal weight variation within and between the populations for flies raised on either a normal or high fat diet. We found substantial variation between populations in their degree of phenotypic robustness to dietary perturbation. We hypothesize that the varied demographic and ecological history of the populations has influenced their ability to buffer the effects of a change in diet.

Elizabeth Henderson, Communicative Disorders
Faculty Mentor: Memorie Gosa, Communicative Disorders

Prevalence of feeding difficulty in children with suspected Autism Spectrum Disorder in Alabama

A known feature of Autism Spectrum Disorder (ASD) is sensory processing dysfunction. Sensory processing dysfunction frequently manifests itself in extremely limited variety of dietary intake in children with ASD. Eating is the most sensory rich activity that children participate in on a daily basis. Feeding engages all of the senses and it is necessary for intake of adequate calories and nutrients to support growth and development during childhood. Despite knowing that sensory processing dysfunction is a common feature of ASD, there does not currently exist a structured method of documenting feeding difficulties for children being evaluated for ASD at The University of Alabama's ASD Clinic (UA ASD). This project introduces a systematic protocol for documenting potential feeding difficulties in children ages two through six undergoing assessment for ASD at UA ASD. This research project provides documentation of the prevalence of feeding difficulties in children suspected of having ASD and allows for characterization of the feeding behaviors that are problematic for these children and their parents. Data collected also allow for correlations between problematic behaviors and anthropometric outcome measures of weight and height. Data collection began in December 2014 and will continue through at least December of 2015.

James Henderson, Civil, Construction and Environmental Engineering
Seth Tibbs, Civil, Construction and Environmental Engineering
Zack Wells, Civil, Construction and Environmental Engineering
Ana Santos, Civil, Construction and Environmental Engineering
Rabelo De Melo, Civil, Construction and Environmental Engineering
Mallory Mitchell, Civil, Construction and Environmental Engineering
Jacob Howell, Civil, Construction and Environmental Engineering
Faculty Mentor: Pauline Johnson, Civil, Construction and Environmental Engineering

City of Tuscaloosa Water Audit

A team of six students from the University of Alabama is conducting an inaugural, pro bono, water audit for the City of Tuscaloosa. The purpose of this water audit is to establish a broad understanding of how the City of Tuscaloosa's water is being used and evaluate system efficiency based on treated water, consumption and losses. Water audits can be beneficial by identifying, quantifying and strategizing reducing water losses, reducing liability, improving data quantity and accuracy, and increasing

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awareness and understanding of water use. The water audit is being conducted in accordance with M36 Water Audits and Loss Control Program published by the AWWA. Each student is undertaking individual tasks for the audit. These tasks include, but are not limited to, quantifying water production and estimating losses from: leaks, authorized use, measurement inaccuracies, and unauthorized use. This complex multi-year problem is a perfect challenge for civil and environmental engineers, involving large databases, incomplete system information and strategic experimental design of field testing and data gathering procedures. The team works concurrently with the City of Tuscaloosa Water Works Department to gather this information. In instances where no or limited data is available on the quantity of losses for a specific item, the quantity is either estimated from M36 recommended strategies or field testing is performed to produce an estimate.

Amber Henson, Health Science
Faculty Mentor: Lori Turner, Health Science

Body Image

Background/Problem: The Student Health Center at the University of Alabama office of Health Education and Disease Prevention provides nutrition education services to address the problem of eating disorders and poor body image. Purpose/Mission: Their mission is to support the academic development of students by providing efficient access to quality healthcare services in a caring manner and promoting student health and wellness in order to satisfy the changing needs of The University of Alabama students' community." (The University of Alabama Student Health Center website.) Methods: Several activities are delivered including Body Appreciation Week. This involved distributing flyers at a table at the Ferguson Center to students. A photo booth that people could write on a dry erase board what they loved most about themselves. We showed a film called "Killing Us Softly 4" which was a documentary about how society portrays in which the "ideal girl" should look like causing younger girls to develop a lower self-esteem. an event scheduled called "Southern Smash" which is a non-profit organization where we set up a "scale graveyard" where people can smash scales with a sledge hammer. Event now going to be held on March 25. Results/Discussion: These events create awareness about serious topics involving eating disorders and body image. Recommendations: Just the overall spread of awareness needs to be taken place year around instead of just one week out of the year.

Mallory Herring, Theatre and Dance
Faculty Mentor: Rebecca Salzer, Theatre and Dance

Drift: An Underwater Screendance

"Drift" is a screendance created for the student choreography concert, Dance Alabama, that explores the use of video editing as a part of the choreographic process. Originally, the dancers rehearsed set movement phrases in a dance studio setting. I then asked them to perform the same choreography underwater. For me, this adjustment represents entering post-graduate life. The knowledge gained from college must be adjusted to negotiate a new and unfamiliar environment. The title of the piece, "Drift," refers to being carried through this transitional period and moved along by life.

Rachel Hill, Biological Sciences
Faculty Mentor: Laura Reed, Biological Sciences

The positive effects of exercising using the TreadWheel for Drosophila melanogaster

The positive effects of exercising using the TreadWheel for Drosophila melanogaster Sean Mendez, Rachel Hill, and Laura Reed. Metabolic syndrome includes conditions such as high levels of blood sugar and cholesterol, high blood pressure, and increased levels of body fat and is an increasingly prevalent problem. It is believed that exercising can affect adult metabolism. We used four genetically unique lines
of Drosophila melanogaster, whose short generation time gives us the ability to quickly study the different parts of the Drosophila melanogaster’s lifespan. Using our fruit fly exercise machine, the TreadWheel, we exercised Drosophila melanogaster on a pyramid routine for five days in groups of 50 divided into males and females, starting when they were four to seven days old. We tested the Drosophila melanogaster’s triglyceride, glucose, glycogen, and protein levels as well as their climbing ability and respiration rates. Results show that exercising can have a positive effect on metabolism, this experiment will serve as a gateway for future experiments testing different variables such as diet and how exercise can interact with diet and different genotypes to affect metabolism.

Chloe Hill, Culverhouse School of Accountancy  
Faculty Mentor: Chip Brantley, Journalism  
Downstream: A Year-Long Look at Alabama’s Rivers  
The goal of the project was to create a website that would continue to serve as an ongoing resource for the community to learn about various issues that surround Alabama’s rivers. The Graduate students in Community Journalism conducted research and reported on the following five topics: dam regulation, the Cahaba Blueways Project, the endangerment of the Southern Clubshell Mussel, the tracking of water from its source to a faucet in the Alabama Theater in Downtown Birmingham, and the history of the people of Village Creek and their experiences with flooding in their community. The website will contain interviews, photographs, and detailed stories on each of the five topics, providing easy access to information for anyone wanting to learn more about their water and the environment.

Preston Hinkel, Biological Sciences  
Faculty Mentor: Laura Reed, Biological Sciences  
Simulating Complex Genetic Evolution  
The world wants to know whether or not complex genetic organisms will adapt to new conditions faster than simple genetic organisms. A population genomics simulation of the two different types of organisms allows for the organisms to experience the same simulated environment, while also allowing faster experiments with many reproductions of the experiments. The population genomics simulator HexSim has been utilized in these experiments. The two organism populations adapt over time to the peak genetic conditions for the original environment and then a portion of each of those populations is then placed in a new environment. The portions placed in the new environment are then observed, their adaptations noted. We expect to find that the complex genetic organisms will adapt faster and better to the new environment than the simple genetic organisms. These results would then demonstrate that complex organisms adapt faster and better to new environments.

Shaun Hogan, Physics and Astronomy  
Faculty Mentor: Conor Henderson, Physics and Astronomy  
Searching for Physics Beyond the Standard Model With the CMS Experiment  
The Compact Muon Solenoid (CMS) is a general-purpose particle detector at the Large Hadron Collider (LHC). With these two machines, we can look at the physics of extremely small particles. The LHC functions by accelerating particles close to the speed of light, and colliding them in a detector such as the CMS. In the collision, new particles are generated, which are then analyzed. The CMS consists of two types of sub-detectors: the barrel, which is where the collision occurs, and the endcaps, which are farther away laterally from the collision. The goal for this project was to use proton-proton collision simulations to analyze the efficiency of the endcap regions of the CMS in order to determine if the generated particles behave in a manner consistent with the Standard Model of Particle Physics, or if there is an unexpected trend that could potentially be evidence for physics beyond the Standard Model.

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In particular, we are looking for evidence of the Randall-Sundrum models of gravitation, which would appear as a particle called the graviton within the CMS detector.

**Margaret Holland**, Psychology  
Faculty Mentor: Joan Barth, Psychology  
*The Influence of Peer Support on Self-Efficacy in Math and Science*  
The relationship between self-efficacy in math and science and perceived peer support was examined in a sample of 4th and 5th grade students in a curriculum with a STEM emphasis. Student perceptions of various careers were examined, particularly careers in STEM-related fields. Gender differences were also an area of focus in the study. Self-efficacy is a person's perception of their ability. Social support includes behaviors from relationships that enrich the well-being of a person and protect them from negative outcomes. Social support can come from family members, peers, authority figures, and other people in a person's life. Self-efficacy levels have a positive relationship with levels of social support. A significant gender gap is present in STEM career fields. Self-efficacy in math and science appears to be a determining factor in whether people pursue STEM careers. It is expected that peer support will be positively correlated with self-efficacy levels in both math and science. Boys are expected to have higher levels of self-efficacy than girls overall and more positive perceptions of STEM careers. However, the specialized curriculum is expected to moderate the relationship.

**Bryan Hopkins**, Capstone College of Nursing  
**Anna Melde**, Capstone College of Nursing  
**Morgan Holt**, Capstone College of Nursing  
**Paige Godfrey**, Capstone College of Nursing  
Faculty Mentor: Sara Kaylor, Capstone College of Nursing  
*The Nursing Shortage: A Critical Health Care Issue*  
The purpose of this presentation is to describe the current nursing shortage in the United States. Registered Nurses make up the largest group of health care providers in the United States. The nursing shortage began long ago, but the largest problem arises from the growing population after World War II and the increased need for licensed nurses. The aging baby boomer population makes up approximately 75 million people, which not only contributes to a need for more nurses, but demands a need for nursing educators as well. The lack of nursing educators causes a decrease in the number of students able to enroll in nursing programs and advanced degree nursing programs. In 2015, approximately 78,000 applicants to bachelor and advanced degree programs were turned down due to the decreased nursing educator staff. The U.S. Bureau of Labor projects that over the next seven years approximately 1.1 million new nurses will replace the increased demand and those retiring from the work force.

**Delaney House**, Theatre and Dance  
Faculty Mentor: Sarah Barry, Theatre and Dance  
*Sculpting Movement*  
Through a semester long choreography class exploring inspiration from text, visual art, and music, similarities amongst the creative processes from various art forms led to an increased awareness of methods and ideas in the creation of new dance work. This project explores some intersections of the creative processes between visual art and dance. The methods used by artist Ken Price for his sculpture entitled "Bro" were examined to see how a dancer could embody similar practices in creating a dance work. Concepts of layering, specific number series and organic inspiration were readily translatable to movement, choreographic design and structure as well as incorporating music invention. Additional structural ideas were explored by studying postmodern choreographers' methods of chance for creating...
dances. A showing of the piece will visually confirm the points of this presentation. This project details the research and process to make the duet entitled "5, 14, 70".

Caitlin Hudson, Human Development and Family Studies
Whitney LaCour, Biological Sciences
Faculty Mentor: Dr. Sherwood Burns-Nader, Human Development and Family Studies
Examining the memories of Young Adult's childhood experiences with the doctor
Children and adolescents are vulnerable to stress and fear during medical experiences. Such vulnerability can lead to an increase in emotions, influencing their memory of the experience. In addition, previous healthcare experiences have been found to influence coping during later healthcare visits. The purpose of this study is to examine adult memories of their pediatric experiences and relationships among different variables of their memoires. In particular, relationships between their level of anxiety as a child in medical settings, the use of a primary physician, and the likelihood to seek medical treatment as an adult were examined. Three hundred and sixty four adults ranging from 19 to 44 years of age were administered a survey. The survey consisted of questions pertaining to the students' childhood health care experiences, including feelings about the medical staff, anxiety about going to the doctor, and family attitudes about health care. Significant findings included correlations between reported anxiety level and the use of a primary care physician and the likelihood to seek medical treatment in adulthood. Those adults who reported experiencing less anxiety during medical visits as a child also reported they used a primary physician. In addition, those who reported being less likely to seek medical treatment in adulthood, reported experiencing higher levels of anxiety in healthcare settings during childhood.

Katlyn Hughes, Chemistry
Faculty Mentor: Elizabeth Papish, Chemistry
The Study of Ru(II) Complexes as Anticancer Agents
The problem that most anticancer drugs have is the failure to differentiate between cancerous cells and healthy cells. A ruthenium complex, [Ru(bipyridine)2(6,6'-dihydroxybipyridine)]Cl2 (1), worked on by the Papish group is both light activated and pH sensitive to specifically target cancer cells, which have a lower pH than normal cells. So far, research has found this ruthenium complex (1) to have an IC50 value of 88 µM in cancer cells. The complex was also tested in solution at pH 5 and 7.5 (above and below the pKa values for loss of 2 protons), and it was shown that light triggered ligand loss led to the active prodru at pH 5 but not at pH 7.5. However, this complex stills needs to be tested at pH 6.5, which is a more accurate pH for most cancer cells, and needs to be tried with normal cells as well. Also, there is a potential for further work with a similar complex, Ru(bipyridine)2Cl2; it's IC50 and UV-Vis spectra have not yet been determined, and could prove useful to this anti-cancer endeavor. (1) Hufziger, K.; Thowfeik, F.; Chaboneau, D.; Nieto, I.; Dougherty, W.; Kassel, W.; Dudley, T.; Merino, E.; Papish, E.; Paul, J. J. Inorg. Biochem. 2014. 130. 103-111.

Daniel Hughes, Information Systems, Statistics and Management Science
Faculty Mentor: Darrin Griffin, Communication Studies
Werther effect in active shooter events? Examining potential copycat behavior
If it bleeds it leads - this is unfortunate but real mentality in the industry of news media. Reporting practices have led to what is perceived as sensationalism of negative events. The Werther effect establishes the connection between suicide events publicized and a spike in incidents of suicide that follow (see Kim et al., 2013). Given these findings it must also be considered that this phenomena may also apply to other sensationalized negative events enacted by criminals. Most recently, active shooter
events have become heavily publicized in the media. This begets a logical question: Are there copycat active shooters? My preliminary research serves to explore the possible presence of copycat phenomena of contemporary active shooters through media sensationalism. Through the analysis of shooters’ written manifestos available through public record I intend to examine references made within their writings to previous active shooters. This relational data will be input into social network analysis software (i.e., UCINET) to construct a network visualization. Also, mathematical calculations from the network will allow quantitative findings to establish whether a copycat effect might be occurring in the context of active shooters. From my findings I will offer and discuss future directions for my research. Reference: Kim, J. H., et al. (2013). The Werther effect of two celebrity suicides: an entertainer and a politician. PLOSone, 8.

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 substance application using ionic liquids as carrier fluids. Ionic liquids are high viscosity solvents that are capable of dissolving numerous substances that are desirable for application to different surfaces. Current application methods involve an industry standard syringe pump, but lack complex pattern generation capabilities. Our project integrates currently available 3D-printing technologies with a custom built syringe system to apply ionic liquids to a flat surface. To accomplish this we have retro-fitted a MakerBot Thing-O-Matic 3D-Printer with a custom liquid extrusion device and altered its programming to interface with the new circuitry required. Our syringe pump is designed to work with high-viscosity non-Newtonian liquids. 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.

Meche Hych, Capstone College of Nursing
Sarah Groover, Capstone College of Nursing
Robin Hall, Capstone College of Nursing
Kimiko Clayton, Capstone College of Nursing
Lindsey Sanders, Capstone College of Nursing
Taylor Roden, Capstone College of Nursing
Jennifer Broughton, Capstone College of Nursing

Faculty Mentor: Michele Montgomery, Capstone College of Nursing

Community Gardens and Childhood Obesity in Coaling, AL

The purpose of doing a community assessment of Coaling was to identify strengths and weaknesses within the community. After further research and assessment of Coaling, readily available healthy food choices were seen as a major weakness. The lack of healthy food choices leads to a decreased quality of life due to the increased risk for obesity. The assessment uncovered empty plots of land that could easily be transformed into community gardens for fruits and vegetables. The idea is to get the entire community, children and adults, involved in the community garden to promote a healthy diet with a variety of fresh fruits and vegetables. To further facilitate a healthy diet, community classes on gardening and the benefits of fresh fruits and vegetables will be available. It is important to make sure children get involved, in order for them to establish good health habits to lay a solid foundation for their health in the future.

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**Optimization of Perovskite Solar Cells**

Organo-lead mixed halide perovskite (CH3NH3PbxCl3-x) materials have garnered a great deal of attention as an active layer absorber in solution processable photovoltaic cells, due to their low exciton binding energy, high free charge mobility and low bandgap characteristics. Despite the rapid increase in power conversion efficiencies generated by these devices in the past few years, little is still known about the effects of various interconnecting layers on device efficiency and charge transport within the photovoltaic cell. In this study, the effects of layer thicknesses on device efficiency were studied by varying the thickness and morphology of the device's active layer and hole and electron transporting layers. In doing so, an optimal device with increased power conversion efficiency was achieved. Using such a relationship between layer thickness and device efficiency, an understanding of charge transport within a perovskite-based photovoltaic cell was obtained. These experiments were carried out using a (Al/PC70BM/ CH3NH3PbxCl3-x/PEDOT:PPS/ITO) device structure.

**The Family Interaction Project: Cortisol stress hormone levels in Young Infants and Toddlers**

In this study, we will be examining if child stressors or changes occurring in the children's present lives, such as teething, reaching a new milestone like walking or starting to eat solid foods relates to changes in the infants' and toddlers' cortisol stress hormone levels. For the current study, we will be using data from the Family Interaction Project (FIP) where 22 infants and toddlers are being tracked until they are five years of age. Every six months, the children's saliva samples have been collected several times during the day and the parents are asked about family and child stressors. The data will be looked at both longitudinally as the child ages 6 months to 2 years of age, as well as cross-sectionally for infants (0 to 1 year) versus toddlers (1 to 2 years). Positive correlations are expected as are differences between infants and toddlers in their cortisol levels.

**Gas-Phase Acidities of Acid-Substituted Dipeptides**

In human biochemistry, peptides associated with digestion, blood clotting, and neurons are often highly acidic and contain glutamic and aspartic acid residues. The lowest energy conformers for neutral and deprotonated dialanine substituted at each position with glutamic acid or aspartic acid were predicted. The reliable correlated molecular orbital theory G3MP2 method was used to predict the gas-phase acidities. The carboxylic acid sites located on each residue have stronger acidities than the amide sites. The results show the importance of intramolecular hydrogen bonding and its effect on acidity.

**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. It allows user to produce virtually any solid object "on demand" and on site, instead of creating it elsewhere. As 3-D printing grows, it has begun 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. Specifically, we foresee many opportunities for 3-D printing as a means of producing novel and advanced components and entire devices for gas treating. Gas treating plays a crucial role in many existing and emerging energy-related processes, including pre- and post-combustion CO2 capture. These processes are typically carried out in absorption columns containing "packing materials" which provide interfaces for gas-liquid contacting. Packing materials are currently created using conventional manufacturing techniques, which means the design, cost, and ability to optimize gas-liquid contactors may be limited. In this respect, 3-D printing could be a mechanism by which to achieve improvements on existing technologies and more rapidly deploy novel devices. We have designed, printed, and begun testing on new packing materials for CO2 separations. In this presentation we will describe the design and performance of our new packing materials as well as future design plans.

Candice Ji, Advertising and Public Relations
Joel Hafer, Advertising and Public Relations
Larissa Magera, Advertising and Public Relations
Faculty Mentor: Teri Henley, Advertising and Public Relations

Advancing Digital Ordering Experience for Pizza Hut in Quick-Service Pizza Restaurant Industry
An increasing number of quick-service pizza restaurants have been developing digital ordering options to provide consumers with a superior ordering experience in order to gain loyalties and drive sales. The purpose of this research is to examine consumers' current pizza consumption habits and ordering process, and to explore opportunities for Pizza Hut to drive digital conversions. Secondary research was conducted to assess the pizza industry and determine Pizza Hut's current brand position. Results showed that Pizza Hut still stood as the industry leader holding 15.3% of market shares, although challenges emerged from increasing consumer demands for convenience, customization and health options. To further understand consumer perceptions and behaviors, extensive primary research was conducted using surveys, focus groups, in-depth interviews, ethnocepts, journal studies, digital ordering observations and eye tracking analysis, with a total of more than 1,500 participants involved. Findings revealed that ordering pizza was a low-involvement decision that typically fulfilled one of three needs: to feed kids, entertain friends, or self indulge. Another finding was that while the majority of consumers habitually called to order, they believed digital ordering was a faster and more convenient option that offered deals and the ability to visually verify orders. However, a lack of awareness of digital ordering options and its benefits presented the biggest challenge for Pizza Hut.

Ayla Jones, Biological Sciences
Kellen Cowen, Biological Sciences
Faculty Mentor: Stephen Secor, Biological Sciences

Energy Efficiencies of a Meal; Gains and Losses
Not all nutrients in food become available for growth and metabolism. Portions remain unabsorbed and are lost in feces or as urea or uric acid. The efficiency by which food is absorbed and assimilated varies as a function of food type and thus may drive the selection of particular foods in the wild. We are investigating the apparent digestive and assimilative efficiencies of different natural foods for the brown anole lizard (Anolis sagrei) to determine whether some foods are more energetically profitable than others. We began this study by asking the questions: (1) how much do apparent digestive and assimilative efficiencies vary among lizards independent of food type, and (2) are there relationships between meal size (meal energy) and the magnitude of apparent digestive and assimilative efficiencies? To conduct this study we used bomb calorimetry to determine the energy content of a natural food item

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(isopods) and of the excreted feces and urates from that meal. We found apparent digestive efficiency (meal energy - feces energy/meal energy) and assimilative efficiency (meal energy - feces & urate energy/meal energy) to average 79% and 58%, respectively, and to vary among individuals. The amount of feces, but not urate, varied as a function of meal mass. We found no relationship between the amount of meal energy and apparent digestive efficiency. However, apparent assimilation efficiency did vary as a function of meal energy.

**Tyler Jones**, Kinesiology  
Faculty Mentor: Beverly Thorn, Psychology  
*Relationships Among Written Pain Descriptions and Perceived Social Support Variables in College Students*  
The objective of this study was to investigate whether there is a relationship between the method or style of written pain descriptions and perceived social support among college students. Previous research on pain and social support has established that higher pain catastrophizing scores are related to reporting more pain and poorer social support. This study attempted to extend the investigation of those relationships by examining qualitative descriptions of pain referents that were coded for certain characteristics (e.g., referencing emotional pain, elaborating on pain referents). 310 college students enrolled in an introductory psychology course answered baseline questionnaires assessing perceived social support and pain catastrophizing, including qualitative descriptions of pain referents that were then coded by multiple raters for analysis. Based on research that has supported the Communal Coping Model (CCM) of pain catastrophizing, it was hypothesized that participants engaging in more elaboration of pain via qualitative descriptors would also score lower on perceived social support. Correlational analyses found no significant relationship between the variables of interest, contrary to what the CCM would predict. Thus, the hypothesis was not supported, suggesting that the CCM may need to be adapted to take into account differences between chronic and acute pain. Important additional implications for future research will be discussed.

**Katherine Jordan**, Human Nutrition and Hospitality Management  
**Caroline Brantley**, Human Nutrition and Hospitality Management  
**Caroline Marsh**, Human Nutrition and Hospitality Management  
**Katie Bain**, Human Nutrition and Hospitality Management  
**Chelsea LeBlanc**, Human Nutrition and Hospitality Management  
Faculty Mentor: Lori Greene, Human Nutrition and Hospitality Management  
*Nutrition Education in Low-income School-aged Children: A Review*  
Background: A major barrier to healthful eating in low-income children is a lack of nutrition education. Often times, fruit and vegetable intake is low among children in this population due to that lack of knowledge. Therefore, these children are more likely to be overweight and obese. The aim of this literature review is to evaluate the current body of research on the outcome of nutrition education in low-income children. Methods: Scout, Pubmed, and CINAHL were used to find articles that evaluated nutrition education in low-income school-aged children. Through this search, 17 articles were evaluated and 10 articles met the inclusion criteria specified. Results: Poor early feeding practices, low levels of parental education, and low family income result in children who consume less than one daily serving of fruits and vegetables. Low-income children who received nutrition education at an early age were more likely to try new fruits and vegetables and increase their overall fruit and vegetable intake. It was also found that involving parents in the nutrition education increases the likelihood that the entire family unit will implement a lifestyle change as a result of the education. Conclusion: The implications of this literature review indicate that early childhood nutrition education may increase fruit and vegetable...
intake in low-income children. This may reduce the prevalence of overweight and obesity in low-income school-aged children.

**Katherine June,** Modern Languages and Classics  
Faculty Mentor: Ana Corbalan, Modern Languages and Classics  
**Butterfly: historical adaptation and creation from the page to the silver screen**  
*International focus*  
A film, when based on a piece of literature, is a manner of creating a visual work from written words that transcends cultures, periods of time, and languages. Directors often adapt the text not only to work within the restrictions associated with filmmaking, but also to exercise creative liberty in their work. This research poses the question of whether a filmmaker can take inspiration from an already-existing text yet at the same time establish an identity in a visual manner. Butterfly, by Spanish director José Luis Cuerda, is one such cinematographic piece that adapts a classic text for the big screen. The film is based on a three chapters from a collection of short stories by Galician author Manuel Rivas and focuses on the Spanish Civil War-how it envelops the whole country while at the same time tearing apart communities. Each chapter in the collection is distinct, but Cuerda weaves the three stories into one, showing 1936 Spain through the eyes of a young protagonist. The film serves as a coming-of-age, but also shows the realities of a war that divided the country and led to a dictatorship of nearly forty years. My intention for this project is to analyze both the film and the text to compare how the plot is portrayed to a visual audience and to a literary audience through characters and cinematic techniques. My goal is to examine the ways text and visual art come together to portray a time period that shaped Spanish history culturally, politically, and economically.

**Katherine June,** Kinesiology  
Faculty Mentor: Margaret Stran, Kinesiology  
**Accessible fitness: an adapted exercise program**  
In the United States, less than fifty percent of adults meet the weekly suggestions for exercise set forth by the CDC and American College of Sports Medicine. Fitness is especially problematic for individuals with intellectual disabilities who typically do not have access to gyms, personal trainers, or other resources to meet their unique needs. As part of an independent study for the human performance/exercise science major, I started a biweekly exercise program at the ARC of Tuscaloosa, a center for adults with intellectual disabilities that teaches skills to improve quality of living. The goal was to design a program that improved both health-related and skill-related components of fitness such as balance and coordination, all while taking into account specific considerations such as exercise experience and behavior management. By analyzing general health concerns for individuals with intellectual disabilities, the benefits of exercise for this population, and the impact of specific diagnoses on fitness, I was able to prescribe an exercise program that incorporated cardio, muscular endurance, and flexibility. The program has since evolved to become part of a course at the university within the kinesiology department this semester.

**Sarah Keller,** Human Nutrition and Hospitality Management  
**Heather Jackson,** Human Nutrition and Hospitality Management  
**Ryan St. John,** Human Nutrition and Hospitality Management  
**Mary Wood,** Human Nutrition and Hospitality Management  
Faculty Mentor: Lori Greene, Human Nutrition and Hospitality Management  
**Fruit and Vegetable Consumption among Preschoolers: A Review**

*The information presented here is intended to represent exactly what was submitted by the student. Errors can occur in the transfer process.*
Evidence-based research suggests fruit and vegetable intake among preschool aged children is less than the recommendations. For optimal nutrition, preschool aged children are encouraged to consume 1-1.5 cups of both fruits and vegetables each day. Whole fruit intake among children has increased each year, while vegetable intake has stayed consistent. This review examines preschool-aged children's exposure to fruits and vegetables as well as parental knowledge of intake recommendations. PubMed and Scout were utilized to locate articles. Home environment has a significant impact on fruit and vegetable consumption in preschool-aged children. Preschoolers in homes of parents from a low socioeconomic status are at a significantly elevated risk of not consuming the recommended amount of fruits and vegetables when compared to children from households of higher socioeconomic status. Preschool-aged children with obese mothers tend to have an inadequate vegetable intake but an adequate intake of fruit. The quality of the mother's diet is a strong indicator of the child's diet. Preschool teachers have varied and growing needs in order to effectively teach the importance of fruit and vegetable intake. Regular family meals can improve the dietary quality of children, and repeated exposure to a disliked vegetable might lead to acceptance when administered by parents and a tangible reward is offered. Preschool-aged children are at increased risk for inadequate fruit and vegetable intake.

Young Kim, Psychology
Faculty Mentor: Theodore Tomeny, Psychology
Depression, Anxiety, and Stress in Adult Siblings of Individuals with Autism Spectrum Disorder: The Role of Aid and Sibling Relationship Attitudes
Typically-developing (TD) adult siblings of those with disabilities are most likely to assume care for their disabled sibling when parents become unable (Heller & Kramer, 2009). Outcomes for TD siblings vary, suggesting the presence of moderating and mediating factors (Meadan et al., 2010). Amount of sibling aid and sibling relationship attitudes are variables likely related to outcomes in TD siblings. We predicted that the relation between level of aid (i.e., provided by TD siblings to siblings with ASD) and depression, anxiety, and stress (DAS) in TD siblings would be indirect and through sibling relationship attitudes. Participants included 59 TD adult siblings ages 18-68 of an individual with ASD. TD siblings completed measures of level of aid provided by TD siblings, sibling relationship attitudes, and DAS in TD siblings. The indirect effect of aid by TD siblings on TD sibling DAS through sibling relationship attitudes was examined using bootstrapping analytical methods via "PROCESS," a tool for SPSS (Hayes, 2013). Analyses revealed a confidence interval around a point estimate of the indirect effect not inclusive of zero indicating a significant indirect effect. An indirect effect was found such that level of aid provided was related to more positive sibling relationship attitudes (B = 7.82, p < .001), and positive sibling relationship attitudes was related to less DAS in TD siblings (B = -.26, p = .001). Clinical implications for treatment of DAS will be discussed.

Sarah Kimbrell, School of Social Work
Catharine Pierce, School of Social Work
Alexis Ferruccio, School of Social Work
Faculty Mentor: Javonda Williams, School of Social Work
Suicide Among College Students
Suicide among college students is an issue that cannot be explained by one simple cause. However, there are a number of factors that contribute to suicide among young adults. Though there are some factors that are considered symptoms of suicidal behavior, such as depression and anxiety, there are other factors that college students face that can lead to suicide. Suicide on college campuses can affect more people than those involved. Because of this, this research project with explore other factors

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besides psychological disorders that contribute to suicide in hopes of being able to create an effective intervention plan for college campuses.

**Daniel Klein, Computer Science**  
Faculty Mentor: Joseph Smith, Political Science  
*A Web-Based Tool For Exploring Supreme Court Opinions*  
The body of decisions and accompanying opinions written by the United States Supreme Court serves as one brick in the foundation of the American legal system. Thus, the review and analysis of these documents on a large scale is highly attractive to legal scholars. However, the enormous number of these documents, especially opinions, makes manual analysis of more than a few documents at a time impractical. To overcome this hurdle, we have designed and are constructing a system for the purpose of analyzing a given subset of the body of Supreme Court opinions and determining the characteristic terms of that subset when compared to the entire body of opinions or another selected subset. This system, accessible as a web application, generates a list of characteristic terms for a subset of opinions, along with key metrics pertinent to those terms. Additionally, the system generates a word cloud visualization that depicts the characteristic terms of the subset and each term’s relative importance. We hope that making such a tool widely accessible will allow scholars and others to quickly and easily design and test hypotheses about how Supreme Court language differs across opinion types, case types, authors, and other factors and how that language has evolved and continues to evolve with time.

**Olivia Knott, Political Science**  
**Josiah Tesfaye, Political Science**  
Faculty Mentor: Nicholas Kerr, Political Science  
*Voter Registration and Public Trust in Nigerian Elections*  
*International focus*  
Voter Registration and Public Trust in African Elections: In many new democracies policymakers have implemented electoral reforms with the hope of enhancing electoral integrity. However, very few studies have examined whether these reforms matter, especially for citizens. This project explores the consequences of voter registration reforms on public trust in elections in African multiparty regimes. Specifically, we focus on recently implemented, yet contentious, reforms to voter registration in Nigeria. In 2010, Nigeria's electoral commission began the process of developing a biometric voter registration system, including the distribution of over 60 million permanent voter ID cards, with the aim of reducing voter fraud. To examine Nigerians' views towards the voter registration reforms, we rely on recent survey data collected in Nigeria in December 2015 as well as content analysis of print media reports on the implementation of the voter registration process.

**Mark Koren, Aerospace Engineering and Mechanics**  
Faculty Mentor: Amy Lang, Aerospace Engineering and Mechanics  
*The Effects of Butterfly Scale Inspired Geometries on Boundary Layer Growth*  
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. We have already used smooth bodied projectiles to examine the effects of the scales on total drag. Measuring the boundary layer will allow us to isolate the effects of the scales on skin drag. This requires us to create a new experimental set-up to run the plates on. We must focus on eliminating...
vibrations to ensure the accuracy of our results. The combination of past and future data, obtained through the new experiment, will demonstrate the effects of the butterfly scales on drag.

**Wesley Korfe**, Psychology
Faculty Mentor: Beverly Thorn, Psychology

*Building a Targeted, Thermally Triggered Drug Delivery System for Cancer Cells*

Prior research has shown that people who catastrophize about pain also tend to be more expressive about pain, including reporting more intensity and unpleasantness due to pain. Personality factors have also been related to pain catastrophizing in previous research. Those findings raise the question whether pain catastrophizing adds to the prediction of pain expression beyond pre-existing personality factors. It was hypothesized that higher pain catastrophizing scores would significantly predict more pain expression even after controlling for personality variables. 310 college students answered baseline questionnaires about their thoughts and evaluations of pain and personality characteristics, including Big Five traits and emotional vulnerability. Whereas only personality variables uniquely predicted wordiness of pain referent descriptions and number of pain referents, pain catastrophizing added unique value to the predictions of pain intensity and unpleasantness of recalled pain referents. Thus, it can be concluded that, in addition to emotional vulnerability, pain catastrophizing plays an important role in expressions of pain intensity and unpleasantness. These findings suggest that people who catastrophize about pain are more likely to express their pain as more intense and unpleasant, which previous research suggests might be an ineffective coping strategy. This study is important because it examines relationships among multiple factors and pain communication styles.

**Rachael Kress**, Chemistry
**Abigail Paulson**, Chemistry

**Dylan Pladers**, Chemistry
Faculty Mentor: Dave Nikles, Chemistry

*Building a Targeted, Thermally Triggered Drug Delivery System for Cancer Cells*

The purpose of this project is to build a system to deliver chemotherapy drugs to cancer cells without impacting the rest of the body. The system consists of a magnetite nanoparticle core with three types of attachments. The first attachment is the targeting group, containing an antibody that seeks out and binds to the surface of cancer cells. The second attachment has the cancer drug and the thermally unstable linker. Application of a radio frequency ac magnetic field heats the magnetite particle, which heats the linker until it decomposes, thereby releasing the cancer drug. The third group is a polyethylene glycol group that makes the system water soluble and protects it from the immune system. Single crystal magnetite nanoparticles of varying sizes were synthesized by the thermal decomposition of iron(III) oleate in high boiling organic solvents (benzyl ether or 1-octadecene). 3-Aminopropyltrimethoxysilane was bound to the surface of the nanoparticles to give a surface of primary amine groups. The next phase of the project will be to build and attach the three attachments. During this phase, the fluorescent dye Rhodamine-B will be used as a nanothermometer to measure the temperature near the magnetite particle. Rhodamine B will also used as a surrogate for the drug, as it fluorescence can be used to track the magnetically triggered release.

**Caitlin Kristof**, Health Science
Faculty Mentor: Lori Turner

*Health Science Increasing Community Awareness of Osteoporosis*
Osteoporosis is a crippling condition that often results in premature mortality and significant morbidity that is manifested in the form of fractures, bone deformity, and pain. It is a serious public health problem that affects 25 million people in the United States, 80% of whom are women. Osteoporosis is responsible for more than 1.5 million fractures annually including hip fracture, a life-threatening outcome. Hip fracture results in severe disability and even death: 20% of persons who experience a hip fracture die within a year. National expenditures related to this disease are estimated at $18 billion annually; this cost is estimated to triple by the year 2040. National health objectives indicate an urgent need to reduce deaths due to falls, reduce the incidence of hip fractures, and increase the number of women educated about osteoporosis. Medical treatment interventions are unable to completely reverse the effects of osteoporosis; therefore strategies designed to include prevention through health education and health promotion are emphasized. While the osteoporosis outcomes are severe and this disease is pervasive, people are generally uneducated and unconcerned regarding this deleterious condition. Health care professionals often consider osteoporosis as a low priority; programs targeting community awareness of osteoporosis are limited. This study describes strategies for enhancing education and awareness of osteoporosis in community settings.

**Joseph Kruszka**, Advertising and Public Relations  
Faculty Mentor: Dylan McLemore, Journalism  
*Examining the Fabrication of War Reporting*  
My presentation will focus on the impact of fabricating reporting while focusing specifically on war and how the reports overshadow the conflicts themselves. Examples will include Brian Williams, the "American Sniper" Chris Kyle, and Bill O’ Reily among others.

**Ketrick LaCoste**, Biological Sciences  
**Hunter Whatley**, Biological Sciences  
Faculty Mentor: Stephen Secor, Biological Sciences  
*Can Body Mass Index (BMI) Reliably Predict Body Composition?; A Test Study with the Diamondback Water Snake*  
A Body Mass Index (BMI) is frequently used to assess one's body condition and to classify a person's body shape into the category of underweight, normal, overweight, or obese. The formula for calculating BMI is mass in kilograms divided by height in meters squared. This formula was developed from a study where it was demonstrated that the resulting value (BMI) possessed a high correlation with one's percent of body fat. However, in that study body fat was not directly measured, but estimated via non-invasive methods. Since its inception, BMI has been criticized for its inaccuracies; however, it is still used as a standard to assess body composition. In this study, we tested the accuracy of the BMI scale to calculate absolute mass and percent body fat for the diamondback water snake (Nerodia rhombifer). For adult snakes, we subjected body mass, body length, fat mass, and percent of body fat to statistical models. We found models that incorporate body mass and length were the best predictors of fat mass. The model based on BMI (mass/body length2) alone was marginally significant statistically in predicting body fat and body composition for the snakes. As shown, indices that are based on actual measure of body fat provide the most accurate estimates of body composition.

**Danny Laderberg**, Biological Sciences  
Faculty Mentor: Stephen Secor, Biological Sciences  
*Glucose tolerance and ecological determinants of blood glucose in the Diamondback water snake*  
Regulation of blood glucose is an important homeostatic process for any animal, especially those that consume meals rich in carbohydrates (i.e., sugars, glucose). For strict carnivores, the capacity to regulate...
glucose may be partly diminished because of the reduced need to control elevated blood glucose. To investigate natural variation in blood glucose, I examined the effects of sex, size, feeding, fasting, hydration state, and stress on the blood glucose of the diamondback water snake (Nerodia rhombifer). To explore the snakes’ capacity to regulate blood glucose, I added glucose to their diet and administered a glucose tolerance test. Baseline blood glucose ranges between 30-40 mg/dl and for recently captured snakes did not vary between males and females. Blood glucose levels decreased as a function of body mass and declines when snakes were maintained at colder temperatures (10 and 20°C). Feeding and long-term fasting generated no significant change in blood glucose concentrations. Following 8 days of dehydration, blood glucose levels increased by 50% and were restored within six hours after drinking. Agitation resulted in a significant increase in blood glucose levels 4-12 hours later. Glucose either added to a meal or administered in solution (1.75g/kg) generated a 3-fold increase in blood glucose within 24 hours with levels returning to near baseline 24 hours later.

**Kate Laird**, Advertising and Public Relations  
Faculty Mentor: Meredith Bagley, Communication Studies  
*Cluster Criticism of Obama’s Turn The Page Speech*  
This presentation is about President Barack Obama’s Turn The Page speech. Obama gave this speech at the democratic national convention in 2007 in order to gain the democratic nomination for the 2008 election. I used the cluster criticism method when analyzing this speech. The five key terms in Obama’s speech are "I, hope, politics, change, and turn the page." I combined "I" and "President" into one term. After determining these five key terms, I determined the clusters around these five key terms. The cluster surrounding the key term "I" were divided into two parts: unifying terms and action terms. The cluster surrounding the key term "hope" are also divided into two parts: American terms and connecting terms between Obama and the audience. The cluster around the key term 'politics' are all terms with negative connotations. The final key term 'turn the page' are words that look towards a positive future of America. After determining these clusters around the key terms, I came to the conclusion that Obama established a connection with his audience and established commonalities between himself and his audience. He rallied the audience together and then established a negative connotation around politics and then presented himself as the person who can bring new change to America by helping him to Turn The Page.

**Myia Lang**, Health Science  
Faculty Mentor: Lori Turner, Health Science  
*Project Health*  
Project Health is a peer health student led organization at The University of Alabama in the Health Promotion and Wellness Department. Project health consists of Health Advocates, Health Hut Interns, and Health Ambassadors. The organization addresses a variety of health issues and behaviors prominent among college aged students. According to the Center for Disease Control and Prevention, sexual pressures, alcohol consumption, unhealthy foods, sleeping habits, and stress are the most common problems students have in college. Project Health’s members are responsible for providing peers with information and support to encourage healthy lifestyle choices. We hold our peers accountable to evaluate and change negative attitudes, values, and beliefs while in college for the safety of their life. This is achieved through the planning and implementation of informal and interactive programs, workshops, social media, and displays relating to various college health issues. Interactive programs are most effective among students. At the end of each week, participants are required to provide feedback about interactions, events, and tabling by survey and a tallying form. Providing enough but not too much information on the weekly handouts is a constant challenge. Students are less likely to read flyers

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Remote Detection and Automated Identification of Audio Alarms

While the automation of modern laboratory systems makes it possible to work on multiple projects simultaneously, the vast majority of systems are not interconnected and simply use auditory signals to notify users of potential problems. The rapid detection and resolution of all problems which arise are critical in ensuring the safety and efficiency of any laboratory environment. In order to facilitate such a response, we have developed an automated and compact detection system capable of identifying auditory alarms originating from any equipment and notifying predetermined individuals of failures. Utilizing a Raspberry Pi microcomputer, the system analyzes sound samples recorded at regular 12 ms intervals. By applying a fast Fourier transform to data packets consisting of only 512 data points, the device continuously identifies sound frequencies present in a laboratory environment. Furthermore, through an analysis of multiple data sequences, the system determines the duration of each detected frequency. Finally, by filtering background noise and performing a matchmaking process against existing alarm profiles, the detection device flags whether an alarm signal is present and subsequently alerts users via email if a match is discovered. To quantify the performance of the system, a set of tests were conducted, checking for detection efficiency and false positives. Experimental results confirm the system accurately detects and identifies alarms, notifying users as intended.

An Investigation of Caddo Salt Production at Drake's Salt Works

The Caddo Indians of northwestern Louisiana played an essential role in the production and trade of salt at the Drake's Salt Works Site. Research shows that there is no evidence of mass salt production in that area prior to approximately A.D. 1500/1600 (Eubanks 2014a; Girard 2006:54-69). A necessary step of salt production in the Southeast was the filtration of brine in order to remove soil impurities (Brackenridge 1962:66; Brown 1980; Keslin 1964:20). Ethnographic and archeological evidence support the hypothesis that woven baskets and water were used as filtration tools in order to separate the salt from the soil (Eubanks 2015:7). Due to their shape, these baskets functioned as funnels and were attached to poles so that water could be introduced into the mixture to filter out the brine. Due to the high quality of the salt produced and traded in northwestern Louisiana, it is possible that this process may have been repeated several times (Eubanks 2015:7) before boiling the brine, leaving only the salt. The liquid brine was then boiled in a standardized ceramic container, known as a salt bowl (Elvas in Bourne 1904:136). The investigation discussed here was designed to address and reconstruct a day-to-day activity of the Caddo salt makers at Drake’s Salt Works.
Patient Portal allows patients to request appointments or make changes to existing/future appointments, request prescription refills and additional prescription instructions, request test results, update demographic information changes, inquire account balance(s), retrieving a child’s blue card, as well as request a copy of patient medical records. "We are dedicated to improving and promoting the health of individuals and communities in Alabama and the region through leadership in medical education and primary care; the provision of high quality, accessible health care services; and scholarship." The UMC employees are in motion to improve every aspect of patient experience. The UMC never ceases effort to provide the most accessible and patient friendly environment possible. Specifically for Patient Portal, informational pamphlets are available at each clinic check in desk. Efforts to improve the patient experience through Patient Portal have been successful. Patient feedback is the best way to record the success.

**Matthew Leeds**, Physics and Astronomy  
Faculty Mentor: Jeremy Bailin, Physics and Astronomy  
**Synthetic Images of Simulated Galaxies**  
MUGS (McMaster Unbiased Galaxy Simulations) is a project to perform and analyze large computer simulations of how galaxies form and evolve in the universe. While these simulations have expanded astronomers’ understanding of galaxy formation, there are large uncertainties when comparing the mass-based simulations to the light-based observations. I have been automating a process to generate synthetic images from the simulations that can be directly compared to the observations; I will present the automation process and a sampling of some of the synthetic images.

**Mercedes Lightfoot**, Health Science  
Faculty Mentor: Jen Nickelson, Health Science  
**The state of depression and anxiety at The University of Alabama**  
**INTRODUCTION:** According to the Centers for Disease Control and Prevention, more than 1 out of 20 Americans 12 years of age and older reported current depression in 2005-2006. Anxiety disorders are the most common mental illness in the U.S., affecting 40 million adults age 18 and older, according to the Anxiety and Depression Association of America. Although anxiety disorders are the most highly treatable disorders, only about one third of those receive treatment. According to the National College Health Assessment, 31% of students have depression and anxiety. Research suggests that more campus based mental health services and supports are needed on campus. **METHODS:** Data retrieved from the University of Alabama students was conducted through self-administered surveys given to 74 students in classes offered by the College of Human Environmental Sciences. **RESULTS:** Participants were 64 females and 10 males. Of those participants, 21.6 % were diagnosed with depression and only 16 participants received professional help. Ironically, 64% of those students stated that they would seek help from a mental health profession. Almost 50% of the students had 5 or more indicators of depression, 19% of those students were diagnosed with anxiety as well. **DISCUSSION:** Mental health issues are a leading impediment to academic success. If more campus based mental health support services were offered, many of these issues could be addressed and lead to a high overall success rate of students with a mental illness.

**Annemarie Lisko**, English  
Faculty Mentor: Lauren Cardon, English  
"Citizens of the South"  
For my project, "Citizens of the South," I conducted extensive research of my family history, contributed to an online gallery, and designed a display for a Hoole Special Collections exhibition. Through taking

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grandmother’s oral history, I learned that our ancestors, the Gnanns, came to the U.S. in the mid-1700s as part of the Georgia Salzburger movement when Lutheran Protestants fled religious persecution in Salzburg and settled in Effingham County, Georgia. I consulted historical and genealogical record books about the Salzburgers and used online resources such as Ancestry.com, the Georgia Salzburger Society website, and historical newspaper databases. I created a family tree tracing the Gnanns back 15 generations, and I found information about their ship passage to America, their religious involvement in the county, and their service during the American Revolution. I even located the Edict of Expulsion passed against the Salzburger Protestants, news articles and photographs detailing Effingham County, and a German Lutheran Bible from 1700, which I found in the Hoole library. From these sources, I designed my display for the Artifacts of Ancestry exhibition at Hoole. My display recounts the Gnanns’ journey from Germany to Georgia, offers a glimpse of their lives in America, and features Hoole’s Lutheran Bible. The opening was attended by students, faculty, and the Tuscaloosa Genealogical Society, and my work was recognized by the Crimson White and the Cool@Hoole blog.

Haley Loitis, Electrical and Computer Engineering
Faculty Mentor: Andrew Lemmon, Electrical and Computer Engineering
Feasibility of Indoor Solar Energy Harvesting
The focus of this project was examining the use of solar energy harvesting under indoor lighting conditions. There has been little advancement in indoor solar use since the advent of the solar powered calculator, with a larger focus in full outdoor systems. Utilizing indoor light allows for advancements without switching to a full solar system. Solar panels of varying characteristics were gathered and exposed to intensities of light intended to mimic a set of nominal indoor conditions. Using ancillary circuitry as part of the test setup, data was obtained to indicate an expected amount of power generated by each solar panel, under each lighting condition. These values were compared to the average power draw of household smoke detectors to determine the expected applications of each panel, and the light intensity threshold above which they would provide a useful amount of power. A load test was designed to examine the performance for these applications.

Alicia Logan, Capstone College of Nursing
Ciara Culler, Capstone College of Nursing
Winton Jones, Capstone College of Nursing
Terry Brown, Capstone College of Nursing
Mary Haley McGarity, Capstone College of Nursing
Nicole Cressy, Capstone College of Nursing
Faculty Mentor: Paige Turner-Johnson, Capstone College of Nursing
Turn Off The TV & Turn Up The Activity: Combating Obesity and Reducing Screen Time in Brookwood, AL
Addressing the health care concerns of a community where known deficiencies exist is an important aspect of nursing care. Aggregate health information from multiple resources is examined and analyzed to address specific needs of a community. To obtain a better understanding of what issues for each community need to be addressed, a "windshield" community assessment is preformed. After the specific needs for the community are found, health interventions using evidence-based practice research can be implemented. This presentation focuses on the small rural community of Brookwood, Alabama. In Brookwood, children make up fewer than 50% of the population. Our main focus is to reduce the amount of adolescents who are obese in the community by limiting technology screen time and using evidence-based practice interventions to cut back sedentary behaviors.

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machines do not increase active knee flexion ROM, increase function or quality of life or decrease pain (Harvey, Brosseau, Herbert, 2014). According to the clinical practice guidelines posted by the American College of Occupational and Environmental Medicine, SCFs, TED hose and early ambulation are more effective in the healing process following a TKA than a CPM machine (Knee Disorders). Through out research and analysis, we have concluded that few inconsequential benefits of using a CPM machine are unjustified when taking into account the cost and general ineffectiveness.

**Anna Lynd**, Kinesiology  
Faculty Mentor: Mark Richardson, Kinesiology  
*Estimated Energy Expenditure During A Home-Based DVD Exercise Program*

**PURPOSE:** The purpose of this study was to determine the estimated energy expenditure (EE) of 5 different exercise videos of a home-based DVD exercise program. **METHODS:** Twelve (3 men and 9 women) physically active college-age adults (age 20.4 ± 1.2 yrs; height 164.1 ± 10.2 cm; weight 64.2 ± 11.8 kg) participated in this study. Videos are a part of the Focus T-25 (alpha) DVD program (Beachbody.com). Each of the 5 videos lasted 25 mins with a different training emphasis (Total Body Circuit [TBC], Cardio, Lower Focus [LF], Ab Intervals [Abs], and Speed). A maximal graded treadmill exercise test was performed to determine maximal heart rate and maximal oxygen uptake. Average heart rate during each video corresponded to a given volume of oxygen and respiratory exchange ratio (max test), which was utilized to determine EE during each 25 min video. **RESULTS:** The mean ± SD EE was 173.9 ± 70.2 kcal. The mean ± SD estimated EE per DVD was as follows: TBC = 200.9 ± 96.1 kcal, Cardio = 203.7 ± 73.0 kcal, LF = 163.5 ± 47.9 kcal, Abs = 115.5 ± 64.9 kcal, Speed = 185.8 ± 69.2 kcal. The mean ± SD EE per week was as follows: W1 = 869.4 ± 351.1 kcal, W2 = 957.6 ± 359.2 kcal, W3 = 954.8 ± 382.3 kcal, W4 = 884.5 ± 378 kcal, W5 = 921.9 ± 426.2 kcal. **CONCLUSION:** T Focus 25 video's burned anywhere from 115 to 203 kcal per video, adding an average additional weekly energy expenditure of 917 kcal. These videos are a short, high intensity dose of training capable of yielding cardiovascular benefits.

**Cameron Lyons**, New College  
Faculty Mentor: Becky Atkinson, Education - Educational Leadership, Policy and Technology Studies  
*The Effect of Elective Course Choice on Postsecondary Aspirations*

The goal of the study is to gain a better understanding of the role vocational electives play for high school students’ post-secondary aspirations. Through looking at vocationally-focused electives, the study seeks to determine how much these elective choices guide the students’ goals following high school.

**Kaylee MacKnight**, Theatre and Dance  
Faculty Mentor: Stacy Alley, Theatre and Dance  
*Island Song: From Page to Stage*

As a performer, it is often hard to grasp the complexities that go into creating a musical theatre production. Collaborating with Sam Carner and Derek Gregor, the writers and composers of the new musical Island Song, my research enabled me to discover what it entails in order to successfully bring a show to fruition. As a result, I was able to produce, direct, and, along with my musical theatre peers, perform the production at the University of Alabama as well as at the Studio Theatre in New York City.

**Mario Maggio**, Aerospace Engineering and Mechanics  
Faculty Mentor: Richard Branam, Aerospace Engineering and Mechanics  
*Rocket Engine Cycle Optimization*

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The Dual-Expander Aerospike Nozzle (DEAN) is the next generation upper stage and orbit transfer rocket engine. My contribution to this engine is to optimize performance of the system simulation and prove the rocket’s advantages in thrust-to-weight ratio and specific impulse. I will continue from the previous research on the modeling of the Dual-Expander Aerospike Nozzle developed in the Numerical Propulsion System Simulation (NPSS) architecture from NASA. By focusing on key physical parameters of the engine simulation (expansion ratio, oxidizer-to-fuel ratio, chamber geometry), I will improve accuracy of the results and more effectively optimize the cycle. The long-term objective of this project is to develop a working simulation, build laboratory components to test and eventually have the Dual Expander Aerospike Nozzle used by NASA.

**Justin Magrath**, Chemical and Biological Engineering  
Faculty Mentor: Yonghyun Kim, Chemical and Biological Engineering  
**Effect of Salinomycin on Glioblastoma Cancer Stem Cells**  
Glioblastoma is a form of highly malignant brain cancer. While current treatment methods exist including surgery, radiotherapy, and chemotherapy, their effectiveness is minimal. The median survival rate for the condition remains only 14.6 months and the two year survival rate, a mere 30%. Studies have shown that many types of cancers including glioblastoma contain a subpopulation of cells known as cancer stem cells (CSCs). These CSCs are the only cells that have the ability to proliferate, differentiate, and generate tumors. They thus are important to recurrence and metastasis. CSCs have also been found resistant to many drugs effective on normal cancer cells. In order to effectively treat glioblastoma, a drug must be identified that can target glioblastoma CSCs. One drug that has shown promising results in targeting CSCs of other cancer types is salinomycin. In this project the ability of salinomycin to target glioblastoma CSCs was tested using U87 glioblastoma cells grown adherently (normal cancer cells) and in sphere culture (enriched for CSCs). This experiment showed that salinomycin was able to target glioblastoma CSCs. The project also investigated the effect of subtype on salinomycin potency. It was found that proneural cells are killed with the lowest dosage followed by classical and finally mesenchymal cells. These results show not only that salinomycin may be used in the future to treat glioblastoma, but also that subtype can be used to determine the optimal dosage.

**Melinda Mann**, New College  
Faculty Mentor: Steven Ericson, Geography  
**Time-Spatial Analysis of Crime on the Campus of Georgia State University**  
On campus college crime, such as sexual assaults, theft, and battery, has become increasingly prevalent in today's news media. Trends in geographic location and time of incident can be seen through data collected by universities. This data collection, mandated by the Clery Act, allows researchers to identify key hot-spots of criminal activity. Using a combination of GIS and data sorting software, these trends can be mapped and plotted. This information, provided to the campus police department, can be further used to develop strategies to combat campus crime.

**Tyler Mattox**, Biological Sciences  
Faculty Mentor: Ryan Earley, Biological Sciences  
**Optimizing Closed Respirometry Using Dissolved Oxygen Probes in an Aquatic System**  
We hypothesized that increased metabolic load in response to ecological stressors would cause the self-fertilizing hermaphroditic mangrove rivulus fish, Kryptolebias marmoratus, to change sex into male. To identify the metabolic threshold that initiates sex change, consumption of dissolved oxygen (DO), metabolic rate, needs to be measured. Currently, there is great variation in methodologies used to test metabolic rates of aquatic organisms using closed respirometry. The need to collect accurate DO

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consumption rates called for experimental determination of an optimal closed respirometer system. Metabolic chambers were built using 250 mL Erlenmeyer flasks containing a constant volume of wax to reduce water volume, and optical DO probes were inserted through stoppers in the openings of the flasks. Variables that were manipulated included: type of seal that closed the system, volume of water in the flask (mL), presence or absence of mineral oil on the surface of the water, and whether the chamber was in a quiet or loud environment. We concluded that the design yielding the most accurate data consisted of a parafilm seal, a small volume of water in the flask (50 mL), the presence of mineral oil in the flask, and placement in a quiet setting. Our study provides a practical design for a closed respirometer that is effective for measuring DO concentrations, eliminates sources of error observed in other designs, and can be employed in both laboratory and field settings.

Molly McCain, Capstone College of Nursing  
Laura Harris, Capstone College of Nursing  
Alison Brock, Capstone College of Nursing  
Carla Keith, Capstone College of Nursing  
Shanice Baldwin, Capstone College of Nursing  
Madeline Krams, Capstone College of Nursing  
Asia Dawson, Capstone College of Nursing  
Faculty Mentor: Michele Montgomery, Capstone College of Nursing  

Duncanville/Big Sandy Community Assessment

Health promotion involves doing things to prevent disease and to improve individual and community health. Health promotion offers solutions to many health problems facing society such as poor nutrition, lack of exercise, and diabetes through developing skills and knowledge, community action, and supportive healthy environments. Educating the community to adopt a healthier lifestyle requires a community wide approach. Health promotion helps individuals or communities to increase control over and improve their health and wellbeing. A vital component of health promotion is health education which aims to change behavior by providing people with the knowledge and skills they require to make healthier decisions and enable them to fulfill their potential. A community health assessment is the groundwork for improving and promoting the health of a community. A community health assessment gives comprehensive information about the community’s current health status, needs and issues. The purpose is to identify the needs of a community in order to provide services appropriate to those needs. Once those needs have been determined, evidence based health promotion interventions can be identified that can correspond to fit the particular needs of the community. This presentation will highlight a community assessment conducted in Duncanville/Big Sandy in Tuscaloosa County.

Hannah McCready, Chemical and Biological Engineering  
Faculty Mentor: Dawen Li, Electrical and Computer Engineering  

Effect of the Functional Group on the Performance of Small Molecule Organic Solar Cells

Organic solar cells are of interest because they can be made at low-cost, they are lightweight, and have flexible characteristics. Solution processed bulk-heterojunction organic solar cells have gained interested due to their high internal quantum efficiency and large-scale printing technique, which allows them to have commercial applications. The small molecule organic solar cells have even more advantages because of definite structures, facile purification, high purity and good photovoltaic performance reproduction. The two small molecules that we tested were D-π-A-π-D type benzothiadiazole-triphenylamine based small molecules. BDCTBT contains a cyano on the π-bridge, while BDETBT does not. The purpose was to determine the effect of the addition of the cyano group on the efficiency and the stability of the organic solar cells. The effect of the addition of the cyano group to the small
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molecules has been found to lower the highest occupied molecular orbit level; which increases the open-circuit voltage of the devices. When looking at the stabilities of the small molecules, it was found that BDETBT degrades at a slower rate than BDCTBT.

Sarah McFann, Chemical and Biological Engineering
Faculty Mentor: Margaret Liu, Chemical and Biological Engineering
Metabolic flux model to optimize n-butanol production by Clostridium tyrobutyricum
Though biobutanol is a promising alternative fuel source due to its high energy content, compatibility with combustion engines, and blending ability, it is currently more expensive to produce than gasoline. However, metabolic engineering strategies can be used to optimize bacterial strains for butanol fermentation, thereby increasing the efficiency of biomass conversion to butanol and decreasing the cost of butanol production. In this study, a constraint-based metabolic model of Clostridium tyrobutyricum was developed to identify an engineering strategy for redirecting C. tyrobutyricum carbon flux to butanol synthesis while maintaining the energy and reducing power generation necessary for cell survival. The model was validated with experimental data and a strategy for maximizing butanol production was determined.

Nicole McFarland, Political Science
Bethany Turner, Political Science
Olympia Karageorgiou, Political Science
Faculty Mentor: Dana Patton, Political Science
Sex Education and Attitudes About Sex
The goal of this research is to find out how the content of middle and high school (grades 6-9) sex education classes affect future attitudes about sex at the college age. We hypothesize that full information sex education courses allow students to make informed decisions about sex and lead them to have healthier attitudes about sex at the college age. This research will be conducted via online survey. Students who take the survey will be asked questions about the content of their middle and high school sex education classes and their current attitudes about sex. This information will be useful in designing more effective sex education policy for future generations. Sex education policy varies throughout the country and different kinds of courses get different amounts of federal funding. This study will allow us to find out which kinds of courses (abstinence only, abstinence plus, or full information) lead students to have healthier attitudes about sex in college. This information can be used in future sex education policy and funding decisions to help improve the effectiveness of United States sex education.

Brian McWilliams, Biological Sciences
Faculty Mentor: Matthew Jenny, 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.

Elizabeth Middleton, Capstone College of Nursing
Mallory Padgett, Capstone College of Nursing
Kristara Lewis, Capstone College of Nursing
Dresha Caldwell, Capstone College of Nursing
Addie Nicholson, Capstone College of Nursing
Natalie Aldrich, Capstone College of Nursing
Alex Hooks, Capstone College of Nursing
Faculty Mentor: Paige Johnson, Capstone College of Nursing

Smoking Prevention for School Aged Children in Vance, AL

Almost 3,000 youth begin smoking each day in the United States. The earlier an adolescent begins smoking, the less likely they are to quit due to nicotine addiction. In Vance, Alabama the adult smoking rate is higher than the national benchmark. This causes an increase rate of strokes, lung cancer, heart disease, obesity, and other chronic illnesses. Smoking prevention needs to be taught during childhood to promote healthy lifestyles as an adult. An experimental study was performed to determine the efficiency of smoking prevention curriculum in fifth-grade children. The effectiveness of the study was determined by assessing the child's intent to smoke by the end of the school year. The results of the study show the child's intention to smoke changed as well as demonstrating refusal skills. Our proposal is to mandate smoking prevention curriculum in Vance Elementary School.

Genevieve Miller, Biological Sciences
Faculty Mentor: Ryan Earley, Biological Sciences

Emersion in Response to Predator Cues in Wild Mangrove Rivulus

Many species evade predators using escape behaviors. Avoiding predation comes with costs, so prey must be able to recognize varying threat levels so they can respond appropriately. Mangrove rivulus fish (Kryptolebias marmoratus) can emerse and locomote on land to find different environments. We hypothesized that rivulus would emerse to avoid predation by mangrove water snakes (Nerodia clarkii compressicauda) and that the geographical origin of the fish would influence its latency to emerse after being exposed to predator cues. To test these hypotheses, fish from three Florida regions were collected and exposed to chemical cues from water snakes that had been fed rivulus or fasted. Behavior following cue presentation was compared across populations and regions to determine whether fish exposed predation threat cues (fed snake) showed faster emersion responses after introduction of the cue than fish exposed to predator presence cues (fasted snake) or control. Analyses indicate strong population-level differences and moderate regional differences in the tendency and latency to emerse and distance moved. Contrary to our prediction, we found little evidence that predator exposure regimes influenced emersion behavior. While no treatment differences were found, our data indicate that factors such as community structure, temperature, water quality, and tidal flux, which vary on local scales in mangrove ecosystems, might be important in driving emersion and locomotion behavior.
**Levi Miller**, Biological Sciences  
Faculty Mentor: Laura Reed, Biological Sciences  
*Dietary Impacts on Triglyceride Levels in Drosophila melanogaster*  
Triglyceride levels are a telling indicator of human susceptibility to Metabolic Syndrome (MetS). Fruit flies have genetic and metabolic homologies with humans, which makes them a model organism to investigate MetS. We measured triglyceride levels in genetically distinct lines fed both normal and high-fat diets. The triglyceride levels showed a significant genetic, environmental, and genotype-by-diet interaction. These results suggest that while we can lower our risk of obesity, type-2 diabetes, and other symptoms of MetS that are on the rise by abstaining from a high-fat western diet, some individuals will respond to a change in diet better than others.

**Sean Miller**, Chemistry  
Faculty Mentor: David Dixon, Chemistry  
*Computational Studies of Phosphorylated Amino Acids and Corresponding Amides*  
Phosphorylation is a common post-translational modification in proteins and is involved in cell signaling. Phosphorylation involves the addition of a phosphate group to a protein and can occur at -OH, -NH, and -SH groups. The most abundant phosphorylated amino acids are phospho-serine, -threonine, and -tyrosine. To date, there have been no reports of the gas-phase acidities (GAs) of any phosphorylated amino acids. The GAs of ten phosphorylated amino acids (arginine, aspartic acid, cysteine, glutamic acid, glycine, histidine, lysine, serine, threonine, and tyrosine) and their corresponding amides have been calculated using the reliable correlated molecular orbital theory G3MP2 method. Extensive conformational sampling was performed using density functional theory. The phosphorylated amino acids are ~5 kcal/mol more acidic than their corresponding amides. They are also significantly more acidic than the parent phosphoric acid and can become similar to the strong gas phase acid H2SO4. Many low energy conformers exist in the neutrals and anions. The lowest energy conformations always maximize the hydrogen bonding. The results will be used to develop anionic proteomic approaches.

**Abigail Mirick**, Health Science  
Faculty Mentor: Lori Turner, Health Science  
*Saving Lives Initiative*  
Saving Lives Initiative is a spiritually based health education program through The University of Alabama Center for Community-Based Partnerships in Tuscaloosa, Alabama. According to the Center for Diabetes Control, diabetes affects 25.8 million people in the U.S. population. The Saving Lives organization targets local church leaders and their congregations to combat common health diseases such as heart disease, obesity, and diabetes. The purpose of a university faith-based partnership is to increase health literacy and support local residence in attaining higher levels of overall wellness. Saving Lives Initiative organizes and implements monthly workshops on topics such as nutrition, physical activity, and health information. Semiannual health screenings at participating churches are also held to provide individuals with their personal health status information. Through the workshops and health screenings, the churches have seen an increase in health literacy and a decrease in health risks and chronic diseases among their congregation. Saving Lives Initiative is beneficial in that it combines health and spirituality while encouraging participants to take charge of their own health. Implementation of health education workshops pertaining to healthy eating and the importance of physical activity provides information to at risk populations such as older adults, minority populations, and those medically underserved.

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Alexandra Moffitt, Political Science
Rachel Palmer, Political Science
Faculty Mentor: Dana Patton, Political Science
Women and Political Representation in Congress
The purpose of this study is to reveal the various reasoning’s behind women being underrepresented in Congress. This study is designed through the conduction of a survey. A conduction of a survey allows for support of the hypothesis, that women are underrepresented due to lack of ambition to be in a leadership position, which is greatly influenced by society. The main objective of this study is to better understand the causes behind underrepresentation of women in Congress so that society may benefit from equal representation and ultimately obtaining equality. Why are women underrepresented in Congress? Our hypothesis is that women are underrepresented in Congress due to lack of ambition to be in a leadership position, which is influenced and caused by various societal factors. Women are underrepresented in positions of power, but specifically in Congress. There has been various research done that has addressed many different hypothesis. From why aren’t there more women fighting for power, to why aren’t more women running for office? Research has shown trends supporting evidence that there are barriers women must face to obtain positions in office. Women are underrepresented in Congress due to their lack of interest to run for office due to the hardships that come along with running for office as a woman.

Rodger Moore, Biological Sciences
Beau Schaeffer, Biological Sciences
Faculty Mentor: Laura Reed, Biological Sciences
A Novel Approach to Inducing Sleep Deprivation and Metabolic Syndrome in Drosophila melanogaster
The primary goal of this investigation is to see if there is a genotype-by-environment linkage between the stress associated with sleep deprivation and the occurrence of symptoms of metabolic syndrome. As of late, Drosophila melanogaster has emerged as a prime candidate for sleep studies of this nature. To perform this study, genetically distinct lines of Drosophila melanogaster are being employed as our model organism. A sleep-deprived state will be induced through a series of random vibration patterns averaging once per minute along with exposure to blue and white light of varying intensity over a ten day interval. Changes in stress-linked neurotransmitters such as dopamine, epinephrine and norepinephrine will confirm that the flies are experiencing stress responses to the stimuli. We will test for metabolite levels through a series of assays including glucose, triglycerides, and proteins to determine if there is variation in metabolic response to the stressors present. This data will be used to infer a correlation between sleep deprivation and metabolic deregulation. Preliminary data produced by the study shows that sleep deprivation does increase stored triglycerides relative to the control group. This project shows promise for producing foundational data that can benefit future experiments that will help better our understanding of the mechanisms in action.

Jessica Moore, Advertising and Public Relations
Faculty Mentor: Yonghwan Kim, Library and Information Studies
Smart Phone Use Among Students at UA: Types of Use, Convenience vs. Distraction, and Security Efficiency
"Smartphone use (ownership and frequent use). This study measured degree of ownership and level of app usage. To assess degree of ownership, the total number of applications downloaded on each respondent's smartphone was used. Because smartphone users may download a number of applications, but use some applications infrequently, we also examined how much the participants used specific types of applications. As there are above 700,000 apps for each major mobile platform (i.e.,
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hydroxyls respectively. In addition, these reactions can be run in open-air environments as opposed to under nitrogen, which is common for reduction reactions.

Josh Mullins, English  
Sierra Wilson, Political Science  
Sarah Bates-Barry, Economics, Finance and Legal Studies  
Faculty Mentor: Dana Patton, Political Science  
The LGBTQ Movement and Issue Prioritization  
This research project analyzes the effects of out-group pressure on in-group behavior within the context of the current LGBTQ+ social movement. The research focuses specifically on issue prioritization in order to discover whether or not out-group pressures (those in opposition to the goals of the LGBTQ+ movement) have an effect on the priorities of the LGGTQ+ social movement. We have hypothesized that, since out-groups have prioritized putting a stop to equal marriage opportunities for gay members of society, the LGBTQ+ movement has reacted by prioritizing marriage equality, as opposed to other issues like equal pay and the cessation of sexuality based hate crimes. This information will be gathered through a survey of individuals who identify as lesbian, gay, bisexual, transgender, or queer. The survey will gather information about personal issue prioritization, group issue prioritization, and perceptions of out-group pressures.

Julia Murphy, Chemistry  
Faculty Mentor: David Dixon, Chemistry  
The Reactions of CO2 with Metal Oxide Nanoclusters to Form Metal Carbonates  
The management of Lewis acid gases, such as CO2, NOx, and SOx, is a major environmental issue. These gases are produced by combustion and industrial processes and their release into the environment can lead to smog, global warming and acid rain. Conversion of these acidic gases into less harmful products can be achieved by using metal-based catalysts, but these materials are still susceptible to degradation and corrosion from the very gases they are designed to eliminate. A greater understanding of the chemistry behind the corrosion of metal oxide catalysts by Lewis acidic gases is needed to design more resilient ones. This computational research investigates the chemical changes that metal oxide nanoclusters undergo when exposed to CO2 by modeling clusters of metal oxides with CO2. Through comparisons of the energies of these products with the metal oxide cluster and free CO2 starting materials, possible reaction intermediates can be identified. The calculations are done with density functional theory and will be benchmarked by correlated molecular orbital theory.

Calvin Muth, Chemistry  
Faculty Mentor: Patrick Frantom, Chemistry  
Kinetic Investigation of a Conserved Active Site Glutamine residue in α-Isopropylmalate Synthase from Mycobacterium tuberculosis  
The DRE-TIM metallolysate superfamily is an evolutionarily-related group of enzymes that catalyze carbon-carbon bond forming and breaking reactions via the stabilization of an enolate intermediate. One well-characterized member of this superfamily is the enzyme isopropylmalate synthase from Mycobacterium tuberculosis (MtIPMS), which catalyzes the first committed step of the leucine biosynthesis pathway by mediating the Claisen-like condensation reaction between acetyl-CoA (AcCoA) and α-ketoisovalerate (α-KIV) to form isopropylmalate. Previous structural and bioinformatics studies have demonstrated that the semi-conserved residue Q84 may play a role in reaction specificity for MtIPMS compared to other members of the superfamily, especially with respect to the development of aldolase-like activities (Casey, et al. (2014) Biochemistry 53, 2915). Site-directed mutagenesis was used...
to investigate the role of Q84 during catalysis in MtIPMS. Undergraduate students in the Fall 2014 Biochemistry Laboratory course generated four variants of MtIPMS: Q84H (an aldolase mimic), Q84E, Q84C, and Q84L. All four variants were successfully expressed and purified, and all variants retain their dimeric structure as determined by gel filtration chromatography. A kinetic investigation of the effect of each substitution on the Michaelis-Menten parameters of MtIPMS is currently underway and results of these studies will be reported.

Amanda Nelson, Psychology
Faculty Mentor: Alan Blum, Community Health Sciences
The "ABCD's" of E-Cigarettes
BACKGROUND: Electronic cigarettes (or e-cigarettes) were introduced to the United States from China in 2007. Whereas cigarette smoke contains more than 4000 chemical byproducts of combustion, e-cigarettes permit the user to inhale a nicotine-containing vapor produced by heating a solution of nicotine, glycerol, and flavoring. The number of users of e-cigarettes is on the rise; one in five adult smokers has tried them. Patients frequently ask physicians about whether they should try using e-cigarettes as a way to stop smoking. There is no consensus in the public health and medical communities as to whether these products are a safer alternative to cigarettes. The health effects of longterm use of e-cigarettes have not been elucidated. Unable to find a basic unbiased guide to e-cigarettes for health professionals and patients, we sought to create such a reference. METHODS: We conducted a review of e-cigarettes in the medical and public health literature, the popular media, and the tobacco industry trade publications from 2007 to 2015. We also interviewed e-cigarette users, vendors, and researchers who have studied potential risks and benefits of e-cigarettes. RESULTS: The debate over e-cigarettes is fierce, pitting those who are hopeful about e-cigarettes' potential to reduce harm when compared with cigarette smoking against those who would raise the alarm over a product that represents a way to maintain dependence on nicotine for situations when one is not permitted to smo

Katherine Nesbitt, Capstone College of Nursing
Cailin Ulmer, Capstone College of Nursing
Jordan Koplon, Capstone College of Nursing
Emily Shealy, Capstone College of Nursing
Elizabeth Hargrove, Capstone College of Nursing
Taylor Leonard, Capstone College of Nursing
Kathryn Fauser, Capstone College of Nursing
Faculty Mentor: Paige Johnson, Capstone College of Nursing
Fosters Community Assessment
The World Health Organization defines health promotion as the "process of enabling people to increase control over, and to improve, their health. It moves beyond a focus on individual behavior towards a wide range of social and environmental interventions." Before health promotion programs can be implemented, or even planned, the community must first be assessed. The community needs to be assessed for what health concerns are most pressing, as well as what resources are readily available to the community. Each community has their own unique health needs and health promotion programs help address these needs in the community. Through the systematic collection, assembly, analysis, and dissemination of health information in the community, factors that affect the health of the community's population can be identified. Characteristics of the community, including demographics, resources, and needs, are presented, a major health problem of the community is identified, and an appropriate evidence-based intervention to address this health problem is discussed. We chose to evaluate the Fosters community in Tuscaloosa County. One of the most pressing needs we witnessed in the

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community was road safety for school-aged children. We discovered an evidence-based article that detailed a road safety program for children. We will implement the same evidence-based practice used in the article to teach road safety to the children of Fosters.

**Ryan Nicholas**, Mechanical Engineering  
**Thomas Hemmings**, Mechanical Engineering  
Faculty Mentor: Paul Allison, Mechanical Engineering  

*Activated Fly Ash (Geopolymer) Exposed to Elevated Temperatures*

Portland cement based concretes continually demonstrate failure under excessive compressional loads and high temperatures. As a result, researchers have studied a thermally stable alkali-activated fly ash as a suitable replacement for structural applications. Alkali-activated fly ash is a chemical process in which the glassy component of the fly ash is transformed into a well optimized packed concrete. Research has shown that the density of fly ash is much greater than that of Portland cement, giving the fly ash polymer higher heat capacities and thermal conductivities. Experimental procedures such as nanoindentation will be used to understand the local nanomechanical properties of the fly ash. In this study, the Berkovich indenter tip will be used to perform the grid indentation technique to obtain statistically significant nanoindentation data. Implementation of the Oliver-Pharr method will be used to determine the elastic modulus and hardness variations in the exposed surface. Additionally, the method developed by this research team of spatially correlating the nanoindentation data to scanning electron microscopy energy dispersive spectroscopy chemical data will be implemented. The chemical data allows for identification of local structures that are then correlated to specific nanomechanical indents. Further understanding of the nanomechanical properties of fly ash could result in totally replacing Portland cement material in structural applications.

**Zoe Nichols**, Biological Sciences  
Faculty Mentor: Stephen Secor, Biological Sciences  

*Not all meals cost the same: natural variation in specific dynamic action*

Every meal incurs a cost that is paid to fuel the activities of the stomach and intestines, to transport nutrients into and through the body, and to assimilate those nutrients into the body’s tissues. The cumulative cost of meal digestion and assimilation is referred to as specific dynamic action (SDA), and varies as a function of meal type and size. Foods that require more energy to digest leave less energy that is available for growth and metabolism. Therefore prey selection may be driven by the perceive profit (more gain, less lost) of one prey type over another. We are examining the variation in SDA for the brown anole lizard (Anolis sagrei) to determine whether different prey do vary in their cost of digestion and assimilation and thus differ in net energy available for other activities. We compared the post-feeding metabolic response and SDA among lizards fed isopods, cockroaches, and cricket meals equaling 5% of lizard body mass and maintained at 30C. The cricket meal generated the largest relative increase in post-feeding metabolism; however, it was the cockroach meal that results in the longest period that metabolic rates were significantly elevated. The order of cost of digestion and assimilation (lowest to highest) was isopods, crickets, and cockroaches.

**Jaron Nix**, Chemical and Biological Engineering  
Faculty Mentor: Laura Reed, Biological Sciences  

*The Effect of Glucose Level and Diet on Gene Expression*

An organism’s phenotype is the product of its genotype and environment. Drosophila melanogaster, an organism with an evolutionarily conserved genetic similarity to humans, acts as a crucial medium by which this genotype and environmental interaction can be better understood. Large population size,

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short life span, and small mass make Drosophila an ideal model organism for this study. Trehalose based QTL's in Drosophila promise to provide a linkage between the human phenotype and genotype, provided a certain environment. Our spotlight has been positioned upon the genetic implications regarding Metabolic Syndrome, namely type-2-diabetes. The focus of my project was to characterize gene candidates and their involvement in diabetes. After analysis of a QTL map, 7 genes were chosen with high probability of involvement. Using RT-PCR, a method of gene expression quantification involving the polymerase chain reaction, we can determine the expression of any number of genes in a genetically unique 'line' of flies. We have available to us triglyceride, glucose, and protein quantifications for normal and high fat environments for these same genetically unique flies. Using this data along with the select gene expression obtained from rt-pcr, we can attribute the presence of certain environmental and phenotypical traits to the relative expression of the corresponding gene.

Katherine O’Connor, Economics, Finance and Legal Studies
Faculty Mentor: Paan Jindapon, Economics, Finance and Legal Studies

*Persuasive Communication when Sender Incentives are Uncertain*

This project is a continuation from the fall semester. Our research, titled Persuasive Communication when Sender Incentives are Unclear, explores participants' behavior and decision making to determine the most effective persuasive technique. We have created a two player, Sender-Receiver, game using the software z-Tree. Participants are assigned a role and will interact on the computer to try to advance their positions. This can be achieved by either convincing the other player to select their item or by picking the most valuable item, depending on which role and type they are assigned. Testing will be completed in UA computer labs where the game data will be collected and then analyzed.

Julia Olsson, Capstone College of Nursing
Miali Praytor, Capstone College of Nursing
Michelle Albright, Capstone College of Nursing
Lindsay Ghiroli, Capstone College of Nursing
Tristan Franklin, Capstone College of Nursing
Amanda Smeltzer, Capstone College of Nursing
Carrye Hodges, Capstone College of Nursing
Faculty Mentor: Michele Montgomery, Capstone College of Nursing

*Assessment of Nutrition in Holt, AL*

The focus of this community health project is on the addition of a community garden to Holt, AL. They lack nutritious and low cost resources, and this is great way to help them obtain healthy lifestyles. The implementation of a community garden at the local elementary school is the best way to go about making a lasting change. Due to a larger population of African Americans who are already prone to an increased risk of hypertension, stroke, and obesity, a the community garden can help counter these issues.

Josh Oriez, Biological Sciences
Faculty Mentor: Mary Givens, Education - Educational Leadership, Policy and Technology Studies

*A Description of the Impact of Parental Involvement on 4th and 5th Grade Testing in an After-School Tutoring Program*

The purpose of this study is to determine whether there is a distinguishable difference in test scores between 4th and 5th grade children in an after-school tutoring program whose parents demonstrate varying degrees of interest and involvement in the program. Testing has become a cornerstone of American education, and is often used to place students into different academic tracks. Strong test
scores on a yearly basis set children up for better colleges and careers. If parent involvement appears to positively influence student testing, steps can be taken to increase parental support. In this study, parents and guardians demonstrate involvement through their support and attendance at after-school functions. A small number of workers and the supervisor of the program are interviewed in order to assess individual parental involvement, and attendance at optional activities for parents is recorded. A child's success is defined through practice tests provided through the after-school program, and these scores are paired with parent involvement in an attempt to expose a correlation between the two.

Mark Ortiz, New College
Faculty Mentor: David Meek, Anthropology
*Toward a Political Ecology "from the hold"
This paper is an attempt to critically interrogate posthuman political ecologies and their explanatory/liberatory potential for the Anthropocene. I begin by arguing that many seminal posthumanist interventions fail to displace the 'liberal subject' and the nature/society binary which underpins the elemental, discursive categories that form the reason of this creature. On the contrary, they reinforce and reinscribe liberal, democratic imaginaries, subject-oriented ontologies, and the supremacy of technical and scientific rationalities. I contend that a more productive direction for political ecology in the Anthropocene might be the consideration of capacious visions of the 'human,' fragmentary imaginings of which populate postcolonial and decolonial literatures. To this end, I explore how a diverse array of postcolonial, decolonial, afro-pessimistic, and object-oriented thought could inform what I call a "tactile" political ecology stemming from a "decolonial alterhumanism" which exists in stark contrast to colonized, ontological renderings of the human as merely a "liberal subject." In fact, much of this paper is devoted to exploring "nontologies" which, according to Fred Moten (2013) emerge from the experience of 'Blackness' which he describes as the "aboriginal displacement of ontology" and "ontology's anti- and ante-foundation, ontology's underground, the irreparable disturbance of ontology's time and space" (739). The ultimate aims of this project are to expound and foreg

Rachel Ostrow, Mechanical Engineering
Faculty Mentor: Beth Todd, Mechanical Engineering
*Instrumentation of an Orthotic Boot*
Gait, the manner in which a person walks, transmits forces to the joints in the lower limbs. Following injury, an orthotic boot is often prescribed. During the rehabilitation process, the individual is told to apply only a portion of their load, for example twenty-five pounds, to the foot inside the boot while walking. However, the individual has no true capacity for determining the load in real time. Thus an instrumentation system is needed to provide this information. In this project, Tekscan sensors will be used to measure the load at various points of contact in the insole. The insole will be 3D printed with specified contact points, and the sensors will be calibrated to transmit signals via Bluetooth. Experiments will be performed to determine the accuracy of the system for several adult subjects.

Ellie Ott, American Studies
Faculty Mentor: Theodore Tomeny, Psychology
*Parent Marital Status and Adjustment in Typically-Developing Siblings of Children with Autism Spectrum Disorder*
Typically-developing (TD) siblings of children with autism spectrum disorder (ASD) may experience maladjustment due to a number of risk factors (Hastings & Brown, 2002). However, outcomes of TD siblings of children with ASD are mixed, suggestive of moderating and mediating variables (Meadan et al., 2010). Characteristics of children with ASD (Hastings, 2003) and demographic factors (Macks &
Reeve, 2007) are variables likely important when predicting outcomes. It was predicted that the relation between ASD symptom severity in children with ASD and maladjustment in TD siblings would be moderated by parent's marital status (married vs. unmarried), per parent- and TD sibling-report. Participants included 113 parents of a child with ASD (ages 3-17) and 113 TD siblings (ages 11-17). Parents completed questionnaires on ASD symptom severity, TD sibling adjustment, and demographic variables. TD siblings completed self-report questionnaires on their own adjustment. Moderated multiple regression analyses were conducted via "PROCESS", a computational tool for SPSS (Hayes, 2013). Significant interactions emerged between ASD symptom severity and marital status when predicting parent- (B = -.21, p = .03) and self-reported (B = -.23, p = .02) TD sibling adjustment after controlling for family income. The interactions revealed that TD siblings with an unmarried parent and siblings with severe ASD symptoms were at greatest risk for maladjustment. Treatment implications will be discussed.

**Meredith Owens, Biological Sciences**

Faculty Mentor: Laura Reed, Biological Sciences

*Impact of high fat larval diet and adulthood exercise in Drosophila melanogaster*

Impact of high fat larval diet and adulthood exercise in Drosophila melanogaster By: Rachel Hill, Meredith Owens, and Laura Reed Childhood obesity is a prevalent issue in America that can lead to lifelong effects, even if corrective measures are taken later in life. Our research focuses on whether the adverse effects of a high fat diet in the juvenile stages of life can be ameliorated by exercising in adulthood with Drosophila melanogaster. We chose this organism because it allows for multiple rounds of testing due to its short generation times. One genetically identical line of Drosophila melanogaster was collected in the first instar larval stage and transferred to a normal or 1.5% high fat diet as larvae, and placed on a normal diet as emerged adults. When Drosophila melanogaster were 1-3 days old, they were separated into test groups of 50 and exercised using our Drosophila melanogaster exercise machine, the TreadWheel. After completing the exercise treatments, Drosophila melanogaster triglyceride levels were measured. We expect to find a difference between Drosophila melanogaster that were exercised and those that were not, in both the normal and 1.5% high fat diets, where exercise will improve the mitigate the negative effects of a high fat diet. Based on our results, we expect to conclude that the negative effects of a high fat juvenile diet can be reduced by exercise in adulthood.

**Christian Palmer, Chemistry**

Faculty Mentor: Shanlin Pan, Chemistry

*Nanoconstruction and Surface Modification of Iron Oxide Photoresponsive Electrodes for Alternative Energy*

Hematite (α-Fe2O3) has been extensively studied as a promising material for the water-splitting reaction in photoelectrochemical cells, due to its absorption of visible light and low cost. However, it is a poor interface for facilitating water splitting and has a very short hole recombination length. To circumvent these problems and maximize photocurrent, other materials have been included to increase the hematite surface area and improve its interactions with water molecules. Inclusion of a surfactant in the iron oxide precursor solutions used to coat electrodes has improved surface area by forming micelles and a porous hematite structure, which has shown some improvements in photocurrent. Surface-coating the electrode with carbon-modified TiO2 (COT) has shown promising results for the interface between hematite and water, but requires more testing. In conclusion, porous hematite structure and surface coating with semiconductors hold the promise for the improvement of hematite photoelectrochemical cells. This work is supported by the National Science Foundation under Award

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The information presented here is intended to represent exactly what was submitted by the student. Errors can occur in the transfer process.
**Caitlin Parker**, Capstone College of Nursing  
**Austin Massey**, Capstone College of Nursing  
**Skyler Palmer**, Capstone College of Nursing  
**Matthew Lund**, Capstone College of Nursing  
**Brantley Porter**, Capstone College of Nursing  
**Lauren Weber**, Capstone College of Nursing  

Faculty Mentor: Michele Montgomery, Capstone College of Nursing  

*Community Health Assessment of Coker, Alabama*

Health promotion is the development of individual, group, institutional, community and systemic strategies to improve health knowledge, attitudes, skills and behavior. The purpose of health promotion is to positively influence the health behavior of individuals and communities as well as the living and working conditions that influence their health. However, before health promotion programs can be implemented in a community, the unique health needs and resources of that community must be determined. Community health assessment is the foundation for improving and promoting the health of community members. The role of community assessment is to identify factors that affect the health of a population and determine the availability of resources within the community to adequately address these factors. This is achieved through the systematic collection, assembly, analysis, and dissemination of information about the health of the community. Once the needs and resources of the community have been identified, evidence-based health promotion interventions can be identified that can be tailored to fit the unique needs of the community. This presentation will illustrate a community assessment conducted in Coker, Alabama. Characteristics of the community, including demographics, resources, and needs, are presented, a major health problem of the community is identified, and an appropriate evidence-based intervention to address this health problem is discussed.

**MaryPat Peeples**, Consumer Sciences  
Faculty Mentor: Melissa Wilmarth, Consumer Sciences  

*An Examination of Financial Wellness and Married Individuals*

Financial wellness is a comprehensive term used to identify areas of financial well-being or financial health, including subjective and objective measures of one’s financial situation. This research examines financial wellness by addressing three research questions; focusing on if financial wellness varies by demographic characteristics, frequency of financial management, or money management strategies among married individuals. Collected in a large, southeastern state, the Healthy Families, Healthy Finances (HFHF) dataset, two cross-sectional samples collected in 2007 and 2011, was utilized for this study as it contains information about married individuals’ finances, relationship, and demographic background. The dataset has a sample of 1,004 married individuals who had an average financial wellness score of 7.293 (SE=0.07) as measured by the Personal Financial Wellness (PFW) Scale. Differences in financial wellness levels were tested by characteristic via one-way ANOVAs and t-tests. Preliminary results indicate that there are demographic differences of financial wellness. On average, men had higher financial wellness than women and we found significant differences for income, education, family, and marital status. Results related to financial management behaviors are mixed and warrant further investigations. Future research will continue to investigate the relationship financial wellness has with demographic variables and financial behaviors.

**Taylor Petersen**, Biological Sciences  
Faculty Mentor: David Nikles, Chemistry  

*The Synthesis of Gold Nanoparticles for Laser Triggered Chemotherapeutic Drug Release*

*The information presented here is intended to represent exactly what was submitted by the student. Errors can occur in the transfer process.*
Current methods of treating malignant melanoma often cause many dangerous side effects due to the inability to deliver aggressive drugs directly to cancer cells. Instead the drugs travel to other regions of the body, attacking healthy cells and causing severe side effects. The goal of this project is to build a nanoscale drug delivery system consisting of gold nanoparticles and a chemotherapeutic drug trapped in the semi-crystalline core of polymer micelles. Conjugated to the periphery of the micelle are RGD peptides that will bind to receptor sites expressed on the surface of carcinoma. The nanoscale micelles will travel through the bloodstream until they encounter the cancer cells and then bind to the cells through the RGD peptides. Application of a near infrared laser will heat the gold particles, melting the core of the micelle and releasing the drugs, thereby creating a targeted drug delivery system. Chemical reduction of Au(III) by oleylamine in refluxing toluene gives purple colored gold particles with oleylamine capping ligands. The oleylamine was replaced with 11-mercaptoundecanol to give particles with thiol groups bound to the gold surface and many primary alcohol groups extending out from the particles. Caprolactone was polymerized from the alcohol groups to give gold particles with polycaprolactone brushes extending from the gold surface. The polycaprolactone coated particles will be compatible with the polycaprolactone core of the polymer micelles.

**Shanna Phillips,** Chemistry  
**Faculty Mentor:** Stephen Woski, Chemistry  
**Novel Fluorescent Nucleotides**  
Although great strides have been made in the field of molecular genetics, our ability to detect nucleic acid sequences can be greatly improved. The synthesis of fluorescent nucleotides for use as biophysical and bioanalytical probes would provide a faster and more efficient tool for genetic testing. The structure of the chromophore in green fluorescent protein may provide a method to synthetically adjust the wavelength at which the probe fluoresces via the addition of side chains. These novel nucleotides could then be used to fluorescently tag oligonucleotides and differentiate them. We have synthesized and glycosylated the nitrogenous bases 4-fluoro-5-benzylidene imidazol-4-one and 4-cyano-5-benzylidene imidazol-4-one in preparation for phosphorylation to generate phosphoamidites for DNA synthesis. DNA assays will be performed to test the versatility of these nucleosides by determining the stability of DNA double helices containing the novel nucleotides paired with each of the four standard nucleotides. We will determine if the novel nucleosides pair universally and examine their fluorescent properties.

**Emily Pickle,** Psychology  
**Faculty Mentor:** Ansley Gilpin, Psychology  
**The Relationship between Social Anxiety and Emotion Identification Skills**  
Emotional intelligence, and more specifically, the ability to identify emotions within one’s self, has been shown to negatively correlate with social anxiety - meaning that social anxiety is higher in individuals who have difficulty identifying their own affective state. Given that social anxiety occurs in response to socially interactive situations, we predicted that social anxiety would also correlate negatively with the ability to identify the emotions of others. To test this hypothesis, 360 college students completed research-derived questionnaires which assessed their self-directed and other-directed emotional identification skills, as well as their tendency towards social anxiety. Emotional intelligence and social anxiety scores were subjected to correlational analyses, which revealed that self-directed emotion identification ability was significantly, negatively correlated with social anxiety. Also, as predicted, other-directed emotion identification ability was significantly, negatively correlated with social anxiety. These findings indicate that the abilities for identifying one’s own emotions and the emotions of others each have a significant relationship to social anxiety for college students. These findings pave the way for future experimental research which should investigate the potential for intervention programs that

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could assist in improving emotion identification skills (in self and in others) as a means to ease college students' social anxiety.

**Austin Pinkerton**, Computer Science  
Faculty Mentor: Eben Broadbent, Geography  
**Automated Tree-Crown Delineation Using Visual 3D Imagery Aquired From UAVs and Photogrammetric Analyses**  
Forest management requires close monitoring of the area which involves the gathering and analysis of relevant data. Current field-based methods of acquiring this data is expensive and timely. Because of this, many large areas of forests are left unmanaged and grow without proper structure. Automated tree-crown delineation from multi-spectral 3D unmanned aerial vehicles (UAVs) using algorithms designed to groom this spectral data could offer an inexpensive solution to this problem. The project includes the design, programming, field validation and parameterization, and implementation of an automated pattern recognition algorithm to identify individual tree-crown dimensions and related forest structural and compositional attributes from high spatial resolution visual and multi-spectral sensors acquired from UAVs. The tree-crown delineation functionality will be the extent of the initial program, and we anticipate that the algorithm will continue to be built upon and expanded with more functionality and data manipulation in the future.

**Joy Prinsell**, Capstone College of Nursing  
**Amy Akel**, Capstone College of Nursing  
**Charlotte Galloway**, Capstone College of Nursing  
**Carla Gonzalez**, Capstone College of Nursing  
Faculty Mentor: Sara Kaylor, Capstone College of Nursing  
**LEAPP into Action with High-Risk Medications**  
This research project explores the effectiveness of using the acronym, LEAPP, as a checklist immediately prior to and following administration of high-risk medications. LEAPP stands for Lab values, Education, Adverse effects, Pre-assessment, and Post-assessment. Lab values include electrolytes, WBC, RBC, and platelet counts, BUN, creatinine, and any other values pertaining to the high-risk drug. Education includes teaching the client about the medication, including expected signs and symptoms, and signs and symptoms of toxicity or overdose. It also provides a time for the nurse to answer questions or concerns of the client or family. If the client is incoherent, the family must be educated to ensure client safety. Next, the nurse must be able to recognize all adverse effects for the medication prior to administration. The nurse must know the antidote for the medication, and have it available. Pre-assessment includes baseline vital signs, breath, heart, and bowel sounds, pain assessment, PERRLA, and any abnormalities prior to administration of the medication. Finally, the nurse checks for abnormalities by conducting a post-assessment and comparing it to the pre-assessment. LEAPP is also implemented after reviewing the six rights of medication administration. After executing this acronym in the healthcare setting, we expect to see a reduction of errors in high-risk medication administration and an improved quality of patient care and safety.

**Brandon Pritchett**, Civil, Construction and Environmental Engineering  
Faculty Mentor: Shahroz Amidi, Civil, Construction and Environmental Engineering  
**Long-term Durability and Environment-assisted Debonding between UHPC and Concrete Substrate**  
Concrete is the most utilized construction material in the world. It is used in the construction of many structures such as bridges, roads, pavements, buildings, dams, and tunnels. The importance of concrete in daily life is immeasurable, therefore making necessary its research and innovation. Since concrete is a

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large factor in daily life, it is constantly being rehabilitated, thus posing the problem of maintaining the structure or changing current design to more efficient and effective methods. Our research focuses on the rehabilitation of existing and in-service concrete using Ultra High Performance Concrete (UHPC). We are interested in UHPC because it has compressive strength far greater than that of Ordinary Portland Concrete (OPC), therefore qualifying for innate longevity. Narrowing the scope, the detail that we are currently investigating is the interaction of UHPC overlay on OPC directly and by means of an epoxy-based bond. Our testing will determine the interface bonding strengths of both methods while in service conditions which include, freeze-thaw cycles, exposure to heat, deicing salts, and alkaline, and stored in stagnant water. Once specimens are conditioned, we use a wedge splitting test method to study the bonding behaviors. Finally, we are going to determine the traction-separation law for each bond and compare the results to quantify the bond strength.

Dylan Quick, Mechanical Engineering
Jamie Moon, Mechanical Engineering
Alex Larson, Electrical and Computer Engineering
Faculty Mentor: Eben Broadbent, Geography
The design and construction of a fully autonomous, lightweight and portable unmanned aerial system to support rescue operations

Tuska is currently developing a UAV capable of extended flight sending a live video stream over several miles to a ground station. This provides immediate information to relief teams following a natural disaster such as a tornado or hurricane. This technology can have a great impact on emergency response as it can be deployed and sent to the disaster site much faster than a manned helicopter or search team. Once constructed and optimized through extensive testing, we aim to get our system into the hands of first responders so it can be used to save lives.

Andrew Raddatz, Chemical and Biological Engineering
Faculty Mentor: Yonghyun (John) Kim, Chemical and Biological Engineering
Identifying a unique stem cell marker for Acute Myeloblastic Leukemia
Cancer Stem Cells (CSCs) have recently been identified as the root cause of tumors generated from cancer cell populations. This is because these cells are drug-resistant and have the ability to self-renew and differentiate. Acute Myeloblastic Leukemia Stem Cells (LSCs) are currently identified as cells containing CD34 and lacking CD38 (CD34+/CD38-); however, the same expression of proteins is also used to identify hematopoietic stem cells (HSCs) which are regularly occurring throughout the body. This creates issues when developing drugs that target LSCs, because they may have the detrimental side effect of also targeting HSCs. In order to distinguish these HSCs from the LSCs we are observing the expression of another protein, CD33. This protein is an attractive marker because it was found to be enriched in Acute Myeloblastic Leukemia (AML). Specifically, we will be evaluating the expression of these proteins after applying shear stress to the cells to mimic the in vivo bloodstream environment. We hypothesize that the shear stress will increase the expression of the known LSC markers, and also that CD33 will be enriched in the sheared AML cells and not in the HSCs. If the expression of CD33 differs between the HSCs and LSCs, then we will be able to develop drugs that target the cancer stem cells specifically which is our end goal.

Robert Ramsey, Aerospace Engineering and Mechanics
Faculty Mentor: Vinu Unnikrishnan
Aerospace Engineering and Mechanics Evolutionary Optimization of Aircraft Landing Gears

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Landing gears (the undercarriage supporting the aircraft) during their lifetime, have to meet a multitude of landing and ground handling design loads with magnitudes several times the gross weight of the aircraft. Also, one of the main criteria for the design is the weight of the landing gear, as an inefficient design can add unnecessary weight to the aircraft, and consequently reduce the payload or useful load. Therefore, to increase the efficiency of the design and reduce the operational cost, structural optimization techniques are employed for an optimum design of landing gears. Landing gear optimization technique involves optimizing the objective functions such as the length, width, material, slip angle, caster length etc., of landing gears for the designed loads range. In this study, evolutionary optimization based genetic algorithms are used to optimize the slip angle, caster length of the nose landing gear and to find the best configuration for minimizing the resistive torque generated. These optimized parameters for the best landing gear configuration are further analyzed and tested using finite element methods for structural stability and will be presented.

**Samantha Reale**, Political Science  
**Kenzi Farish**, Political Science  
**Emily Kotroco**, Political Science  
Faculty Mentor: **Dana Patton**, Political Science

*The Correlation Between News Reporters and their Perceived Level of Education*

The study is being conducted to discover if there is a correlation between news reporter's appearance and their perceived level of education. By conducting a survey among college educated students, we hope to discover a relationship between how accepting students are of information coming from a source who hold the same level of education. To eliminate regional bias we plan to control for regions of the United States. We survey 150 students.

**Summer Reedy**, Capstone College of Nursing  
**Sarah Scoggins**, Capstone College of Nursing  
**Kayla Thomas**, Capstone College of Nursing  
**Haley Osteen**, Capstone College of Nursing  
**Stephanie Gross**, Capstone College of Nursing  
**Alexa Polanski**, Capstone College of Nursing  
**Maya Yarbrough**, Capstone College of Nursing  
Faculty Mentor: **Stephanie Turner**, Capstone College of Nursing

*Let's Get Critical*

Background Critical lab values are test results that deviate from normal limits toward unsafe values that may become life threatening. The Joint Commission Journal recommends that critical lab values be reported to the attending physician within 1 hour. Trinity Medical Center's policy requires that critical results must be reported to the LPN or RN in 30 minutes or less Purpose The purpose of this research project is to emphasize the importance of properly managing critical lab values. Methods The RN’s on our unit, along with the Nurse Manager, completed surveys to determine if this procedure needs improvement. Results Our findings concluded that while Trinity's Critical Values and Notification Procedure does, in fact, adhere to the standard guidelines; the policy can be better implemented on the unit. Interventions Our clinical group provided interventions to be employed that will decrease the time it takes to report Critical lab values. Conclusions It is our hope that earlier communication of urgent values will improve patient safety and decrease emergent situations.

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Pastors’ HIV Knowledge, Stigma, and Outreach in Rural African American Churches

Background. African Americans (AA) in Alabama are disproportionately impacted by HIV/AIDS (HA), especially in rural areas. Religion is vital to AA and the AA church has been a partner in addressing health issues. Stigma is a barrier to addressing HA in AA. A faith-based anti-stigma study is being conducted in 12 AA churches in Alabama to reduce HIV stigma. Objective. To assess HIV knowledge, stigma, and outreach in rural AA pastors. Methods. Interviews were conducted with pastors that assessed HIV attitudes, knowledge, stigma, and HA-related activities. Interviews were audiotaped and transcribed verbatim. Constant comparative analysis used to develop themes. Results. Sample consisted of 11 AA pastors (10 males, one female). Denominations included: Baptist (n=3), CME (n=3), AME Zion (n=2), Disciples of Christ (n=3). Pastors had limited experience with HIV. Two pastors learned of HIV when a relative or friend was diagnosed, and several pastors had medical training. However most knew about HIV through the media and had no HIV education. Stigma was defined as being treated differently due to fear. Pastors identified young people as being the most at-risk group. HIV related activities included distributing brochures and testing. Many churches had not engaged in activities. Conclusions. Pastors had limited HIV knowledge but were able to conceptualize HIV stigma. More awareness of risk factors is needed. HIV related activities varied, and were inconsistent.

Strong Electrostatic Adsorption of Nickel to Hierarchically Porous Carbon

Hydrogenation over fixed bed catalysts are widely used in chemical processes such as petroleum refining and commodity chemicals. Hierarchically porous carbons supporting metals are of interest for such applications. Strong electrostatic adsorption (SEA) is a method of dispersing metal ions on carbon supports to produce fixed bed catalysts. The point of zero charge (PZC) and the density of ion binding sites for activated and non-activated carbon was found by a pH titration method. Adsorption isotherms of the nickel were carried out to determine the amount of nickel adsorbed on the surface as a function of pH. It is planned to reduce the nickel ions to nickel metal, and determine the nickel particle size. SEA is reported to produce very small metal nanoparticles which are expected to be efficient hydrogenation catalysts.

Art de la Mode

Through experiential learning opportunities, students are able to engage in their passions, sharpen their skill sets, expand their knowledge and understanding, and broaden their perspectives. “Learning by doing and reflecting” is an inductive process based in theory which allows students to actively engage in experiences outside the classroom and the academic setting. This presentation focuses on le Art de la Mode, an experiential learning opportunity that occurred on 21 November 2014 in Downtown Tuscaloosa in conjunction with UA’s Homecoming 2014, and sponsored by Downtown TTown. This art/fashion design battle consisted of six teams, an apparel design student, a local artist and a fashion retail student, that were partnered with a food/beverage business in Downtown Tuscaloosa. The art/fashion design battle began at 10:00 am at Tuscaloosa City Hall from which the teams raced to their respective business. Teams were tasked with creating an inspired look, based on the brand identity of
the business, on 18” wooden mannequins by 5:00 pm. For eight hours, the fashion retail student's role was social media storyteller using the battle's Twitter, Instagram, Facebook, Flickr, and Pinterest accounts. The battle ended at 5:00 pm and the mannequins were transported to Grace Aberdean HABITAT ALCEHEMY to be judged by a panel of local professionals. This experience culminated in the creation of a print book featuring each of the mannequins and images from the social media story.

**Eric Roddy**, Philosophy  
Faculty Mentor: Rick Houser, Education - Educational Studies in Psychology, Research Methodology and Counseling  
* Differences in Neural Correlates, Physiological Measures, and Sensation Seeking in High Impulse and Low Impulse Individuals During High Stimulus Virtual Reality  
Researchers have identified DLPFC as a critical neural area related to risk-taking/impulsive behavior. There is little known as to whether DLPFC will regulate individuals’ risk-taking/impulsive behaviors differently (under a virtual reality environment) regarding their functional and dysfunctional risk-taking/impulsive tendency. As a result, this will be the main area to explore for the current study. In addition, the measurement of the change of heart rates will also be included in the current study as a biological measure of participants’ level of immersion under the virtual reality environment. We hope to determine if there are differences in neural correlates of those who have high versus low impulsivity. Additionally we hope to determine if there are differences between those high and low impulsive individuals on physiological measures, sensation seeking and speed in completing a virtual reality game. Ultimately we hope to begin to understand how impulsivity may be experienced and potentially impacted by the use of virtual reality.

**Aisha Rogers**, Communicative Disorders  
Faculty Mentor: Anthony Buhr, Communicative Disorders  
* Moving While Speaking  
The purpose of this study was to investigate the potential influence of movement and activity on the increased speech fluency of those who stutter. With the guide of a student clinician, speech therapy clients were engaged in a monologue or dialogue while carrying out one of four activities: sitting, walking, tossing a ball, or constructing a block structure. Recordings of the clients’ speech were transcribed, and speech disfluencies were coded. Results are anticipated to show that speech fluency is enhanced when an individual is performing an activity.

**Elizabeth Rogers**, Political Science  
**Sarah Sawyer**, Political Science  
Faculty Mentor: Nicholas Kerr, Political Science  
* Gender Equality in Africa: Assessing the Relationship between Gender Norms and Women's Empowerment  
*International focus*  
This paper examines social and political gender equality in sub-Saharan Africa. An accurate enforcement of equal treatment for all genders requires two main components: cultural support and a representative political structure reflective of women in society. Since the reintroduction of multiparty rule, some African countries have attempted to integrate women into political and economic positions of power through legislative and ministerial quotas as well as promote social equality in the treatment of women. We seek to understand whether shifting cultural norms that emphasize the empowerment of women are being reciprocated in the various the social, economic, and political spheres that make up daily life. Our hypothesis is that higher levels of support for gender equality in African countries will be reflected
with higher levels of empowerment of women in parliament, education achievement, and health outcomes. Through the use of an intersectional theoretical framework and a mixed-method approach, we will use various sources, such as recent survey data from the Afrobarometer, to test our argument.

**Huston Rogers**, Electrical and Computer Engineering  
Faculty Mentor: Paulius Puzinauskas, Mechanical Engineering  
*GT Suite Simulation of a Caterpillar C9*  
The goal of this project is to develop a simulated engine model. The model will be used to create a new control strategy for a high pressure Exhaust Gas Recirculation (EGR) system and Variable Geometry Turbocharger (VGT) to reduce emissions and fuel consumption for a Caterpillar 9L 6-cylinder Diesel engine. The problem with developing this strategy is that any change in controls on the VGT causes large changes in the EGR system as well. For the purpose of this project, Gamma Technologies (GT) Power, a subset of the GT Automotive Simulation Suite, will be used to model the engine to create a simulation environment. This simulation environment will be used to more rapidly develop and optimize control strategies than changing and testing the control algorithm in real-world testing. The first part of this project is the development and calibration of a model of the engine in the laboratory. The second part of this project is verification of our model by comparing simulation data to data acquired from testing the engine.

**Michael Rogers**, Mechanical Engineering  
Faculty Mentor: Shanlin Pan, Chemistry  
*Fluorescence-Intermittence of Single CdSe@ZnS Semiconductor Quantum Dots on Ag Nanowire Substrate*  
Electrodeposition is used to grow silver nanowires (Ag NWs) onto an indium tin oxide (ITO) glass substrate. CdSe@ZnS core-shell semiconductor quantum dots (QDs) sample are prepared on the Ag NW substrate using drop-coating method for single QD imaging. Under a confocal microscope, the illuminated sample is filmed with a high-speed camera. Using MATLAB software, fluorescent-intensity duration data is obtained for each single quantum particles identified in the film compilation image. The data shows that single particles usually have a brief fluorescent "on" duration of only 1-2 frames of illumination. The results indicate that QDs are more likely to blink in short, quick intervals of time, as opposed to having long, drawn out periods of illumination.

**Benjamin Romano**, Computer Science  
Faculty Mentor: Brandon Dixon, Computer Science  
*Visualizing Weather Data*  
Situational awareness is critically important for weather broadcasters during a severe weather event. Various data visualizations make understanding and presenting the weather data possible. By adding on additional data sources, it is possible to get even more insight into severe weather scenarios. Increasingly, social media data has the potential to add to the situational awareness of the event. Our goal for this project, is to combine social media with traditional weather data into one visualization. To achieve this, we are currently creating software that can collect and display both types of data. These tools will additionally allow the playback and analysis of archived data as though it were occurring in real time. With the completion of the tools, we plan to run the software on an array of six 55" TVs.

**John Roveda**, Chemical and Biological Engineering  
Faculty Mentor: Jason Bara, Chemical and Biological Engineering  
*Design of Bis(imidazole) Monomers for Step-Growth and Radical Polymerizations*  

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Recently, several promising classes of promising polymer materials have emerged as advanced gas separation membranes. Here, we focus on combining two of these materials platforms in the form of novel polymers with alternating ionic and polyimide groups. These materials present opportunities for unique nano- and microstructures that can impart high fractional free volume and enhanced permeation of gases such as carbon dioxide. Given the number of simple precursors available for study, a large number of unique materials are possible. This presentation will focus on our synthetic techniques and design of films for testing as membranes.

Matthew Rowell, Health Science
Faculty Mentor: Lori Turner, Health Science
West Alabama Food Bank
Title: West Alabama Food Bank Background/Problem: The West Alabama Food Bank was incorporated in 1987 as a nonprofit organization to West Alabama. The problem is that Alabama has one of the highest poverty rates in the country. One in every five children and one in every four seniors live below the poverty level. Purpose: The West Alabama Food Bank's mission is to help extinguish hunger and food insecurity in West Alabama. Methods: The West Alabama Food Bank partners with businesses to donate food, as well as individuals donating food. WASB is involved with several programs to help banish hunger from West Alabama, including Brown Bag program for needy elderly, Mobile Food Pantry, Freezer Loan Program, Secret Meals for Hungry Children, and my personal favorite, Beat Auburn Beat Hunger. WAFB also has its doors open for anyone who is interested in volunteering. They are great with giving physically and mentally handicapped citizens the opportunity to better themselves and help others. Results/Discussion: I believe that all efforts are successful. Beat Auburn Beat Hunger is huge in Tuscaloosa. An employee told me, during this week, it is nonstop truckloads of food. They measure success by the number of lives they can improve by feeding the needy. Recommendations: I believe that all efforts should be continued. Whether it is through churches, soup kitchens, or food pantries, it is necessary. The only challenges would be the decline of donated foods, and people using the system.

Samantha Rudelich, Management and Marketing
Faculty Mentor: Meredith Bagley, Communication Studies
Kanye West’s Representation of Women
This research takes a critical look at Kanye West and his representation of women in the songs “Hey Mama”, “Bound 2”, and “Only One”. These songs were chosen to exemplify West's relationships with his mother, wife, and daughter. The song "Hey Mama" from his sophomore album Late Registration, released in 2005, "Bound 2" from his latest album Yeezus, released in 2013, and the single "Only One", released in 2014, also provide a progression of his music. My presentation utilizes previous methods of research of Tupac and Kanye West in order to analyze not only themes of patriarchy, but of ageism as well. It also aims to reconcile the differences in representations of women in West's life and to understand the impact of his work on the new generation. While recognizing West's ability to reflect our modern day society and his influence on pop culture, my research ties his songs to larger societal ideals and values.

Melinda Russo, Biological Sciences
Faculty Mentor: Julie Olson, Biological Sciences
Identification of the Presence of Cryptosporidium, Bacteroides, and Giardia in Rural Alabama Drinking Water
Over 340,000 low-income, rural Alabamians are at an increased risk for waterborne illnesses proximately caused by groundwater contamination or lack of effective water treatment. In this study,
we investigated the presence of the pathogens Cryptosporidium spp., Bacteroides spp., and Giardia spp. in water samples obtained from four rural Alabama water distribution systems. Samples were collected at pre-treatment, post-treatment, post-storage, in-line, and end of line locations to provide an overview of the water with regard to microbiological quality throughout the distribution system. We hypothesized that as the water traveled through the distribution grid after chlorine treatment, the likelihood for contamination would increase based on a diminishing chlorine residual and the possibility of intrusion into the water lines. To examine the presence and abundance of these pathogens, DNA was extracted from 100 L samples and analyzed using most probable number PCR followed by gel electrophoresis imaging. Although Bacteroides has not yet been found, we have found evidence of Giardia at the pre-treatment well-head of one system. Currently, Cryptosporidium has been detected in in-line and end-line locations in multiple systems, and was detected at the pre-treatment sites from two systems. These data suggest that the chlorination treatment was not entirely successful at eliminating these organisms from the system.

**Kristen Sabino, Chemistry**
Faculty Mentor: Shanlin Pan, Chemistry

*Facile solution synthesis of Ag@Pt core-shell nanoparticles with dendritic Pt shells*

I will present the synthesis and electrochemistry characterization of Ag@Pt core shell nanoparticles with dendritic Pt shells. The Ag nanoparticles were synthesized by combining AgNO3 with NaBH4 in the presence of the nonionic surfactant P123. The nonionic surfactant helped to synthesize both the Ag@Pt particles as well as the Pt nanostructures. Pt was added to the Ag nanoparticles in different quantities in the presence of ascorbic acid. To test these nanoparticles and their electrochemical performance, an electrode was set up and the particles were placed on the glassy carbon electrode for oxidation of methanol. The potential values were measured in reference to the Ag/AgCl reference electrode and a Pt wire that acted as the counter electrode. The particles were measured based on their current density and their potential in volts. The results showed that the amount of Pt in the cells did not directly correlate with the catalytic oxidation of methanol.

**Madison Santana, Psychology**
Faculty Mentor: Kristina McDonald, Psychology

*The Mediating Effects of Parental Feedback on Parent’s Implicit Theories and Children’s Social Attributions*

The purpose of the current study is to investigate the role of parent feedback as a mediator on the relationship between parents’ implicit theories and their children’s social attributions, particularly after peer rejection. A link between parents’ implicit theories of both personality and intelligence and children’s social attributions has been long established by previous research. This study builds on previous research by calculating the impact of different types and amounts of praise and criticism given by parents to their children and measuring how these feedback styles shape and connect families’ views of success and failure in their environment. For this study, 60 children ages 12-15 were recruited from the Tuscaloosa area joined by one parent. The pair individually filled out questionnaires regarding beliefs about success and peer relationships; children played a game simulating peer interaction and rejection. The anticipated results of this study will show that parents’ emphasis on process-oriented praise rather than trait-oriented praise will be correlated with both parents’ expression of an incremental style of implicit theories and children’s display of more positive social attributions, even in the face of failure.

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The Family Interaction Project: A Closer Look at Language and Social Development in Early Childhood

The Family Interaction Project is a longitudinal study designed to find variables in early childhood that are predictors of later development. Children attending a university childcare center are assessed every six months. Data are collected by student researchers and from parents and teachers in the form of questionnaires. The current poster submission focuses on children between 0 and 3 years of age and examines the relationship between daily family activities, as reported by the parents, and the communication skills developed by the children, as reported by the childcare teachers. The following research questions were addressed and findings will be discussed at the Undergraduate Research Conference. Approximately 23 children and their families have been followed and are the participants in the study. Are parents' perceptions of children's social skills related to teachers' assessments of children's social development and communication levels? Does parental involvement correspond with teachers' assessments of children's language development? Is language development linked to whether or not the child was breastfed? Are teachers' assessment of language skills correlated with how often parents read to their child? How do teachers' assessments of children's understanding and object use compare to parents' responses on how the child behaves and how the parent perceives the child in terms of social skill development? Finally, do teachers' and parents' scores correlate?

Cody Savage, Chemistry
Faculty Mentor: David Dixon, Chemistry
Gas-Phase Acidities of Phosphorylated Dipeptides
Phosphorylation, the addition of a phosphate group, is a common post-translational modification in proteins and is involved in cell signaling. The most abundant phosphorylated amino acids are phosphoserine, -threonine, and -tyrosine where phosphorylation occurs at the -OH group. The lowest energy conformers for neutral and deprotonated dipeptides composed of one alanine residue and one phosphorylated amino acid were predicted. The reliable correlated molecular orbital theory G3MP2 method was used to predict the gas-phase acidities. The lowest energy anion results in deprotonation of the phosphate group. Partial proton transfers are seen between the phosphate and carboxylic acid groups showing the importance of hydrogen bonding in the most stable structures and its effect on acidity.

Sarah Sawyer, Political Science
Faculty Mentor: Nicholas Kerr, Political Science
Traditional Law and Women in sub-Saharan Africa
*International focus
There are many ways in which women are affected by traditional norms in their everyday life. These traditional norms can change the way that a woman would dress to whether or not she would choose to allow her daughter's external genitalia to be removed through FGM practices. Studies have shown that women are the main supporters of these practices. It begs the question of why and what effect this ultimately has on the country. Traditional law has a major effect on the public opinion of women and this impacts the protection of women's rights in Mali and Guinea. However, there has been a steady
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of VPS41 in Aβ toxicity enhances understanding of AD pathology. Evaluating interactions in which VPS41 is involved can lead to enhanced knowledge of how Aβ is trafficked throughout the cell and, in turn, illuminate the cellular mechanisms of AD progression. Here I propose to study VPS41 in the context of neurotransmission and Aβ toxicity through development of a new transgenic C. elegans model that will facilitate analysis of potential genetic modifiers of neurodegeneration over the course of aging.

Richard Seeber, Biological Sciences
Faculty Mentor: Ryan Earley, Biological Sciences
**Metabolic Response to Maternal Fasting in Embryonic Mangrove Rivulus**
All biological processes are driven by energy stored in and released from chemical bonds; organisms acquire this energy through their diets. Thus, food limitation can have a profound impact on an animals' health. Our laboratory houses many isogenic lineages of the mangrove rivulus, Kryptolebias marmoratus. Because of this fish's unique reproductive strategy, self-fertilization, all individuals of a lineage are genetically identical. This allows us to pinpoint the effects of environmental factors experienced during early development, such as maternal food limitation, on physiological processes in the absence of genetic variation. We developed an assay to measure metabolic rates in rivulus embryos, which involves quantifying changes in color of phenol red dye in response to production of acid, which results from CO2 respired by embryos. Using spectrophotometry, we will quantify rates of acid production - an indirect measure of total metabolic rate - of rivulus embryos laid by mothers with or without food restriction. We also will quantify maternal reproductive investment by measuring embryonic fat and protein content. Because maternal fasting may reduce reproductive investment and thereby slow development, we hypothesize embryos of fasted mothers will have decreased metabolism compared to control. Given the extensive conservation of vertebrate stress responses and development, this research could provide new insights into physiological consequences of food limitation.

Ashley Seiss, English
Faculty Mentor: Kathy Wetzel, Education - Special Education and Multiple Abilities
**Perceived Effectiveness of a Gifted Summer Enrichment Program**
For years, scholars, parents, and others have debated over the need for summer enrichment programs for students in primary education. For example, studies have found that most students lose about two months of grade level equivalency in mathematics over the summer months (National Summer Learning Association). Gifted and talented students are some of the best and brightest, and the summer vacation period can be the source of boredom and frustration for many of these students. The University of Alabama's College of Education's program for the exceptionally gifted has created the Summer Enrichment Workshop (SEW). This program provides three weeks of opportunity for educational enrichment in areas of interest that are chosen by the student. This research study provides insight on summer enrichment programs throughout the United States with a focus on the SEW and the influence it has on the Tuscaloosa gifted community.

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Kendyl Shelton, Capstone College of Nursing
Elizabeth Williams, Capstone College of Nursing
Melissa Clark, Capstone College of Nursing
Caroline Langly, Capstone College of Nursing
Kelsey Childress, Capstone College of Nursing
Ballie Hooten, Capstone College of Nursing
Brandyn Dupree, Capstone College of Nursing
Allison Beckworth, Capstone College of Nursing

Faculty Mentor: Julie Jones, Capstone College of Nursing

Incentives for Spirometry

Purpose: This clinical project is designed to improve communication between nursing staff and administration. Documentation of patients receiving education and implementation of incentive spirometry post-op day one is lacking. Documentation needs to improve to ensure practice is consistent with hospital policy and government guidelines. Problem: Documentation about teaching patients the process and purpose of incentive spirometry is lacking which reveals unsatisfactory percentages of implementation upon chart review. Nurses lack knowledge of chart location and content to be documented. Review of Relevant Clinical Practice Guidelines: Hospital policy states incentive spirometer is used 10 times every two hours while awake; government guidelines state it is used 10 times every one to two hours while awake. Hospital policy says the ball is to be held steady for 3 seconds; government guidelines state 5 seconds. Both policies lack standardized documentation guidelines for patient education or implementation. Intervention: A staff meeting discussing patient education documentation of incentive spirometry post-op will occur. Staff will revise hospital policy regarding the intervention. Outcome: Patient education on incentive spirometry documentation will improve from a previous score of 29.41% to 70% or higher within one month, equaling or surpassing a satisfactory score. The staff meeting and policy adjustment will lead to better documentation, reflecting what is being done.

Michael Shook, Biological Sciences
Faculty Mentor: Stevan Marcus, Biological Sciences

The Role of Two Rab7 Homologues in the Avicin Response in Fission Yeast

The electrophilic triterpenoid, avicin G, has been shown to be a potent tumor inhibitory compound. Previous work has demonstrated its ability to induce multi-septated cells and necrotic cell death in fission yeast. Cells that show avicin-induced necrosis undergo an invariant response in which vacuole integrity is lost, the cytosol is acidified, the mitochondrial tubular network is disrupted, and finally, high levels of reactive species are produced. Surviving cells invariably are able to maintain the integrity of their vacuoles. Prior to necrosis, large-scale fusion of vacuoles can be observed, which is immediately followed by a loss of vacuole integrity. In fission yeast, vacuole morphology is mediated by two Rab7 homologs, Ypt7 and Ypt71, that act antagonistically to regulate vacuole morphology. In ypt7Δ cells, vacuoles appear smaller and fragmented while in ypt71Δ cells, vacuoles appear to be larger. ypt7 has been shown to bind to two subunits of the HOPS complex and mediate both endosome-vacuole fusion and vacuole-vacuole fusion. Here, we begin to investigate the role of the Rab7 homologs in the avicin response in fission yeast.

Grace Silverstein, Mechanical Engineering
Faculty Mentor: Alexey Volkov, Mechanical Engineering

Numerical Modeling of Laser-Induced Plasma Plume Expansion

When a high-power laser irradiates a target, part of the target material is removed in the process called laser ablation. The ablation products expand away from the target and form a plume flow. Ionization...
effects in the laser-induced plumes are important for laser-based materials processing. In particular, the ionized plumes can efficiently absorb incident laser radiation, decreasing the amount of energy absorbed directly by the target, reducing the target temperature, and decreasing the amount of ablated material. This shielding effect of the plasma plume substantially limits the overall efficiency of industrial laser systems. The goals of the project are to develop a C++ code for modeling laser plasma plume expansion and shielding based on the numerical solution of one-dimensional equations of gas dynamics and to use the code to study the degree of plasma shielding in the high-power laser ablation of copper. The code is based on the existing thermal model of laser ablation of silicon and gas dynamic model of neutral vapor plume expansion. First, an equilibrium plasma model based on Saha-Langmuir equations was implemented and tested, agreeing with literature data. The non-equilibrium model of ionization based on kinetic rates for a number of ionization and recombination processes in copper vapor is in progress. The two ionization models will be compared with each other in order to reveal the effects of kinetics of ionization and recombination in laser-induced plasma plumes.

Lakeisha Skinner, History
Faculty Mentor: Jenny Shaw, History
*Laws Concerning Indentured Servants and Slaves in Virginia: Bacon’s Rebellion and the Development of Racial Slavery by Means of Christian Baptism, 1660-1723*
Bacon’s Rebellion was an uprising comprised of white servants and African slaves led by wealthy planter, Nathaniel Bacon. Virginian elites saw it as problematic because his following of white servants and African slaves were a united front. After the rebellion, laws were passed that would cripple this unity and create discontent amongst the servants and slaves; these laws were viewed as more harsh in its punishments. Many historians have agreed that Bacon’s Rebellion was the turning point of the laws changing for servants and slaves. What some historians have neglected to do is provide more concrete sources of evidence, or documented laws/acts, to correlate laws being rewritten as consequences of the rebellion. A close reading of the laws surrounding pre-rebellion and post-rebellion was conducted to identify the following correlations: Slave codes and servant laws of the 1660s-1670s demonstrated a slide into racial divides that were already well on its way before the rebellion. The rebellion accelerated the process; scholars view it as a watershed movement that caused changes/revisions to laws pertaining to servants and slaves. The rebellion brought an awareness of the unity of slaves and servants that would threaten the livelihood of colonial elites. Racialized slavery was fully enforced after the rebellion. Colonial elites used religion and racism to divide slaves and servants to prevent an interracial unity between them, clearly defined in statutes of 1705 and 1723.

Megan Smith, Political Science
Faculty Mentor: Stacy Hughey-Surman, Education - Educational Studies in Psychology, Research Methodology and Counseling
*Modern Segregation Academies: Myth or Reality? Understanding Racial Composition of Private Schools in the Alabama Black Belt*
This study examines the relationship between race and private schools in Alabama’s seventeen Black Belt counties. More specifically, this study aims to delve into the historical development of "segregation academies" in these areas, and determine the extent to which a correlated racial identity persists. The term "segregation academy" was coined in the heart of the Civil Rights era. In 1971, according to Gloria Ladson-Billings (2004), "about half a million white children" attended private schools in the South. These private schools began to emerge following the Brown v. Board decision, eventually creating enclaves of "racially isolated, White monocultural" schools (Ladson-Billings). In the two years immediately following the passage of the Civil Rights Act, "fifty-five private school foundations were incorporated in the state.

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of Mississippi... by 1970 that number had grown to 158" (Private School Movement in Mississippi, 167). In a demographic analysis of reasonably integrated school systems, this study aims to identify the point at which a full movement toward school integration occurred, and under which circumstances. In the reverse, this study also identifies communities where very little integration has occurred, and explains those influencing factors in terms of history, culture, and legal mechanisms.

**Sydney Smith**, Political Science  
Faculty Mentor: Dana Patton, Political Science  
**Social Security - A timely change for an aging policy**  
This project will explore American social security, the ideas of privatization, age and tax rate increases, and the overall relationship between social security requirements and payout as related to the changing standard of living and expected life span increases since the policy's initial implementation in 1935. The original New Deal and social security implementation policy was written eighty years ago for a different America and a different citizenry, and it now has an integral need to be revised for modernity and efficiency. Add to this the fact that by 2033 the amount of revenue entering the program will only cover seventy-five percent of the expenditure, and this policy suddenly possesses the utmost need to enact a timely change and for politicians to stop shying away from difficult decisions.

**Sydney Smith**, Economics, Finance and Legal Studies  
**Jordan Sandy**, Economics, Finance and Legal Studies  
**Abigail Ratliff**, Management and Marketing  
**Dana Sweeney**, English  
Faculty Mentor: Andrew Dewar, New College  
**Creative Campus Sustainability Initiative**  
In a region of the country where environmentalism has traditionally been under-explored, Creative Campus is committed to taking bold steps to raise awareness for and act as a model for sustainability on the UA campus. With the intention of further leveraging our unique capacity to connect campus, community and culture, we have sizably reduced our environmental footprint, and are proud to support UA's aim to be a nationally significant innovator and leader in sustainability. Our presentation will outline Creative Campus's mission, methods, and the current year's projects and how they fit in to our sustainability initiative as well as how they can affect the greater UA community.

**Haley Smith**, Communication Studies  
Faculty Mentor: Meredith Bagley, Communication Studies  
**Analysis of "Travelin' Soldier" Through Narrative Criticism**  
Music, by design, is created to relate to its audience. However, through careful analysis, patterns within lyrics reveal surprising ways that relate to audiences. In 2002, the Dixie Chicks released the song "Travelin' Soldier." Through the method of Narrative Criticism I examined this song to explore how it pursues its objective. Through the narrative elements key events, time sequence, causal relationship, and unified subject, I was able to determine how effectively the song created a narrative the audience could connect to in order to heal from loss. This song introduces unique characters, notable themes, and a progressive sequence of events.

**Grant Smith**, Chemical and Biological Engineering  
**Nick Van Otterloo**, Biological Sciences  
Faculty Mentor: Stephen Secor, Biological Sciences  
**Diverging Allometries in the Skeletal Mass of Sexually Dimorphic Snakes**

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Organ size and mass tend to increase isometrically with body size: a ten-fold increase in body mass is matched with a ten-fold increase in the mass of each organ. However, animals that exhibit distinct differences in body shape between adult males and females would predictably experience different growth patterns of the skeleton. We explored this prediction by analyzing the relationships between body size and skeletal mass separately for male and female diamondback water snakes and the Burmese python. Both snakes are sexually dimorphic as adults, with females reaching three times the mass of males and as adults having a broader body than males. Skeletons, cleaned by a dermestid beetle colony, were weighted and compared to the snake’s original body mass. For males of both species, the mass of the skeleton increased linearly with body mass, whereas for females of both species the relationship was curvilinear. This difference extended to an analysis of the logged body mass and skeleton mass. Skeletal mass of males scaled isometrically (slopes not different than 1.0) with body mass as scaling exponents (slopes) were significantly less than 1.0. In summary, the skeletal mass of males increases in proportion to body mass, whereas after a certain size, female skeletons do not keep up with the relative change in body mass.

Connor Smith, Electrical and Computer Engineering  
Faculty Mentor: Susan Burkett, Electrical and Computer Engineering  
**Solder Based Self Assembly Method For 3D Integration Using Polyacrylic Acid**  
The use of Solder Based Self Assembly (SBSA) in fabricating 3D structures on the microscopic scale is a process with numerous potential applications. This method involves creating copper plated 2D flat patterns of various shapes on a silicon substrate. Then, upon dip soldering these patterns and reflowing the solder with hydrochloric acid, surface tension pulls up on these shapes to form a 3D structure. However, the use of a SiO2 sacrificial layer in performing this method results in the need for hydrofluoric acid (HF) during the etching phases, which has many dangerous hazards associated with it. The goal of this research is to develop a new process in which a water-soluble polymer, polyacrylic acid (PAA), may be used as a sacrificial layer instead of SiO2--thus making the micro-fabrication process much safer. By working through the original SBSA method, and overcoming the various obstacles created by needing to protect the PAA from being exposed to water earlier than desired, an effective procedure is to be developed. Through completing this project, future attempts to fabricate microscopic 3D structures using the SBSA method will be safer and less prone to dangerous HF exposure. Furthermore, removing HF etching from the procedure will reduce the time required to move through the process as a whole, thus increasing its efficiency.

Sara Smith, Capstone College of Nursing  
Jordan Yazbec, Capstone College of Nursing  
Brittney Pruitt, Capstone College of Nursing  
Meredith Kocan, Capstone College of Nursing  
Shelby Dowdy, Capstone College of Nursing  
Kayla Wilson, Capstone College of Nursing  
Rachel Litke, Capstone College of Nursing  
Bailey Newby, Capstone College of Nursing  
Faculty Mentor: Heather Reeves, Capstone College of Nursing  
**Can lack of nutritional intake affect hospital revenue?**  
Quality nutrition in a hospital setting is essential in the overall health of patients. Patients lacking adequate nutrition can lead to an increased length of stay, increasing the financial responsibility of the hospital. The dilemma observed at the facility was that many patients were malnourished due to lack of attention by hospital staff. The hospital policies state that it is the initial responsibility of the RN to...
ensure that the patients’ dietary intake is adequate and beneficial to the patient. After conducting interviews with an RN, the nurse manager, and the RD manager, we concluded that there is much deviation from the hospital policy. The RNs stated that they stray from the nursing standard policy because of understaffing, a high patient to nurse ratio, patients requiring more intensive care, and less assistance from licensed practical nurses (LPN) and PCTs. Improved communication between staff would assure each patient received adequate care concerning nutrition. Suggested interventions include: enforcing documentation of the percentage of each meal eaten including additional notes with eating patterns, adding a nutrition section to the patient's board in each room that includes intake and output, formal staff education on computer documentation, and including the percentage eaten on the patient's intake and output record in the computer. Using these interventions, these dilemmas could be resolved, and this facility's policy could mimic evidence-based guidelines.

Aubrey Smith, School of Social Work
Erika Rogers, School of Social Work
Sara Langley, School of Social Work
Jonathan Harrell, School of Social Work
Sonya Barnes, School of Social Work
Erin Delaney, School of Social Work
Alexa Argianas, School of Social Work
Ashley Gullap, School of Social Work
Faculty Mentor: Kevin Corcoran, School of Social Work
"Starts With Me": Breaking Stereotypes with the Next Generation

We are Team Change Agents, we have invented "Starts With Me", which are playing cards to addresses the issues of racism, sexism and classism. The objective is to introduce and reinforce the importance of children who are between the ages of five to eight to successfully eliminate stereotypes. "Starts With Me" is full developed for demonstration and we shall include a research proposal using a 2 x 2 randomized controlled trail to determine if "Starts With Me" changes the way children interpret or believe racial, gender, and class stereotypes.

Moriah Smoot, Metallurgical and Materials Engineering
Ana Diniz, Metallurgical and Materials Engineering
Duarte Belem, Metallurgical and Materials Engineering
Faculty Mentor: Subhadra Gupta, Metallurgical and Materials Engineering
Optimization of Co/Pd Multilayers Patterning by Block Copolymer Templating

A statistical Design of Experiments was carried out on the nanopatterning of Co/Pd multilayers using block copolymer templating and ion milling. The multilayers were patterned into well-defined 30 nm nanopillars. The effect of varying ion mill beam voltage and etch angle on the coercivity of the resulting nanopillars was studied by response surface methodology. The results indicated that an etch angle of between 50° and 60° was optimal for yielding coercivity greater than 3.5 kOe, starting with a full-film coercivity of 1.5 kOe. A further study of coercivity versus etching time was conducted, resulting in a maximum coercivity of 6.6 kOe. Vacuum annealing of the ion-milled nanopillars were found to yield a significant increase in coercivity, indicating reversal of ion irradiation damage.

Sam Stanley, Biological Sciences
Bryan Martinez, Biological Sciences
Faculty Mentor: Kim Caldwell and Guy Caldwell, Biological Sciences
Investigation of dopamine neuron degeneration as a consequence of microbiome-derived bacteria

*The information presented here is intended to represent exactly what was submitted by the student. Errors can occur in the transfer process.*
Within the human digestive tract, thousands of bacterial species comprise the microbiome, an ecological environment that contributes to the health and longevity of the host organism. While most bacteria within the microbiome beneficially interact with the host, pathogenic bacteria can invade the gut and produce byproducts that damage intestinal cells. The ability of humans to resist pathogenic colonization is dependent on the robustness of the microbiome as well as the adaptive and innate immune systems of the intestine. Although effective immune responses can neutralize pathogens, chronic responses can contribute to disease. For instance, Parkinson’s disease (PD) associated with midbrain dopamine neuron degeneration has been linked with microbiome-changes and chronic intestinal inflammation, sometimes years before clinical symptoms appear. Of the two classical human immune responses, the innate responses that alter cell-stress tolerance are highly conserved across species. The model organism C. elegans has evolved to ingest nutritious bacteria while avoiding pathogenic bacteria. We investigated the relationship between bacterial influences upon the innate immune pathways of this nematode with the sensitivity of its dopaminergic neurons to stress. This research has the potential to uncover novel interactions between bacteria and the innate immune system of C. elegans, and potentially aids our understanding of the gene-by-environment intersection underlying the onset of PD.

**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. Dating violence usually occurs in bi-directional or mutually violent relationships with female-perpetrated violence being more widely accepted or justified. College students in violent dating relationships also tend to be more accepting of dating violence than those who are not a part of violent relationships. The purpose of this project was to determine the link between involvement in IPV and the perceived acceptability of dating violence behaviors by both male and female students. Surveys on dating violence perpetration and victimization as well as attitudes toward dating violence were distributed to 568 undergraduate students in introductory human development classes. Results indicated that male students had more accepting attitudes toward dating violence than did female students. In addition, students with a perpetration history along with students with a history of being part of a mutually violent relationship had more accepting attitudes than those with a victimization history and those with no history of dating violence.

**Elan Strange**, Biological Sciences
Faculty Mentor: Stevan Marcus, Biological Sciences

*Phosphatidylethanolamine is essential for cytoprotective responses to the anticancer triterpenoid avicin G in the fission yeast, Schizosaccharomyces pombe*
Avicin G is a plant-derived triterpenoid glycoside that exhibits selective cytotoxicity toward a broad range of human cancer cells. We have shown previously that avicin G induces asymmetric cell death in the fission yeast Schizosaccharomyces pombe. Previous research conducted in our lab shows that avicin G-induced necrosis in S. pombe is associated with vacuole fusion and subsequent loss of vacuole integrity, production of reactive oxygen species, and loss of mitochondrial integrity. Here we show that S. pombe cells rendered deficient in phosphatidylethanolamine (PE) by virtue of deletion of the three phosphatidylserine (PS) decarboxylase genes are hypersensitive to avicin G. In comparison to wild type, psdΔ cells are deficient in the ability to localize sterols to cell tips in response to avicin G. In addition, while psdΔ cells exhibit loss of vacuole integrity and undergo necrotic cell death in response to avicin G, they undergo necrosis without detectable vacuole fusion. Interestingly, ethanolamine, which is utilized...
by the Kennedy Pathway to synthesize PE independently of PS decarboxylases, not only rescues the avicin G hypersensitive phenotype of psdΔ cells but strongly suppresses avicin G induced growth inhibitory effects in both these and wild type S. pombe cells. Our findings demonstrate that PE plays an essential role in the cytoprotective response to avicin G in S. pombe and suggest that the Kennedy Pathway contributes to cytoprotection against the toxin.

**Sarah Strickland**, Communicative Disorders
Faculty Mentor: Angela Barber, Communicative Disorders

*Autism Study*

Background This study aims to measure and compare rural and urban caregivers’ baseline knowledge of ASD and child development in order to develop resources that match level of need. One in 68 children in the U.S. has autism (CDC, 2014). Though, only 1 in 175 children were identified with autism in Alabama, representing the lowest prevalence among the 14 states surveyed and suggesting a disparity in early identification. This discrepancy is most likely a result of the large number of rural counties (82%; AHRA, 2003) in Alabama. Methods Rural primary caregivers of children under 6 years of age living in rural areas were invited to complete a short survey. Participants are recruited through local community events. Results Recruitment is ongoing, but preliminary analyses reveal that rural caregivers demonstrate higher knowledge of general child development relative to autism. Nineteen percent of rural caregivers described autism characteristics in terms of diagnostic criteria. Using qualitative and quantitative data, we will discuss the process and goals relative to surveying rural caregivers as these relate to the larger goal of examining and addressing disparity. Conclusions This study is an important first step to better understand how parents living in rural communities understand and access information related to autism. This information is important so researchers can tailor intervention materials for families living in underserved communities.

**Renee Stullich**, Chemistry

**Adam Shipley**, Chemistry

Faculty Mentor: Kevin Shaughnessy, Chemistry

*Novel air-stable palladium precatalysts and their reactivity in the Suzuki-Miyaura Reaction*

The palladium catalyzed Suzuki-Miyaura reaction is widely used in academia and industrial processes for the production of new materials such as pharmaceutical drugs. Commonly used catalyst systems for the Suzuki-Miyaura reaction are prepared in situ and require the use of air-sensitive trialkylphosphine ligands. In addition to air-sensitivity, trialkylphosphine ligated palladium catalysts prepared in situ do not permit control of the palladium to ligand ratio. Therefore, the development of preformed air-stable palladium precatalysts containing trialkylphosphine ligands is of high interest. Previous research has shown that neopentylphosphines are useful ligands for palladium catalyzed cross-couplings due to favorable steric and electronic properties. In particular, in situ catalysts prepared using di-tert-butylneopentlyphosphine (DTBNpP) and trineopentlyphosphine (TNpP) are effective for Suzuki couplings. Two air-stable, mono-ligated palladium dimer complexes [(DTBNpP)PdCl2]2 and [(TNpP)PdCl2]2 were prepared for potential use as precatalysts for cross-coupling reactions. The palladium complexes are effective precatalysts for the Suzuki cross couplings of a variety of substrates under mild reaction conditions with comparable yields and higher reaction rates than the catalyst prepared in situ.

**Ashley Sutton**, Civil, Construction and Environmental Engineering

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

*Evaluation of the Autoclaved Concrete Prism Test in Determining Aggregate Reactivity*

*The information presented here is intended to represent exactly what was submitted by the student. Errors can occur in the transfer process.*
The research, conducted in the past year, has been to evaluate a new, quicker and more accurate test for detecting alkali-silica reaction (ASR) in concrete. ASR is a reaction which occurs over time in concrete between alkalis in the cement paste and reactive silica from aggregates. When this chemical reaction occurs, it produces an expansive gel that causes permeant structural damage and reduces service life of the structure. The two most common tests to detect ASR are the mortar bar test (ASTM C1260) and the concrete prism test (ASTM C1293). The mortar bar test can be completed in sixteen days, but results can be misleading. The concrete prism test requires one to two years to complete, which is why most construction companies prefer not to use it. The approach to solve this problem is to evaluate the autoclaved concrete prism test (ACPT). This test only takes four days to complete. In this test, three concrete prisms are conditioned in an autoclave for twenty-four hours, and then taken out for expansion measurements. The concrete prisms are cut into small squares and inspected for any reaction product using an electron probe micro-analyzer. The autoclave water is analyzed to help determine the existence of alkali leaching, which is a problem with the concrete prism test. At present, there is less alkali leaching from this test than the concrete prism test.

Abbey Tadros, Biological Sciences
Samantha Dyroff, Chemistry
Katie Kuykendall, Chemistry
Rachel Honan, Chemistry
Faculty Mentor: John Vincent, Chemistry
Trivalent chromium has no effect on delaying azoxymethane-induced colorectal cancer in FVB/NJ mice
As Cr(III) compounds have been shown to increase insulin sensitivity and decrease plasma cholesterol and triglycerides in rodent models of diabetes and insulin resistance and as colorectal cancer risk has been associated with insulin resistance and diabetes, the effects of the Cr(III) compound Cr₃((Cr₃O(O₂CCH₂CH₃)₆(H₂O)₃)⁺) was investigated in male and female FVB/NJ mice with azoxymethane-induced colorectal cancer. In contrast to a previous study on the effects of Cr₃ on 1,2-dimethylhydrazine-induced colorectal cancer in Sprague Dawley rats, no effects of Cr₃ at daily doses of 1 mg and 10 mg Cr/kg body mass were observed, leaving in question whether administration of Cr(III) compounds can delay or prevent the onset of colorectal cancer.

Qamar Tejani, Chemistry
Kieran Bhattacharya, Chemistry
Faculty Mentor: Shalini Pan, Chemistry
Photoelectrochemical reduction using CuBi₂O₄
For over a decade, copper oxides (CuO and Cu₂O) have been utilized as p-type semi-conductor oxides for solar water splitting. Very recently, an FTO CuO | CuBi₂O₄ | Pt electrode was produced, which yielded a significantly improved photocurrent compared to the FTO CuO | Pt or FTO CuBi₂O₄ | Pt electrodes alone. While the original photoelectrode was formed on FTO slides using the dropcast method, the parameters of this research also included application by spin-coating and on ITO slides. Moreover, concentrations and layers on slides were varied to observe differences in morphology and photocurrent efficiency. Ultimately, ITO and FTO electrodes showed similar efficiency, with photocurrency decreasing with additional layering.

Leigh Terry, Political Science
Faculty Mentor: Douglas Gibler, Political Science
Intradispute Bargaining in Militarized Interstate Disputes
*International focus

*The information presented here is intended to represent exactly what was submitted by the student. Errors can occur in the transfer process.
Both policymakers and scholars care greatly about military bargaining between leaders, but no large-scale date resource exists to adequately test theories on bargaining and dispute resolution. This project is focused on collecting, coding, and analyzing incident-level data for all Militarized Interstate Disputes (MIDs) from 1816 to 2001. A Militarized Interstate Dispute is a combination of military actions involving explicit threats, displays, or uses of force by one system member state towards another system member state over the same issue. The current MID data includes the start and end dates, highest hostility and fatality levels, and the final outcomes and settlements. There is no data on the evolution of conflict within the dispute, when fatalities occurred or what actions each combatant took. This project extends that effort down to the incident level, improves the data, and makes the data compatible with the temporal domains of almost all studies of conflict.

**Elena Thompson**, Capstone College of Nursing  
Faculty Mentor: Alan Blum, Community Health Sciences  
*The Role of Schools and Universities in Addressing the Obesity Crisis: An Examination of Contradictions*  
Over the last 30 years, the percentage of obese children 6-11 has doubled from 7% to 18%, and the percentage of obese adolescents 12-19 has quadrupled from 5% to 21%. Many etiological factors have been cited. The role of schools (K-12) has been studied extensively in efforts to reduce obesity, but the role of universities in curbing obesity has been insufficiently examined. In the mid-1980s, cigarette manufacturers began acquiring food product companies to create the appearance of diversification, prompting one author (AB) to collect articles and advertisements from the lay press, marketing trade press, and public health journals on aspects of these companies' food marketing as well as on childhood obesity, nutrition, and physical activity. We reviewed the collection and recent publications in public health literature. Despite schools introducing more stringent nutrition standards, contradictions remain, most notably the decline in physical education and the marketing and sale of non-nutritious food products at school. Children are being targeted at school no less than at supermarkets and by TV food and beverage advertisements. Similarly, universities have ubiquitous vending machines and primarily fast food dining options while claiming to promote healthy lifestyles on campus. Schools and universities do not appear to be playing a significant role in countering childhood and adolescent obesity. Although universities study the problem, few findings have been put into practice.

**Barbara Thornton**, Capstone College of Nursing  
**Emma-Caitlin Pitts**, Capstone College of Nursing  
**Katie Meredith**, Capstone College of Nursing  
**Kristina Collins**, Capstone College of Nursing  
**Ashley Mixson**, Capstone College of Nursing  
**Virginia Farlow**, Capstone College of Nursing  
**Lauren Higginbotham**, Capstone College of Nursing  
**Staci Shea**, Capstone College of Nursing  
Faculty Mentor: Stephanie Ragland, Capstone College of Nursing  
*When It Bleeds It Pours*  
Administration of pharmacological VTE prophylaxis post-cardiac procedures varies from nurse to nurse in a medical facility. VTE prophylaxis standard of practice has not been implemented for this facility, and consequently there is a breach in communication of this unwritten protocol and it creates a significant concern for patient safety. A variance in any standard of practice presents a potentially fatal issue, and in this case, this issue is one that can easily be fixed through the development and effective communication of a written protocol. The data from this study was collected through interviews using a mixed-method approach. Nurses interviewed had experience that ranged from newly hired to working

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on the floor for over thirty years. The results revealed many different responses from over 24 nurses, which showed us that there is in fact much confusion with this standard of practice. In order to alleviate this issue, we propose interventions of listing the date and time of previous cardiac procedures on a patient’s Kardex paperwork and a pop-up notification on each patient’s E-MAR. Proven from a past incident where a patient was put in a life-threatening situation and required extra hospital stay, patient safety is at risk due to this general lack of education and communication. Patient safety, which is every nurse’s number one priority, can be improved through effective communication and interventions.

Elizabeth Tillotson, Mechanical Engineering
Faculty Mentor: Marcus Ashford, Mechanical Engineering

Accuracy of Automotive Sensing
Costly research equipment is detrimental to lab productivity. Generally, there are multiple specification levels for the accuracy of a given type of instrument. The cost of research-grade sensors often far exceeds that of production level sensors found in automobiles. The assumption has always been that research equipment is much more accurate. Has anyone ever tested this expectation? In recent years, the efficiency requirements of automobiles has risen; therefore, the accuracy of sensors probably has improved as well. We are going compare a consumer grade mass air flow sensor ($250) to a laminar flow element ($5000) and compare a pressure-sensing glow plug ($100) to an in-cylinder pressure transducer ($5000). Our equipment has been purchased and we are in the initial stages of this project.

Samantha Tilson, Chemical and Biological Engineering
Faculty Mentor: Yonghyun (John) Kim, Chemical and Biological Engineering

The Effect of Y-27632 on the Propagation of Glioblastoma Stem Cells
Glioblastoma is the deadliest form of brain cancer. Patients diagnosed with glioblastoma have poor prognosis; their median survival rate is approximately one year. Recent research shows evidence for a specialized subpopulation of glioblastoma cells called glioblastoma stem cells (GSCs). GSCs have the ability to self renew and differentiate into the heterogeneous cells that constitute the entire tumor. GSCs are thought to be resistant to current treatment techniques such as chemotherapy and radiation. Thus, the study of GSCs is an area of extreme interest in current glioblastoma research; however, very few GSCs exist in glioblastoma cell lines grown in conventional in vitro conditions. When glioblastoma cells are grown in serum-free media, they form tumorspheres that imitate the in vivo tumor niche and are enriched for GSCs. We have shown that the addition of the Rho-Kinase (ROCK) inhibitor Y-27632 to serum-free, GSC media increases the total number of cells and the number of GSCs that can be grown in vitro. Our data showed that supplementing the GSC media with Y-27632 inhibits apoptosis. Furthermore, we demonstrated that Y-27632 positively affects the cells’ ability to form tumorspheres and increases the expression of known stem cell markers using various molecular and cell biology techniques. Our data therefore showed that Y-27632 has an overall positive effect on tumorsphere formation and is poised to have a promising application for cancer stem cell culture in the future.

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Anne Townsend, Capstone College of Nursing
Maela Lanier, Capstone College of Nursing
Haley Davenport, Capstone College of Nursing
Erin Thompson, Capstone College of Nursing
Jane Anne Elliott, Capstone College of Nursing
Jordan Kabase, Capstone College of Nursing
Anna English, Capstone College of Nursing
Faculty Mentor: Michele Montgomery, Capstone College of Nursing

Welcome to Nutritional Education 101
Health promotion is an important aspect to address in all communities around the world. It is evident that there is a lack of nutritional education in many rural communities surrounding Tuscaloosa. This deficit in education leads to many chronic illnesses and poor health decisions that could be prevented by simple interventions. The purpose of our project was to assess Lakeview, Alabama through windshield surveys, observations, and interviews with members of the community to collect information and implement an intervention that would benefit them. It is apparent that there is a lack of health care providers and access to major grocery stores in this community. We focused our intervention on teaching the members of the community about good nutritional habits and healthy eating to improve their overall health status.

Bailey Trott, Health Science
Andrew Starkey, Health Science
Faculty Mentor: Lori Turner, Health Science

PRIDE of Tuscaloosa
Title: PRIDE of Tuscaloosa Background/Problem: The use of alcohol, drugs, and tobacco is higher in the city of Tuscaloosa than the state and national average. In the city of Tuscaloosa, the average age of students who first use of alcohol is 11.3 years old, tobacco 11.5 years old, and marijuana 12.2 years old. Along with this, nearly 45 percent of students report that their teachers never talk with them about the importance of not using drugs and alcohol
Purpose: The mission of PRIDE of Tuscaloosa is to create awareness and strive to reduce substance abuse in Tuscaloosa.
Methods: PRIDE has several different programs and activities they use to help live out their mission. They provide prevention education at seminars and events throughout the community. They also provide mentor programs through school activities, and speak in local schools about the importance of making good choices. PRIDE is a drug and alcohol education resource for parents, students, and community members in Tuscaloosa.
Results/Discussion: PRIDE programs have been proven very successful nationwide. Results of the PRIDE programs are measured through PRIDE surveys that are administered in both Tuscaloosa County and City schools. These surveys measure prevalence, age of onset, and perception of drug and alcohol use among peers and can be compared with other PRIDE surveys throughout the nation online.
Recommendations: The PRIDE programs face many challenges, but most of the barriers they face stem from a lack

Lynda Truong, Chemistry
Faculty Mentor: Stephen Woski, Chemistry

Investigation of Cyanocarbazole Derivatives 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 novel 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.

Alexis Vaughn, General Studies in HES
Faculty Mentor: Lori Turner, Health Science
The University of Alabama Beautiful Health Program
Abstract for UA Beautiful Health Title: The University of Alabama Beautiful Health Program Problem: To improve the mental, physical, social and spiritual health of 7th and 8th grade girls at Davis Emerson Middle School by focusing on enhancing self-esteem and body image. Methods: Activities were conducted to cover self-esteem, body image and other related issues. Activities were designed to be fun and engaging and to assist in creating an open environment for girls to share concerns and challenges. One example of an activity was conducted on the week of Valentine’s Day—a “speed dating” lecture. In this activity the girls went from desk to desk and we informed them about qualities of a healthy relationship, and obtained their feedback. Results/Discussion: Activities have been received with positive attitudes and comments. They enjoy individual attention and caring. One challenge is keeping their attention when lecture is conducted. Interactive activities appear to be better received than lecture. Recommendations: This program appears to be well received. Fun activities should definitely continue to take place to increase involvement. Instead of having a lecture about "nutrition" or "physical exercise" providing activities seems to be preferred. Plans for this program include providing pre and post surveys to measure program success.

Adrika Venkatanarayanan, Metallurgical and Materials Engineering
Faculty Mentor: Nitin Chopra, Metallurgical and Materials Engineering
Stimuli-Responsive Hydrogels with Nanoscale Heterostructures
Development of multifunctional hydrogels for controlled release is critical for designing programmable delivery devices. We report a surfactant-free approach to fabricate carbon nanotubes (CNTs) decorated with one or more kinds of noble metal nanoparticles. These heterostructures were embedded in a temperature-responsive poly N-isopropylacrylamide (NIPAAm) hydrogel. These nanocomposites hydrogels could swell and shrink under light illumination due to optical to thermal energy conversion and generating temperature gradients between ~3.2 × 10^{-3} and 3.8 × 10^{-3} °C/s. Controlled delivery of model molecules in optical cycles followed by a burst release under a temperature cycle was demonstrated. Such nanocomposite hydrogels represents a truly multifunctional controlled release system activated by multiple triggers and compatible with physiological conditions. The use of low-energy light illumination as a trigger mechanism makes this a safe delivery approach.

Emily Vork, Religious Studies
Faculty Mentor: Merinda Simmons, Religious Studies
Authenticity and Nostalgia in Historical Scholarship
This project examines the role(s) played by nostalgia in historical scholarship on antebellum plantation slavery. The research explores how different groups use the rhetoric of authenticity to present their narratives as historically accurate. By analyzing the scholarship of such historians as Eugene Genovese, Albert J. Raboteau, and John Blassingame, I argue that the nostalgic lens through which the "Old South" is viewed perpetuates the romantic myth that slavery and myths of this "Old South" can be separated

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from one another. Ultimately, this projects aims to question "authenticity" in historical scholarship by analyzing the individual narratives that are put forth as "true" by historians.

**Caitlin Wall**, Consumer Sciences  
**Sarah Kidwell**, Consumer Sciences  
Faculty Mentor: Shinae Choi, Consumer Sciences  
*Examining the Need of Financial Counseling for Undergraduate Students at the University of Alabama*  
Financial literacy is a growing concern for our nation. Financial counseling is one solution for the low financial knowledge in college age, young adults. Guided by prior literature, we designed an online survey investigating the financial knowledge, attitudes, and practices of undergraduate students to analyze the need for financial education and counseling at the University of Alabama. We seek to discover if the varying levels of financial knowledge students have, how financial knowledge is related to their use of and desire for financial counseling, what their attitudes are towards seeking financial counseling services, and what types of financial counseling services students would be willing to use if available on campus. This topic is significant because of a lack of financial education in many high schools and we are interested in identifying if it continues into the college environment. After reviewing the resources the university currently provides, we believe additional measures need to be taken to ensure that all students are receiving the best education possible. Data collection is underway through recruitment of participants through venues on campus. This research project will examine what other researchers have found on the topic and compare and contrast the best methods for our own initiative here at the University of Alabama. Results will be used to better understand students' financial wellness as well as the need and demand for financial counseling on campus.

**Kelly Ward**, Journalism  
Faculty Mentor: Kim Bissell, Journalism  
*Gender in Sports Media: A Look into How the Media Covers Injuries in Male and Female Athletes*  
When Paul George broke his leg playing in basketball's World Cup, the coverage was nonstop. When Alex Morgan of the U.S. Women's National Team sprained her ankle, the coverage was smaller. These were two different injuries, but they are representative of how the media covers men and women and their injuries. This study looks at four and a half years of data from Jan. 1, 2010 to June 30, 2014 from four media outlets (ESPN, Sportsillustrated, AL.com and The Tuscaloosa News) to determine which sport is covered most with injuries, what injuries are being reported and what gender these athletes are. The research uses the programming language Python to sort through stories and determine these aspects among others like word count on the stories and outlet. The study also looks at how the coverage has changed over time and breaks down differences by the years and months.

**Simoen Tere Warren**, Clothing, Textiles and Interior Design  
Faculty Mentor: Kristin Maki, Clothing, Textiles and Interior Design  
*International focus*  
With the increased significance of the Chinese-American economic business exchange, this research focuses on the re-examination of the design for the Chinese Embassy currently located in Washington DC. The current Embassy building is located on Embassy Row in northwest Washington, DC. The building features traditional philosophies of Chinese architecture with the mixture of the modern. Built by the American born Chinese architect, I.M. Pei, the building is designed with more modern influences and less Chinese culture making it insensitive to the Chinese nationals who are visiting this building. Being a place of business exchange and representative landmark of the Chinese culture within the United States,
the embassy's overall visual cultural, and emotional aesthetic is important. I propose based on research a new embassy location, such as San Francisco, built and designed with a more sensitive approach to Chinese culture will give the People's Republic of China a more prideful standing in the United States. My goal is to give the embassy visual and emotional value using elements important to Chinese culture. These cultural elements include the use of feng shui, which will involve furniture layout and orientation, color choice and other creative design features, such as artwork and the materials used.

Hashulu Watson, Political Science
Charlotte Givhan, Molly O'Keefe
Faculty Mentor: Dana Patton, Political Science

Influence of Coolness and Social Goals on Classroom Support, Engagement, and Belonging
This study examined associations among coolness, social goals, classroom support, academic engagement, and school belonging across the sixth grade school year. Research has primarily studied coolness and social goals separately, and in relation to social adjustment, rather than academic, during adolescence. Students reported coolness, social goals, classroom support, academic engagement, and school belonging in the fall and spring of sixth grade (N=347; 49% females) from three middle schools. Coolness and goals in the fall were expected to have unique, interactive associations with later adjustment, and gender was expected to moderate associations. Predictive hierarchical regression analyses supported hypotheses. Results indicated coolness and goals influenced subsequent adjustment after controlling for gender, prior adjustment, academic efficacy, and social efficacy. Gender moderated the association of dominance goals and academic engagement, with girls who had a low endorsement of dominance goals in the fall reporting lower levels of involved behavior and higher levels of disruptive behavior in the spring. Popularity goals moderated the association of coolness in student support and school belonging, with cool adolescents who had a low endorsement of popularity goals in the fall reporting higher levels of subsequent student support and belonging. Implications regarding research on coolness, goals, and school functioning in the first year of middle school will be discussed.

Kolton Weems, Psychology
Emily Ingram, Psychology
Faculty Mentor: Jeffrey Parker, Psychology

Probing the cues for outcrossing in the mangrove rivulus (Kryptolebias marmoratus)
The mangrove rivulus fish, Kryptolebias marmoratus, is one of two self-fertilizing, hermaphroditic vertebrates. Many generations of self-fertilization produces individuals with complete homozygosity at all genetic loci. The presence of heterozygous fish in the wild indicates that outcrossing between hermaphrodites and males occurs but the mechanism that promotes outcrossing remains elusive. Outcrossing can only occur if hermaphrodites forego selfing to lay unfertilized eggs. We are pursuing a reliable method of stimulating unfertilized egg production, thereby probing the mechanisms that might trigger outcrossing between hermaphrodites and males. We hypothesize that visual and chemical cues from a male will induce the production of unfertilized eggs by hermaphrodites. We built partitioned tanks to compare unfertilized egg yield between hermaphrodites housed in the presence or absence of a male. We employed three treatment groups: isolated hermaphrodites or hermaphrodites paired with males or other hermaphrodites. Our long-term goal is to perform crosses between homozygous lineages that differ dramatically in phenotypic characteristics such as behavior, reproduction, and growth rates. Outcrossing will allow us to generate a wide variety of genotypes, giving us unprecedented insights into the genetic underpinnings of phenotypic variation. Considering the wide conservation of gene function among vertebrates, we could translate these findings to other vertebrate species.

Leah Wilkes, Human Nutrition and Hospitality Management
Bridgett Howell, Human Nutrition and Hospitality Management
Abigail Tankersley, Human Nutrition and Hospitality Management
Sarah Monroe, Human Nutrition and Hospitality Management
Faculty Mentor: Lori Greene, Human Nutrition and Hospitality Management

The Negative Impacts of the Consumption of Processed Foods in Low-Income Children: A Review

Topic: Research has shown a correlation between high consumption of processed foods and low consumption of "whole foods" in low-income children. Both processed food consumption and a lack of whole food consumption can contribute to poor health outcomes, including childhood obesity, which is very prevalent in the low-income populations. Specific Question: In low-income children and adolescents, what is the prevalence of processed food versus whole food consumption? How can this affect child health? Method: Ten peer-reviewed journals were selected from PubMed and Scout and analyzed to determine the association of consumption of processed foods and consumption of whole foods to low-income children/adolescents and the effects that these foods may have on child health. Results: There is a correlation between high processed food consumption and low whole food consumption among children and adolescents in low-income areas. Consumption of processed foods is associated with higher net total energy intake and poorer diet quality. This can also affect the amount of "fresh" foods that low-income children are consuming, like fruits and vegetables. Foods that have been heavily processed tend to be higher in calories, sodium, and fat than whole foods. Conclusions: Many children in low-income areas are consuming on average more fast foods and less fresh foods; it can negatively impact not only the child's weight, leading to obesity, but also overall health and cognitive function.

Kindle Williams, Chemical and Biological Engineering
Faculty Mentor: Stephen Woski, Chemistry

Synthesis of Molecular Electronic Components for Self-Assembly onto Metal Electrodes

Molecular electronics encompasses the synthesis and study of single-molecule electronic devices. Such devices could prove smaller and more efficient than their silicon-based analogs. Our present goal is to design and synthesize a carbon-based molecular diode. Current work centers on molecules bearing an electron-rich dimethoxybenzene donor ring and an electron-poor quinone acceptor ring separated by a single bond. We have successfully synthesized a template molecule, dibromohemibiquinone - which can

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then be converted to aminohemibiquinone - that will allow for substitution of functional groups at its attachment sites. The purpose of such groups is bonding to metal electrode surfaces. Through deprotonation and acylation at the amino site of aminohemibiquinone, attachment groups may be added to the hemibiquinone framework. Some particularly useful groups for bonding to metal surfaces are nitriles and thiols. A benzoyl nitrile moiety has been incorporated. In order to append a thiol group, we have prepared 4,4'-dithiodibenzoic acid. Transformation of the acid into the acid chloride then allows for acylation of aminohemibiquinone. Once this substitution is completed, surface studies will be conducted in order to determine the geometry of a self-assembled monolayer on a gold surface. The diode's purpose is to allow unidirectional electron flow between two surfaces via attachment to each.

Alexis Williams, Computer Science
Faculty Mentor: Laura Myers, Computer Science

Improving Weather Warning Communication for the Public

The purpose of this project is to assess the public's perception, preparation, and understanding of the information disseminated by meteorologists, first responders, emergency managers, and government agencies during a severe weather event. During a severe weather event, the population that is impacted by the event can be divided into three groups: individuals that are weather aware; individuals who want to attain weather warning information, but they do not have the opportunity or possess the resources to obtain the information; and individuals who are not concerned about the weather event and react as needed to the event. The approach to studying the communication process between the weather enterprise and their audiences involved conducting several surveys and interviews after the following events: April 27th tornado, 2011 Alabama and Mississippi tornadoes, Birmingham, Alabama and Atlanta, Georgia 2014 Snow Events, 2014 Texas Hail Storm, and the 2013 Moore, Oklahoma tornadoes, which provided both quantitative and qualitative results. The results from the assessments revealed several major findings that have provided insight to weather professionals, emergency managers, first responders, and city officials regarding the public's behavior during a severe weather event. After the identification of the major findings that impact the communication process during an event, the results were used to train leaders within the weather community who disseminate information.

Regina Williams, School of Social Work
Faculty Mentor: Javonda Williams, School of Social Work

Caring for the Elderly: Comparing the quality of care between nursing homes and residential homes.

Considerate care for our elderly population is at an all-time high. The research project I have chosen to discuss will evaluate and compare the quality of care between nursing homes and residential home care for the elderly population. This research will include the initial monitoring of residents with diseases and beneficial drug use, as well as the quality of care within the residents living quarters.

Regina Williams, School of Social Work
Jenna Corley, School of Social Work
Jessica Perkins, School of Social Work
Heather Bryant, School of Social Work
Shellie Parrish, School of Social Work
Susan Slay, School of Social Work
Jonta Moore, School of Social Work
Faculty Mentor: Kevin Corcoran, School of Social Work

"Love Cub: Maintaining family bonds in the midst of temporary separation"

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We are Team Brainstormers and we invented the Love Cub to reduce separation anxiety while maintaining family bonds. The product is a stuffed animal with a simple voice recording mechanism for parents to record a simple phrase to comfort the child during temporary separation. The Love Cub is fully developed for demonstration and we shall include a research proposal using a 2 X 2 randomized controlled trial to determine if Love Cub enhance interaction and attachment when families are separated temporarily.

**Erica Willis**, Capstone College of Nursing  
**Emily Fields**, Capstone College of Nursing  
**Lindsay Henderson**, Capstone College of Nursing  
**Reagan Isbell**, Capstone College of Nursing  
**Samantha Vuckovich**, Capstone College of Nursing  
**Bekah Wilson**, Capstone College of Nursing  
**Amber McDonald**, Capstone College of Nursing  

Faculty Mentor: Michelle Montgomery, Capstone College of Nursing

**Nutritional Education in Samantha, Alabama**

Nutritional habits are formed in early childhood and foreshadow a person's longevity and health status for years to come. Parents have the biggest influence on these habits as children continue to grow. Unfortunately, in rural areas access to healthy foods is often limited. There is often a lack of grocery stores which leaves rural populations with processed foods as the only available option. Healthy foods for children often come in the form of meals provided by schools. The community of Samantha, Alabama experiences problems many rural areas face. This presentation will demonstrate ways to educate parents and children of Samantha, Alabama on the importance of nutrition through educating families on healthy eating habits.

**Lauren Wood**, Computer Science  

Faculty Mentor: Steve Burdette, Computer Science

**Inspection Into the Effectiveness of Graduated Licenses**

The purpose of this project is to assess the effectiveness of Alabama's graduated license system, as well as the most hazardous times and locations for drivers aged sixteen to twenty-five with particular attention paid to the most common factors of the crashes. The graduated license system includes teenagers aged fifteen to seventeen with each stage containing safety restrictions in an attempt to give young drivers experience with driving in a reduced danger environment. The proceeding age group of eighteen to twenty-five is of similar interest as it can be an indication of whether the drivers who participate in the graduated license program emerge as safer drivers. The approach to studying the success of staging license privileges utilized the integrated crash test data from the years 2004 to 2013 that cataloged driver data, the conditions of the crash, and the specific time and location. The results from analysis revealed information will provide data to traffic officers and legislative figures that pertains to the relative hazard level of young drivers. This information will be useful to driver education programs and future legislation as it pertains to licenses issued to youths.

**Charles Wood**, Consumer Sciences  

Faculty Mentor: Kyoung Tae Kim, Consumer Sciences

**Which households seek comprehensive financial advice?**

The financial planning industry is a diverse set of professionals assisting clients with financial decisions. For the last two decades, the use of comprehensive financial planners has increased steadily. This study analyzes the demand for financial advice and financial behaviors associated with households seeking...

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comprehensive financial advice. We include nationally representative samples (N=6,015) from the 2013 Survey of Consumer Finances (SCF) to examine the most recent trends and outcomes. The dependent variable is comprehensive financial planning advice defined as advice pertaining to both saving/investment decisions and credit/borrowing decisions. Further, six different financial behaviors are tested as key independent variables. The 2013 SCF shows that about 11% of households used a comprehensive financial planner. 14% sought a financial planner only for saving/investment decisions while only 4% used for credit/borrowing decisions. Otherwise, 71% did not use a financial planner. Our means test indicates that the likelihood of using a comprehensive financial planner is strongly related to six financial behaviors. Households with equity (17%), stock investment (20%), saver (14%), homeowners (13%), self-employment (15%) and IRA holders (21%) are more likely to seek a comprehensive financial planner compared to reference groups. This study provides important insights for researchers, as well as financial practitioners.

**Ariel Worthy**, Journalism  
Faculty Mentor: George Daniels, Journalism  
*Black Men: A Dire Need in Education*

The percentage of black men in education is a small one: two percent. Central Elementary School principal Dr. Monte Linebarger, first grade teacher Taril Slater, and UA student and aspiring Principal Tyler Merriweather share their beliefs and goals of being black men in education. The need for black men in education is dire, especially in communities that are led by mostly single-parent households. These three men's goals are to see their students reach their full potential and not become products of their environments. Linebarger's motivation for teaching his students is to keep them off the front page of the newspaper and in the library. He also believes that a better solution for dealing with difficult students is to talk to them, rather than suspending them. Slater's motivation for teaching his students is watching the progress and growth he has seen in them. He believes that despite the difficulties of being black man in a woman-dominated workforce, seeing his children gain from his teachings keep him moving forward. Merriweather, who was once a member of the Boys & Girls Club of West Alabama and now works there, remembers the inspiration that having a black male teacher had on him and wants to be the same type of motivation and image for his students. These men all have the same goal: to be the inspiration and motivation needed for their students so that they can become the greatest they can ever be.

**Ellie Wortman**, Capstone College of Nursing  
**Lindsey Patterson**, Capstone College of Nursing  
**Lane Balzli**, Capstone College of Nursing  
**Anna Cassels**, Capstone College of Nursing  
**Emily Trentacoste**, Capstone College of Nursing  
**Brianna Wolfe**, Capstone College of Nursing  
**Andie Wolfe**, Capstone College of Nursing  
Faculty Mentor: Paige Johnson, Capstone College of Nursing  
*Windham Springs Disaster Preparedness*

Windham Springs is a rural Alabama community located in Tuscaloosa County. Upon reviewing available information on the community of Windham Springs, it was discovered that the community possesses higher than normal rates for natural disasters, namely tornadoes. Upon assessment of the community, it is believed that Windham Springs may benefit from disaster preparedness training and information in the event of a tornado or other natural disaster. This presentation will illustrate the assessment of currently in-place disaster preparation systems and evacuation plans, and an assessment of the

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community's ability to manage a disaster, should one occur. Our presentation also serves to educate on actions and programs that healthcare professions may be able to implement in order to best prepare individuals within the community for emergency situations.

**Hannah Wright,** New College

**Julie Gyurgyik,** New College

Faculty Mentor: Michael Steinberg, New College

*Avian Diversity and Suburban Forests*

Forest fragmentation and associated edge effects have resulted in population declines for many avian species, especially Neotropical migrants. The ecological impacts of edge effects are especially important in suburban areas, limiting the breeding success of many bird species. However, other studies have found that suburban/urban woodlots can provide important habitat for birds in areas where natural forests have largely been cleared. This study sampled bird diversity and numbers in a suburban 20-acre forested lot during late winter and spring in Tuscaloosa, Alabama. The forest's structure ranged from ornamental shrubs to mature loblolly pine (Pinus taeda), magnolia (Magnolia grandiflora) and beech (Fagus grandifolia). Like most suburban forests, invasive species made up a significant portion of shrubs and ground cover. When compared to less forested suburban habitats, the wooded lot supported larger numbers of both species and individuals. These species ranged from Neotropical migrant songbirds to birds of prey. Therefore, we conclude that while edge effects might be amplified in suburban woodlots, these forests still provide important habitat (i.e. feeding opportunities) for a range of avian species.

**Amber Wright,** Psychology

Faculty Mentor: Tricia Witte, Human Development and Family Studies

*Why do We Stigmatize Substance Users?*

Stigma occurs when one is disqualified from social acceptance due to specific attributes or negative characteristics. Stigma toward substance users can have a serious, wide-spread impact on their ability to obtain a job, form social relationships, and participate in the social arena. The goal of the present study is to determine specific factors that may contribute to “enacted stigma,” which is discrimination based on membership in a stigmatized group. Six pairs of vignettes will be used to test the influence of 6 variables on the level of stigma toward substance users: voluntary vs. involuntary initiation of the substance use; severity of consequences related to the substance use; medical origin of symptoms; types of behaviors used to support drug habit; acknowledgement of the problem vs. denial; and relapse tendency. A randomized set of 3 vignettes will be distributed to 600 undergraduate students in a classroom setting. Participants will read each vignette and then answer questions about the character in the vignette. Stigmatizing attitudes will be measured and compared across each vignette pair to determine the degree to which each variable influences stigma toward substance users.

**Jeffrey Wysong,** Mathematics

Faculty Mentor: Glenn Richey, Management and Marketing

*Supply Chain Transparency/Big Data*

For our research, we studied supply chain transparency and big data. For the former, a supply chain is the steps to get goods from suppliers to the consumer. The transparency of a supply chain described by factors such as the visibility of activities in each of the supply chain stages, traceability of the history of products, and communication with and between stakeholders. There are ample reasons to care about supply chain transparency such as relationships between organizations, sustainability and reverse logistics, and ethics. The research then focused towards creating a survey that companies could take that would describe how transparent they are based off a set of questions. The questions were decided from

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analysis of previously published articles related to supply chain and then condensed to a smaller set of questioned for the final survey. For the second part of the research, we focused on Big Data. Big Data is considered to be unstructured data that is generated in real time and which surpasses the capacity of existing infrastructure and data management systems. Big Data is expected to make supply chain activities more efficient and help reduce managers for supply chain managers. Thus, the main purpose of this Big Data research is to measure how supply chain managers manage and use this Big Data through the use of a survey.

Samuel Yang, Geography
Faculty Mentor: Anne Williamson, Political Science
The Impact of Board Governance on State Housing Finance Agency Policy Responses
Housing policy in urban areas can shape the lives of low-income residents, especially in the areas of implementing and using federal mandates and resources. Dr. Anne Williamson previously investigated and established the relationship between the professional orientation of board members and state housing finance agencies. The project, done as part of her Public Service Research Team, continues to examine this by breaking down the makeup and performance of boards and agencies in terms of community revitalization and "Extremely Low Income" populations. This poster focuses on a case study analysis I performed comparing creativity and usefulness of selection criteria to agency board composition in four different states, as well as showing preliminary findings on quantitative performance data and providing background information on the impact these findings could have on our understanding of urban housing policy.

Spencer Yeamans, Political Science
Alexandra Bushelli, Political Science
Sarah Sheahan, Political Science
Faculty Mentor: Dana Patton, Political Science
Gender Gap in Opinions on Same-Sex Relationship Rights
In recent years, the debate over same-sex relationships and the rights associated with them has risen to prominence throughout the United States. As the conversation rages on, political scientists have theorized about elements that contribute to the varying opinions held on this polarizing issue. Researchers are quick to cite political affiliation, race, age, location, exposure, religious connections, or any number of other factors as important indicators of individual’s beliefs and views on same-sex relationships and the rights of the individuals in them; one often overlooked dynamic is a person’s gender. We conduct a survey to answer this question. We hypothesize that women will have more positive views of same-sex relationships and the rights associated with them. Additionally, we predict that female same-sex relationships and their rights will be viewed more positively than male same-sex relationships and their respective rights.

Shuwen Yue, Chemical and Biological Engineering
Faculty Mentor: David Dixon, Chemistry
Theoretical Study of Ligand Steric Effects in Homogeneous Catalysis
Metal-catalyzed reactions are the workhorse synthetic methods for modern chemists in both academic and industrial labs. These reactions provide general methods for bond formation under mild conditions with high levels of chemo-, regio-, and stereo-control. With the movement towards sustainable processes in industry, the use of catalysis will increase. Despite the power of these methods, there remain significant unmet challenges in the scope and efficiency of these processes. We are developing a fundamental understanding of the roles of ligand properties on catalyst activity, selectivity, and lifetime
in palladium and other metal catalyzed cross-coupling reactions. A high level computational chemistry approach is being used to develop an improved understanding of the role of ligand steric and electronic properties on homogeneous catalyst activity. Bond dissociation energies collected for various conformations of alkylphosphine ligands show the effect of such flexibilities on the catalyst system. In addition, homolytic dissociation of palladium catalyst complexes is preferred dominant over heterolytic dissociation. Computational results are being correlated with experimental studies of ligand effects on individual catalytic steps as well as overall catalytic processes.

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