



10th Annual Phi Kappa Phi Student Research and Fine Arts Conference

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The Student Research and Fine Arts Conference is an opportunity for all students at Augusta State University, regardless of discipline, to showcase their scholarly and artistic endeavors. In a double-blind review process, participating students were competitively selected from previously submitted abstracts of their proposed conference projects. The proposed project may have been presented elsewhere or be expected to be presented elsewhere, and it must be endorsed by a full-time Augusta State University faculty member. The conference is open to all undergraduate and graduate students. Students and faculty sponsors are not required to be members of Phi Kappa Phi. This is the first year that the research will be judged.



Abstract Reviewers

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Dr. Tom Crute, Chemistry and Physics
Dr. Brandon Cromer, Biology
Dr. Trinanjan Datta, Chemistry and Physics
Dr. Kim Davies, Sociology
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Moderators

Dr. Tom Colbert, Chemistry and Physics
Dr. Brandon Cromer, Biology
Dr. Tom Crute, Chemistry and Physics

Dr. Trinanjan Datta, Chemistry and Physics
Ms. Fay Verburg, Library
Dr. Sudha Ratan, Political Science

The planning committee would like to thank the following for their creative support:

Professor Richard Davis and the following COMP 4500 students for all publications:
Katie L. Atkinson, Melissa M. Brown, Staci R. Cooper, Thomas O. Cooper, K. Blake Davis,
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Professor Kathleen Trigg for assistance with award certificates.

The National Honor Society of Phi Kappa Phi

Established in 1897, the Honor Society of Phi Kappa Phi is a century-old non-profit organization that recognizes and promotes academic excellence in all disciplines of higher education.

The Society was founded to cultivate a deep appreciation and respect for scholarship and is convinced that in recognizing and honoring those persons of good character who have excelled in scholarship, in whatever field, it will stimulate others to strive for excellence.

With more than one million members from across the globe and 282 chapters located on university campuses throughout the United States, Puerto Rico, and the Philippines, Phi Kappa Phi is among the oldest and most respected academic honor societies.

Students elected to membership in Phi Kappa Phi include the upper 7.5 percent of last-term juniors and the upper 10 percent of seniors, along with outstanding graduate students, faculty, and alumni.



Schedule

Plenary

“The Legacy and Where It Has Led Us”
Mark Swanson, Renee Toole, and Adam Doss
10:30 a.m.- 12 p.m. University Hall, Room 170

Opening Remarks and Performance

12:30 p.m.
JSAC 1st floor breezeway

Musical performance from “Oklahoma!”

Directed by Professor Patricia Meyers
ASU Department of Music

Poster Displays

12:00 - 2:30 p.m.
JSAC 2nd floor breezeway

Panel Session I

1:00 - 2:15 p.m.

Biology: In the lab or the field
JSAC- Hardy Room

Science: History, teaching, and research
JSAC- Butler Room

Relations: International, internal, and interpersonal
Reese Library- 2nd Floor

A fictional window into the reality of Afghan politics
JSAC- Coffeehouse

Panel Session II

2:30 - 3:45 p.m.

Synthesis in chemistry and physics
JSAC- Hardy Room

Physics: Observations, simulations, and equations
JSAC- Butler Room

Heroes/Heroines
Reese Library- 2nd Floor

At the Movies
JSAC- Skinner Room



Abstracts



Session I

Biology: In the lab or the field

Reproduction of the Red Claw Crayfish in captivity

Student: Allison Poindexter, Melinda LeCount, and Lewis Boykin, *Biology*

Faculty Sponsor: Bruce Saul, *Biology*

C*herax quadricarinatus* is native to the tropical region of northern Australia and the southeastern area of Papua New Guinea. This crayfish is a relatively large crayfish growing to the weight of two to four ounces. They are blue and exhibit lobster like characteristics. The purpose of our research is to learn the most effective way to successfully breed the red claw crayfish so that the information can be used for commercial and restaurant industries. Harvesting the crayfish is a cheaper alternative than harvesting lobsters. We introduced male and female crayfish of various ages and sizes in ten 30 or 50 gallon aquaria. Various pairings were tried with the males and females to induce breeding behavior. For optimal breeding conditions we adjusted the temperature of the water to 82°F and fed them various diets. Some eggs have been produced, but they did not hatch. Our results have shown that temperature plays a crucial role in red claw crayfish breeding and in the aggression of this species. When a male and female were double housed at a temperature of 82°F, they showed no signs of aggression. The males showed signs of aggression and injured the females when the temperature dropped below 79°F.

Effect of pH on biosynthesis of prodigiosin by Serratia marcescens

Student: Brian Lumpkin, *Biology*

Faculty Sponsor: William Wellnitz, *Biology*

Bacteria are among the most diverse and widespread organisms, adapting to practically all environments. While all bacteria share many similarities, there are some characteristics that are unique to particular species of bacteria. The bacterium *Serratia marcescens* occurs in the natural environment in soil, water and other surfaces. It is recognized by the red pigment, prodigiosin, which it produces at room temperature. This pigment has garnered interest due to its potential uses in the field of medicine. Prodigiosin's production can be altered by outside influences other than temperature such as the medium in which the bacteria is grown and the availability of oxygen. In this research project, the effect of pH on prodigiosin's production was studied during the three main phases of bacterial. The results demonstrate that the pH does effect prodigiosin's production, and that the effects depend upon the stage of growth during which the pH is altered.



Motion of a magnetotactic bacteria

Student: Timothy Kurtz, *Biology*

Faculty Sponsor: Trinanjan Datta, *Chemistry and Physics*

We investigate the motion of magnetotactic bacteria in the presence of an external magnetic field. We explore the cases when the net torque acting on the bacteria is both zero and non-zero. Using Mathematica, we perform numerical simulations of the model bacteria system to investigate the various types of motion. In the absence of an external torque we find that the system can exhibit both a synchronous and an asynchronous motion. In the presence of a net external torque the system can exhibit oscillatory motion



Session I

Science: History, teaching, and research

Alchemy's advancement into chemistry

Student: John Matthew Perkins, *History and Anthropology*

Faculty Sponsor: Wendy Turner, *History*

Alchemy slowly developed into modern chemistry with assistance from forward thinkers and new technology. I examine what forces conspired to assist with alchemy's transformation. The field of alchemy benefited from advancements in scientific thought as well as new technologies developed for other purposes. The advances in scientific thought include: replacing reasoning with experimentation, only accepting empirical data, and the formalization of the scientific method. The development and use of the printing press was, perhaps, the single greatest technological advancement that furthered the development of modern chemistry. My hypothesis is that alchemy did not develop in a cultural or technological vacuum, but many outside factors contributed directly or indirectly to its advancement.

Electrophilic halogenation of sulfanilamide in the organic teaching laboratory

Students: Akshita Parikh, Van Beaty, Leila Borders, and Aiko Bradford, *Chemistry and Physics*; Scarlett Timmons, *Biology*

Faculty Sponsor: Chad E. Stephens, *Chemistry and Physics*

As sulfanilamide is a compound with biological implications interesting to students and is inexpensive, it is potentially a good starting material for an organic chemistry teaching laboratory. Our research attempted to create a halogenation experiment that would be time efficient and allow students to obtain good yields for analysis. Using various reagents, we dihalogenated sulfanilamide with chlorine, bromine, and iodine. Reaction with N-chlorosuccinimide (NCS) in acetic acid provided the best dichlorination yield in the most efficient time, while reaction with hydrogen bromide and hydrogen peroxide provided the best yield for dibromination. For diiodination, the combination of sodium chloride, potassium iodide, and sodium iodate in aqueous acetic acid provided the best yield. For analysis, ^1H and ^{13}C NMR were performed, which showed that each product was symmetrical. Furthermore, estimation of ^{13}C NMR peak positions using substituent shift constants allowed for a confident assignment of those signals, but has not allowed for a definitive assignment of structure. Based on these results, the three halogenation experiments will be conducted by the Organic II students this semester, and the results of these "in the field" trials will be reported as part of this presentation.



Synthesis of the thiophene analogue of a potent antiprotozoal agent

Student: Mary Kate Fisher, *Biology*

Faculty Sponsor: Chad E. Stephens, *Chemistry and Physics*

Reversed diamidines are currently under development for treatment of many protozoal diseases, including Leishmaniasis. The reversed diamidine, DB766, contains O-isopropyl groups adjacent to the central furan ring and previous research has found that this compound shows the most promising activity against the Leishmania parasite. From this, we became interested in whether the efficacy against Leishmania could be improved by substituting the central oxygen of the furan ring of DB766 with sulfur to produce the thiophene. To test this, we undertook the synthesis of the thiophene analogue. To begin, we alkylated 2-bromo-5-nitrophenol with 2-iodopropane, and then the resulting isopropyl ether was subjected to a Stille coupling with 2,5-bis(trimethylstannyl)thiophene to yield 2,5-bis(2-isopropoxy-4-nitrophenyl)thiophene. We then performed a reduction of the nitro groups using SnCl₂ to give the diamine, which was then reacted with a thioimidate compound to yield the targeted thiophene analogue. At this point, we then prepared the HCl salt of our product. IR, NMR, and TLC showed the purity at each step in the synthesis, and elemental analysis confirmed that our synthesis was successful. Currently, our product is being evaluated in an animal model for Leishmania by collaborators.

Graph theory, topology, and the million dollar question

Student: Tony Zamberlan, *Mathematics and Computer Science*

Faculty Sponsor: Cornelius Stallman, *Mathematics and Computer Science*

In mathematics we often find ourselves asking the following: When are two spaces (roughly defined to be a set with some structure) essentially the same? For instance given a circle and a triangle, a geometer would point out several differences while a topologist might note that you could stretch the triangle (without breaking it) until it became a circle. The general strategy for attacking this question is to check if certain structural properties are shared/not shared by the spaces. Results stem from research conducted at the University of Tennessee in Knoxville. Techniques and concepts span several mathematical disciplines, including graph theory, topology, algebra, and combinatorics. While these topics are relatively advanced, they are not requisite to understanding, and the overwhelming majority of the presentation is accessible to those with a minimal background in mathematics. This will culminate with a fascinating connection to one of the six still unsolved Millennium Problems.



Session I

Relations: International, internal, and interpersonal

Venezuela's international relations

Student: Jorge Virguez, *Political Science, English, and Foreign Language*

Faculty Sponsor: Jana Sandarg, *English and Foreign Language*

Since my field of study is both Political Science and Spanish, I have combined both areas of interest to examine Venezuela and its dealings with international relations. Venezuela has a controversial leader in President Hugo Chavez, who has been known for his flamboyant personality, remarks and ideology. I am interested in examining Chavez's relationships with other nation-states. Specifically, I focus on his anti-western stance and deteriorating relationship with the United States, and his bonding with other anti-western countries such as Iran, Syria, China, and Cuba. Similarly, I also want to examine Chavez's relationship with other Latin America countries and his wish to unify Latin America by eliminating the presence of the West

U.S.-Mexico relations: Implications of the policy on drugs

Student: Stephanie N. Coleman, *Public Administration*

Faculty Sponsor: Sandra Reinke, *Public Administration*

The drug industry has been a constant source of controversy since the medical profession deemed drugs addictive in nature and unsafe for society nearly a century ago. The regulation of drug use through the Harrison Act of 1914 slowly resulted in the United States prohibiting the use, production and distribution of drugs entirely. Furthermore, the ever-changing drug policy within the United States has far-reaching effects on the economy, law enforcement agencies and day-to-day activities of Mexico. Since the United States placed this ban on the drug industry, the Mexican government has faced increasing pressure to enforce their northern neighbor's anti-drug laws. The impacts have been paramount for Mexico. Corruption and lucrative illegal drug networks have flourished, even in the face of heightened law enforcement strategies within Mexico. The illicit drug industry and the policies that shape it are far from settled, while the relationship between Mexico and the United States is continuing to change in order to adapt.



Life after “War is Hell”: PTSD in Civil War veterans

Student: Travis L. Wagner, *History, Anthropology, and Philosophy*

Faculty Sponsor: Wayne Mixon, *History, Anthropology, and Philosophy*

Post-Traumatic Stress Disorder (PTSD) is a psychological disorder that became familiar to Americans in the late 1960’s with the return of Vietnam veterans to the home front. While PTSD is a common diagnosis for troops in today’s wars, it is an anachronism in terms of the American Civil War; however, there have been a variety of studies in both history and psychology that have attempted to apply the current disease to the soldiers and veterans of this 19th century war. Many of these scholars argue that while PTSD did not exist in a clinical sense, it was still mirrored in a variety of other Civil War era “diseases.” Therefore, I will focus on three factors in order to explain the heightened sense of trauma, which Civil War soldiers and veterans felt: The strong sense of guilt that many soldiers felt while killing, the inadequate care of 19th century medicine, and abandonment by families of veterans. I propose that these three factors, more than the actual trauma of war itself, provided a catalyst for the persistence of stress disorders in Civil War veterans.

Race and body image effects on perceptions of attractiveness

Students: Amanda D. Khidirov, Dustin Allen, Brooke Johnson, *Psychology*

Faculty Sponsor: Georgina Hammock, *Psychology*

The effects of body image and race on perceptions of attractiveness were examined. Twenty-eight Caucasian and 29 African American participants rated their own body image and then evaluated the attractiveness of Caucasian and African American target pictures. Our hypothesis that subjects with a low body image would rate target attractiveness higher than those with a high body image was unsupported; that this relationship would interact with race was also unsupported. We found that participants rated the same race targets more attractive than different race targets. Also, that subjects with a low body image rated Black women as more attractive than white women, a result unreported in prior literature. Results imply an in-group bias with race, and support that persons’ self-perceptions affect their perceptions of others.



The quilt code: Fact or fiction?

Student: Robin Scharff, History, *Anthropology and Philosophy*

Faculty Sponsor: Ruth Estella McClelland-Nugent, *History, Anthropology, and Philosophy*

Basically, folklore about slaves and/or abolitionists using quilts to send coded messages to escaping slaves has been around since before the Civil War. That premise got a huge boost from the 1999 book *Hidden in Plain View*. My presentation focuses on the research or, more appropriately, the lack of research by the book's authors and the scholarly arguments against their findings.



Session I

A fictional window into the reality of Afghan politics

The role of external powers in Afghan politics

Student: Scott Baskin, *Political Science*
Faculty Sponsor: Sudha Ratan, *Political Science*

I am examining external powers and their role in Afghan politics using Khaled Hosseini's *A Thousand Splendid Suns*. Throughout the novel, there are several instances which illustrate how Afghans are being affected by these external powers. Early in the novel, we see that Afghanistan is far from perfect, but is at a sort of equilibrium until it becomes the victim of external powers at work. The stress of a Soviet-backed communist regime coming to power keeps most of the populace terrified and trapped in their homes, never straying from within earshot of the family radio. This same regime tears educated professionals from their jobs, and forces them to perform manual labor. The presentation will discuss the novel's ability to paint a vivid picture of how much damage can be inflicted upon a populace, both physically and emotionally, by the intrusion of external powers.

Afghanistan as failed state in Hosseini's A Thousand Splendid Suns

Student: Chris Harrison, *Political Science*
Faculty Sponsor: Sudha Ratan, *Political Science*

I have chosen to examine Afghanistan as a failed state using Khalad Hosseini's novel *A Thousand Splendid Suns*. My hypothesis is that the harshness of Afghan culture has been created, over time, by the lack of cohesive governmental organization which has plagued the region for centuries. The lack of a structure to arbitrate disputes peacefully (a stable, functioning government) has rewarded strength and viciousness, allowing the strong and vicious to maintain rapacious regimes until someone more brutal displaces them. To explain this position I will provide a brief overview of Afghan history, culminating in an examination of the period between the Russian incursion into Afghanistan and the rise of the Taliban in the 1990s, the period in which Hosseini's novel is set, using characters from that novel, and their experiences, as anecdotal "snapshots" to represent those in Afghanistan at the time who were disadvantaged by the chaos. This will be accompanied by comments that the Afghans' inexperience with stable government should inform NATO's nation building policy in the state.



The role of tribal leadership in Hosseini's A Thousand Splendid Suns

Student: Adam C. Mestres, *Political Science*
Faculty Sponsor: Sudha Ratan, *Political Science*

Ixamine tribal leadership and its role in Afghan politics using Khaled Hosseini's *A Thousand Splendid Suns*. Hosseini's novel centers on the lives of two women born nineteen years apart and living in two different cities in Afghanistan. The book spans the period between 1974 and 2003 and provides a window into the lives of these women as Afghanistan goes through dramatic political changes. With the downfall of the Soviet Union in April of 1992, the Afghan mujahedeen take full control of the country. The leaders of the five different factions that made up the mujahedeen could not agree on any one way to lead Afghanistan. The fighting that ensued had terrible consequences for the people and in particular the women, and led to the rise of the Taliban. Hosseini's novel provides a way to come to grips with the complexity of Afghan politics.

The role of identity in Hosseini's A Thousand Splendid Suns

Students: Miriam Townsend, *Political Science*
Faculty Sponsor: Sudha Ratan, *Political Science*

Iam examining the ethnic identities and impact on Afghan politics using Khaled Hosseini's *A Thousand Splendid Suns*. Through two main characters, Hosseini portrays the 1970s Daoud regime and coup right into the 1980s rule by the Soviets and Afghan leader, Najibullah. Laila, one of the two characters, experiences the positive aspects of the freedom of women during the Soviets' rule, while Mariam experiences the harsh traditional response to such freedom of women. Their lives are intertwined as the overthrow of the Soviet rule leads to warfare among the various ethnic groups in Afghanistan—disputes that were put aside in order to unite to overthrow the Soviet rule. With the absence of an outsider, the various factions commence with their own fighting after failing to set up a working government. The entrance of the Taliban radically alters the lives of the Afghan people, as seen through Mariam and Laila. As the book closes, a brief respite of peace is seen as the 21st century warfare is about to begin. Through this novel, we can learn about ethnic identities and their effects on Afghan politics and how to use this knowledge to improve our understanding of policy in Afghanistan.



***Patriarchy and its discontents in
Hosseini's A Thousand Splendid Suns***

Student: Miguel Trujillo, *Political Science*

Faculty Sponsor: Sudha Ratan, *Political
Science*

Although characterized by a long social history of instability, Afghan politics has often been viewed through the narrow window of foreign policy and governmental relations. In Khaled Hosseini's *A Thousand Splendid Suns*, the novelist gives the reader a glimpse of Afghanistan and its political climate from an intimate social perspective. His case study of two women living within the constraints of a patriarchal culture illustrates the enormous impact that internal conflict can have upon the citizenry, both male and female. Hosseini's portrait of the Middle East combines storytelling with history that provokes the reader to consider the singular case of Afghanistan amidst a backdrop of developing nations in the 21st century.



Session II

Synthesis in chemistry and physics

Synthesis of N-substituted analogues of a potent HHV-6 inhibitor

Student: Gary Schwarz, *Biology*

Faculty Sponsor: Chad E. Stephens, *Chemistry and Physics*

Human Herpes Virus 6 (HHV-6) is a member of the β -herpesvirus subfamily and exists as two closely related variants, HHV-6A and HHV-6B. HHV-6 is a DNA virus that infects lymphocytes and monocytes and may persist in various tissues with a low-level of replication. HHV-6 is opportunistic and may significantly infect immunocompromised patients. Research also suggests that this virus may be an underlying cause of many diseases, such as epilepsy, chronic fatigue syndrome, and some cancers. Recently, a benzothiazine S, S-dioxide compound has been shown by us and our collaborators to greatly inhibit HHV-6. The purpose of our research is to synthesize N-substituted analogues of this lead compound for testing in order to identify a more potent inhibitor. Thus far, four new compounds have been synthesized. The first reaction of the synthesis involves the nucleophilic aromatic substitution (NAS) of a fluorine atom with an amine, resulting in an intermediate compound. In the second step, an aldol condensation is performed to produce the final cyclized product. During the aldol reaction, an intramolecular Michael addition also occurs, resulting in ring formation. Once in hand, the final compounds, as well as the intermediate products, will be tested by our collaborators for activity against HHV-6.

Novel tricyclic heterocycles via intramolecular N-arylation of 2-aminopyrroles and -thiophenes

Student: Brandon L. Hammond, *Biology*

Faculty Sponsor: Chad E. Stephens, *Chemistry and Physics*

Novel heterocyclic ring systems are of interest due to their potentially useful biological properties. In our research, we are attempting to prepare some heterocyclic-fused benzo[b]thiazines via an intramolecular N-arylation reaction of 3-(2-bromophenyl)sulfonyl-2-aminopyrroles or thiophenes. In order to cyclize these compounds to the tricyclic ring systems, a variety of catalysts, ligands, solvents, and bases were surveyed in an attempt to discover the optimal conditions. For preparing the tricyclic pyrroles, the optimal conditions include the use of Pd2dba3 as catalyst, butyldi-1-adamantyl-phosphine as ligand, and Cs2CO3 as base in dioxane at 100°C for 2.5 hours. These conditions have resulted in yields ranging from 9 to 25%. For the tricyclic thiophene, the optimal conditions include the use of tri-t-butylphosphonium tetrafluoroborate as ligand, instead of the adamantyl ligand. These conditions resulted in an 11% yield of the tricyclic thiophene. In both cases, it has been found the reaction can be driven by addition of more catalyst and ligand after a certain period of heating. It has also been found that the use of more standard ligands, such as xantphos, do not lead to formation of any product in these reactions. Currently, we are working to develop efficient purification methods for these interesting products.



Synthesis and fluorination of various 1,3,5-triarylpyrazoles

Student: Ronnie Neil Jenkins, Jr., *Chemistry and Physics*

Faculty Sponsor: Chad E. Stephens, *Chemistry and Physics*

Derivatives of pyrazoles have been commercially produced as medicines, pesticides, and dyes. Given such, their synthesis has been of great interest in the chemical community. A particularly attractive substituent to incorporate into organic compounds is fluorine, which has been found to enhance metabolic stability, enhance binding efficacy, and increase adsorption and distribution of pharmaceuticals. As the direct fluorination of pyrazoles has not been reported in the literature, we were interested in attempting this chemistry, but needed to first synthesize the pyrazoles. One of the most common routes to pyrazoles involves the oxidative aromatization of the corresponding pyrazolines (4,5-dihydropyrazoles) using oxidizing reagents or catalysts. A simpler and more environmentally friendly method involves open air heating in a solvent such as dimethyl sulfoxide (DMSO), although this approach has only been tried in a few cases and is not typically mentioned as a useful method. In our research, we have further developed the scope of this simple oxidation, readily obtaining the pyrazoles in yields from 70-85%. From these pyrazoles, we have also successfully synthesized and characterized a series of 1,3,5-triaryl-4-fluoropyrazoles via direct electrophilic fluorination with NFSi (N-fluorobenzenesulfonimide), obtaining yields of 20-29%.

Synthesis of an Al-Ga-In-Sn alloy: An alternative method of generating Hydrogen gas for the operation of a fuel cell

Students: Brandon L. Hammond, *Biology*; Jeremy Robinson, *Chemistry and Physics*

Faculty Sponsor: Hauke Busch, *Chemistry and Physics*

An economically viable process for producing hydrogen on demand has yet to be fully discovered due to the problem of safely storing hydrogen gas. We have conducted experiments using an aluminum-gallium-indium-tin alloy, which when immersed in water, splits water into hydrogen and oxygen. The hydrogen gas generated, after being compressed and stored, was then directed into a hydrogen fuel cell where it was used to operate various electrical applications. The alumina side product of the reaction can then be recycled back into aluminum at almost 100% efficiency. Testing at Purdue University by Professor Jerry Woodall has revealed that this alloy is exceptionally efficient for both hydrogen production and storage. Our research initially consisted of synthesizing this alloy using various ratios of aluminum, gallium, indium, and tin to determine which proportion is most economically and environmentally efficient in regards to the production and storage of hydrogen. Other metals, including antimony and thallium, are also being integrated into the alloy and each mixture has produced a variety of results. After sufficient testing of the various alloys, we plan to use the hydrogen generated to run a small internal combustion engine.



Session II

Physics: Observations, simulations, and equations

Optimized field gradient directions in diffusion tensor imaging

Student: Chris Wright, *Chemistry and Physics*
Faculty Sponsors: Nathan Yanasak, Andy Hauger, *Chemistry and Physics*

Diffusion Tensor Imaging (DTI) is a magnetic resonance imaging (MRI) technique used to characterize properties of the diffusion of water in tissue. Such information is used to detect pathology via microscopic structural changes in tissue, affecting diffusion properties in the case of certain diseases or in highly structured tissue. Using DTI, magnetic field gradients are applied in a large number of directions, allowing for the measurement of diffusion in each of these directions. After imaging, these data are reduced to a diffusion tensor that describes the magnitude and direction of diffusion anisotropy. The directions of the applied magnetic field gradients are typically distributed uniformly over a sphere to avoid introducing bias dependent on the spatial orientation of the tensor. If prior knowledge of a preferred diffusion direction exists, the tensor can be determined more precisely per unit of imaging time by applying gradients non-uniformly. In this study, we quantified this improvement in the tensor precision using simulations. Additionally, we examined the impact of using different gradient strengths.

Hysteresis loop area of the next-nearest neighbor kinetic Ising model

Student: William D. Baez, *Chemistry and Physics*
Faculty Sponsor: Trinanjan Datta, *Chemistry and Physics*

We examine the effects of next-nearest neighbor interactions on the hysteresis loop area of the two-dimensional kinetic Ising model subject to an external, time-dependent, sinusoidal magnetic field through the use of computer simulations. For the nearest neighbor Ising model, the loop area has a known hysteresis dispersion relationship in the low frequency limit. Using the Metropolis algorithm, we investigate the hysteresis dispersion in the low frequency limit for various high and low magnetic fields. We find that the hysteresis dispersion relationship changes when next-nearest neighbor interactions are present.



An experimental setup to verify the catenary equation

Student: James Bartasis, *Chemistry and Physics*

Faculty Sponsors: Trinanjan Datta, Eric Zuckerman, *Chemistry and Physics*

In 1638 Galileo Galilei posed the problem of determining the shape assumed by a uniform and ideal chain or cable hanging under its own weight from two fixed points. He conjectured incorrectly that the shape was a parabola. It was Huygens, who first showed that for the case where the mass of the chain was distributed uniformly the curve is not a parabola, but a catenary. We have designed an experimental set-up to verify the catenary equation using a peg-board, a wooden frame, and a digital camera. We obtain images of the hanging object and digitally process them using a digital filter designed by Williams and Bartasis. The experimental set-up is designed to compensate for non-level surfaces and for visual aberrations created by the digital camera. The mechanical setup is flexible enough to study the catenary equation for various material lengths and depths. Materials used include a string and a chain made out of springs.

Digital filter processor: Detecting objects through hue, saturation, and value

Student: Barry Williams, *Chemistry and Physics*

Faculty Sponsors: Trinanjan Datta, Eric Zuckerman *Chemistry and Physics*

We have designed a Hue Saturation and Value (HSV) algorithm as a digital filter to identify various geometrical shapes and hanging strings by their color. In the algorithm, hue is the raw color value, saturation is the intensity of the color, and the value is the brightness. The algorithm uses the hue to select a color, and then a histogram to count the number of pixels corresponding to the saturation and value of all pixels within that hue to produce a filtered image. Using MATLAB, a computational toolbox for numerical and digital simulation, we implement the above algorithm. The test images used include standard geometrical shapes (square, circle, triangle, and lines), and hanging strings (catenary). The ability to resolve two closely spaced geometrical objects were also carried out using the filter. The algorithm can also be used to filter regular photographs.



Session II

Heroes/Heroines

Performing drag: Reality versus perception

Student: Leah M. Walls, *Anthropology*

Faculty Sponsor: Angela Bratton, *Anthropology and Philosophy*

The purpose of this research study is to highlight the discrepancy between the perceptions of drag queens among the general population and the realities of the drag queen life style. My first objective is to determine opinions about drag queens among the general population of the southeast U.S. I hypothesize that the main influences upon people's perceptions will be religious upbringing, age and ethnicity. My second objective is to determine what cultural and social factors influence men to choose to become drag queens. I hypothesize that one of the main factors in this decision is a need to belong, and to be accepted into a group. My research looks at the inner workings of the drag scene, in order to determine what makes it so appealing to people who choose the lifestyle. Surveys administered to one hundred participants from the general population and interviews conducted with fifteen drag queens have thus far supported my hypotheses.

Tolkien: The great translator of heroes

Student: Eve Winkleman, *English, Foreign Languages, and Biology*

Faculty Sponsor: Christina Heckman, *English and Foreign Languages*

In the 20th century, the Western world experienced a myths void in which the ancient heroes and epics lost much of their relevance. In order to make a 20th century hero, Tolkien combined the heroes of the past with his own experiences as a soldier in World War I to create an image the modern reader could relate to. He revised the concept of honor, changing the emphasis to doing the right thing rather than seeking recognition. He presented readers with the psychological journey of the hero, introducing self-doubt and loss of faith. And he asserted that making the right choice was more important than any inherent quality within the hero; he celebrated the extraordinariness of the ordinary. In Tolkien's translated heroism, ancient warriors, with their great deeds and legendary reputations, gave way to ordinary people who struggle in humility to make the right choices.



***Foucault, feminism, and
Shelley's Frankenstein:
Death of the feminine female***

Student: Melinda McKew, *English and Foreign Languages*

Faculty Sponsor: Ted Atkinson, *English and Foreign Languages*

In my research, I investigate the ways in which Mary Shelley critiques patriarchy's tendency to rigidly define and categorize gender into dichotomous constructions, particularly the special import power plays in generating a masculine identity. In understanding power's prominence in patriarchies, it is instructive to utilize feminist critiques of Michel Foucault's conceptions of power over the body. Although I frequently reference Foucault's *History of Sexuality: An Introduction*, Volume I and *Discipline and Punish: The Birth of the Prison*, I also make extensive use of feminist scholars' works, most notably Lois McNay's *Foucault and Feminism*. Viewed through this theoretical framework, Mary Shelley's *Frankenstein* becomes a social commentary on the destructive effects of patriarchy's proclivity to construct gender, particularly masculinity, in terms of power. As products of the cyclical system of patriarchy, Victor and the creature struggle to assert their masculinities through the execution of power over the body. Their power struggles, however, inevitably marginalize, silence, and destroy the feminine-female.

***Unmasking Othello:
Expanding beyond race***

Student: G. W. Hitchcock II, *Communications and Professional Writing*

Faculty Sponsor: Julie B. Jones, *English and Foreign Languages*

“If [Othello] did not begin as a play about race, then its history has made it one”
Nigerian poet Ben Okri

William Shakespeare's *Othello, The Moor of Venice*, is a play about race, but it also about so much more. By examining contemporary accounts of the play and Elizabethan ideas of race and society, I will show that focusing only on race prevents a full grasp of the play's breadth. I will then propose an adaptation of the play that can help to highlight these often ignored ideas, while still maintaining the integrity of Shakespeare's original work.



Psychology and film

At the movies: Perceptions of short film

Student: Jackie Long, *Communications*

Faculty Sponsor: Rick Pukis, *Communications*

Professors Topolski and Pukis are joining two academic fields, communications and psychology, in a joint research project entitled “At the Movies: Perceptions of Short Film.” The project’s purpose is for studying the effects that the hand-held camera has on its audience versus the effect of the stationary camera. To do this, we filmed one situation using both techniques. After viewing these videos, audiences will be asked to fill out questionnaires that will be used for analysis.

The experiment is divided into four segments. I will be a research assistant for Pukis and Topolski’s project, but I will be heavily responsible for one of the segments. My responsibility is to test the preference of audiences, which includes drawing up questionnaires and analyzing the data that is gathered. The hypothesis of my segment is as follows: younger audiences prefer the hand-held camera style, while older audiences prefer the stationary camera style.

For my presentation, I will show short clips of both videos, discuss the questionnaire, our results and the history of the hand-held camera technique.



Posters

High-resolution magnetic survey over Laramide and Basin and Range structure, Big Bend National Park, Texas

Students: John Allison, Christopher Parham and Rebecca Sawyer, *Chemistry and Physics*

Faculty Sponsor: Christian Poppeliers, *Chemistry and Physics*

We performed a ground-based, high-resolution magnetic survey on the South Persimmon Gap Laccolith (SPGL) and Dagger Mountain in Big Bend National Park, TX. We collected data to help us determine the geological structure of these two areas. The mapped, surficial geology in the vicinity of the SPGL led us to two competing hypothesis as to the nature of the local geologic structure: either a Laramide aged fold or a Basin and Range fault. We analyzed and modeled the data from SPGL and now favor the Basin and Range fault model. In a second field area, we tested the hypothesis that Dagger Mountain is a Tertiary aged intrusive structure (dome) rather than a Laramide fold. Although Dagger Mountain displays significant magnetic structure, the data is too sparse to construct convincing geologic models.

The building and evaluation of a hydrogen fuel station

Students: Jeramy Barry and Dewand Jones, *Chemistry and Physics*

Faculty Sponsor: Hauke Busch, *Chemistry and Physics*

One of the most notable changes to our environment is that of global warming. In this research a solar panel is used to collect sunlight and convert it into electric energy. The solar panel uses a renewable energy source, the sun, to provide carbon and pollution-free energy. Through the collection of data gathered by numerous tests, a complete analysis of the solar panel will be accomplished. The optimum working conditions of the solar panel to convert solar energy to electrical energy is also evaluated. The solar panel will then be used to power a hydrogen fuel cell electrolyzer. An electrolyzer is a hydrogen fuel cell operated in reverse, compared to that of a regular hydrogen fuel cell. The electrolyzer uses the solar panel's energy to generate hydrogen gas from regular water, which when stored is available for later use to power a fuel cell or a regular combustion engine. In this way, a carbon-free fuel can be provided reducing the affect of global warming. Data representing the effectiveness and feasibility of such a hydrogen fuel station will be provided.



Gender, sex role, and job attribute preferences

Students: Marian R. Beasley, Amanda D. Khidirov, and Gary A. Baker, *Psychology*
Faculty Sponsor: Robert Reeves, *Psychology*

This study examined the relationship between gender and sex role and preferences for job attributes. Previous research portrays consistent, small differences between genders and respective job attribute preferences (Konrad et al., 2000). Consistent with sex role expectations and stereotypes, women's values (e.g., interpersonal relationships, opportunities to help others) differed from men's preferences (e.g., earnings, solitude, promotion opportunities) (Corrigall & Konrad, 2006; Konrad et al., 2000). More recently, Judge and Livingston (2008) reported that traditional gender role orientation accentuated gender differences in earnings. Konrad et al. (2000) found that as obstacles to women's employment have diminished, women rated many job attributes as increasingly important. The purpose of the present study was to examine how gender and sex role relate to job attribute preferences. Participants (319 male and female students from two small universities) completed the Personal Attributes Questionnaire (PAQ) (Spence & Helmreich, 1978), career expectation survey (Heckert et al., 2002), and demographic questions. Results indicate that masculinity and femininity predict importance ratings of some job attributes at least as strongly as gender. The lack of a more distinctive pattern of differences in job attribute preferences between males and females is possibly due to socio-cultural changes over time (Konrad et al., 2000). Additional explanation of the observed relationships will be discussed.

Disconnected: An ethnographic exploration

Student: Kathryn Calkins, *Political Science*
Faculty Sponsor: Michael Schwartz, *Art*

This project uses photography to document a first person ethnographic study of a Mennonite community. During my one week living with a Mennonite family, I was able to explore all aspects of the community's daily life. Many of the rules, such as those regarding dress and the use of technology, were unfamiliar, challenging my sense of cultural identity as I put aside the trappings of what I took for granted as constituting "me." It felt like stepping back into an earlier historical moment centered in agrarian local community; one, however, that was not immune from the modern world. I was able to observe economic, cultural, religious, familial, and social behaviors and interactions; and participated in many of these, disclosing the similarities and differences between the world of this community and the one of my own postmodern life.



An experimental study of the lengthening pendulum

Student: Seth Clark, *Mathematics and Computer Science*

Faculty Sponsor: Andy Hauger, *Chemistry and Physics*

The lengthening pendulum involves a mass oscillating at the end of a string which lengthens at a steady rate. A closed form solution exists for this system if one assumes small oscillation amplitude and ignores damping forces. We have also solved the large amplitude motion of the pendulum using standard numerical techniques. An experiment was then devised to measure the motion of such a pendulum at both small and large oscillation amplitudes. A stepper motor controls the lengthening rate of the pendulum. The pendulum motion was measured using ordinary video tracking. We find that the motion of the pendulum is in close agreement with the theoretical predictions for both small and large oscillation amplitudes. We will present the theory, experimental techniques, and results.

Funny stuff: A study of developmental preferences for humorous images

Student: Brandi Dorsey, *Psychology*

Faculty Sponsor: J. Quentin Davis, *Psychology*

Ruch, McGhee and Hehl (1990) found significant differences in adolescent and adult perceptions of humor. McGhee (1971) found that with increases in age, comprehension of humorous stimuli increased. Adolescents have not fully developed reasoning skills that they will gain as an adult (Davies & Rose, 1999). Therefore, we hypothesized that adolescents may find more complex stimuli less funny than adults find it. Participants (N = 83), age 18-52 completed a humor questionnaire. Adolescents were defined as participants between 18 and 20; adults as 21 years or older. The questionnaire consisted of eighteen images, which experimenters coded according to presence of verbiage, complexity, and type. Participants rated images on a 7 point funniness Likert scale and indicated if they “got the joke.” Results showed that adolescents found low complexity humor to be funnier than high complexity humor ($t=2.85$, $p<.01$). Results indicated the same pattern for adults ($t=4.89$, $p<.0001$). Across all types of humor (i.e., image, story, stereotype, play on words) adolescents rated images funnier than adults did. Results suggest preference for low complexity humor is not influenced by age or reasoning skills. It is likely some undetermined factor(s) in the low complexity category accounts for higher funniness ratings by both groups.



Body image satisfaction between African American and Caucasian college women

Students: Montana M. Foss and Gina Maddox, *Psychology*

Faculty Sponsor: Rebecca Rogers, *Psychology*

For years, investigators have found a relationship between body image and race, with Caucasian women being more dissatisfied with their body image than African American women (e.g., Rucker and Cash, 1991; Cash et al., 2004). Recent meta-analyses (i.e., Grabe and Hyde, 2006; Roberts et al., 2006) have challenged this belief by demonstrating smaller discrepancies in body image than previously reported, and provided evidence that this may be limited to weight-related measures of body image while “more global body image measures” continue to reflect discrepancies. A problem with this conclusion is the definition of “weight-related” vs. “global measures,” with global measures including both weight and non-weight items. The purpose of the current study was to tease out these factors and examine their relationship to White versus Black women. Given recent meta-analyses, we hypothesized that Black women would be similar to White women on weight related but dissimilar on non-weight body image measures. Supporting our hypotheses and past research, our results indicated that African American women are more satisfied with non-weight aspects of appearance as opposed to Caucasian women. Both groups of women had similar satisfaction with weight aspects of appearance. Limitations of the study, directions for research, and clinical implications will be discussed.

Effects of pollutants on Bluegill Sunfish reproduction

Students: Patrice Frazier and Jamie Crabtree, *Biology*

Faculty Sponsor: Jeanine Burse, *Biology*

This research focuses on endocrine-disrupting capabilities of paper and pulp mill effluents. According to the EPA, “Endocrine Disrupting Compounds (EDCs) are exogenous agents that interfere with the synthesis, secretion, transport, binding action, or elimination of natural hormones in the body that are responsible for reproduction.” Some effects of EDCs on fish are abnormal gonadal development (usually a reduction in size and growth rate), and low levels of gender specific hormones such as estradiol, testosterone, and 11-ketotestosterone. This research compares the gonad size (GSI) of bluegill sunfish, *Lepomis macrochirus* from a control site, McDuffie Fish Hatchery, and an exposed site, Elevenmile Creek in Florida. We hypothesize that exposed fish’s GSI will be lower than reference fish GSI. Standard weight and length were recorded. Gonads were removed and weighed, GSI (gonadosomatic index), was calculated by dividing gonad weight by adjusted somatic weight. Females exposed to the paper mill effluent showed a significantly lower GSI (0.0198) in comparison to the control females (0.1347). Exposed male GSI (0.0048) was lower than control male GSI (0.211). This data shows that exposure to polluted aquatic environments may affect fish reproduction.



Effect of a summer prescription burn on the community structure of gopher tortoise forage

Student: Russell J. Ingram, *Biology*
Faculty Sponsors: Donna J. Wear, Judy Gordon, *Biology*

The community structure of longleaf pine habitat is fire dependent. Historically, fire occurred most often in summer months via lightning strikes. Fire-dependent communities are now maintained by prescribed burning that is typically conducted in winter months to reduce the risk of fire outbreak. In June 2008, prescribed burning was conducted in the longleaf pine habitat at the McDuffie Public Fishing Area, McDuffie County, GA. This area is designated as the state's relocation site for waif gopher tortoises. I examined the effect of fire on plant diversity with emphasis on forage for gopher tortoises. Overall diversity decreased after the burn in both sun and shade quadrats compared with controls. Abundance of *Carphephorus bellidifolius* (gopher weed) increased in response to fire as did the undesirable *Pteridium aquilinum* (bracken).

What's on the agenda?

Student: Ashley Rogers, *Special Education*
Faculty Sponsors: Alice Pollingue, Paulette Harris, *Special Education*

The poster will describe a service learning project conducted at Tubman Middle School during spring, 2009. The purpose of the study was to measure homework completion rates before and after the Tubman pupils were taught how to use agenda books by eight special education students. Agenda books were provided by Augusta State University. The eight special education undergraduates volunteered six hours in eight seventh grade classrooms to teach study skills, organizational skills, test-taking skills, and time management skills using agenda books in language arts, social studies, mathematics, and science. They also administered a Study Skills Inventory that resulted in a Study Skills Quotient for each of the 175 Tubman students. The poster will show the results of the study, examples of content of the lessons presented, and summaries of the students' Study Skill Quotients.



Rolling resistance of tires with a rotary pendulum: Preliminary Results

Student: Rebecca Sawyer, *Chemistry and Physics*

Faculty Sponsor: Christian Poppeliers, *Chemistry and Physics*

We explored a method to determine the rolling resistance of pneumatic bicycle tires using a rotary pendulum. We measured the time dependent angular displacement of our pendulum and fit the data to an analytical model. The model is based on a damped simple harmonic oscillator where the damping term is related to the rolling resistance. To fit the model to the data, we employed a grid search technique which minimized the difference between the data and the analytical model. The result of the grid search was a best-fit estimate of the damping parameter. Based on our preliminary results we found that there is a power-law relationship between the tire pressure and the damping parameter.

What's the key to love: Passion, commitment or intimacy?

Student: Lyston E. Skerritt and Megan N. Annis, *Psychology*

Faculty Sponsor: Quentin Davis, *Psychology*

One of the most basic human behaviors studied in psychology is relationships. This study contributes to the literature on intimate human interaction by assessing the correlation between Robert Sternberg's love components: passion, intimacy and commitment and perceived relationship satisfaction. A survey containing modified versions of Sternberg's (1986) love assessment scale and Hendricks' (1998) relationship satisfaction scale was administered to an Augusta State student sample (n=80). The authors hypothesized that among college students: the composite components of love will have a strong positive correlation to relationship satisfaction and intimacy will have a stronger individual correlation to relationship satisfaction than the other two components. Love, as defined by Sternberg, was found to be strongly correlated to relationship satisfaction. Analyses showed passion to be the strongest correlated love component. We believe that age range contributed to this result. With increased age and experience what is important in a relationship may change. Relatively young adults may find passion more important than intimacy. Length of a commitment may have also influenced the results, thus further study is suggested.



Effect of slide printouts on task load during PowerPoint lecture

Students: Adam Underwood, Chad Carrick, and Jen Watson, *Psychology*

Faculty Sponsor: Julia Quentin Davis, *Psychology*

Butler and Yaffe (2006) suggest taking notes directly from PowerPoint slides may result in students encoding only fragments of the narration instead of complete concepts. The purpose of the current study is to determine whether allowing students access to slide printouts during a PowerPoint supplemented lecture decreases task load associated with note taking, thereby facilitating learning. Authors posit students provided with slide notes (printout group) will encode more narrated concepts not contained on the slides than students who do not receive slide notes (non-printout group) during a PowerPoint lecture. A secondary hypothesis is students who receive a printout will encode a more complete understanding of the lecture by recalling a more equal amount of concepts from both the narration and the slides than students who do not receive the slide notes. Results indicate slide printouts allow a greater recall of the verbal narration without significantly diminishing recall of concepts contained on the slides. Additionally, the data suggest slide printouts promote a more equal recall of concepts presented in each condition. Our study suggests that students who do not have slide printouts are spending more time and cognitive resources writing slide material than attending to the verbal portion of the lecture.

Synthesis of a dehydrogenated analogue of a potent HHV-6 inhibitor

Student: Phillip Wilkerson, *Chemistry and Physics*

Faculty Sponsor: Chad E. Stephens, *Chemistry and Physics*

Human Herpes Virus 6 (HHV-6) is a DNA virus that facilitates several diseases in young children, elderly people, and immunocompromised patients such as transplant recipients. Some of the diseases include meningitis, encephalitis, and roseola infantum (exanthem subitum) in infants. The virus also increases the viability of HIV infected cells. There are two variants of the virus, with HHV-6B being the cause of roseola infantum in children, and HHV-6A being the primary infection in later childhood to adulthood. Recently, the potent anti-HHV-6 activity of a benzothiazine S,S-dioxide compound has been described by us and our collaborators. The purpose of this research is to synthesize an analogue of this lead compound that has a double bond incorporated into the thiazine ring. After attempting several routes, this has been accomplished by an interesting approach that involves C-acylation, followed by an intramolecular condensation reaction on a ketone that takes place upon reduction of a nitro group with iron in acetic acid. Our hope is that the dehydrogenated analogue will be a better inhibitor of HHV-6 than the original lead compound.



***Mark and recapture as a method to
determine Turtle migration at Reed
Creek Park Interpretive Center***

Student: Travis L. White, *Biology*

Faculty Sponsor: Donna J. Wear, *Biology*

Reed Creek Park Wetlands Interpretive Center has three unique aquatic habitats: a pond, a seasonal wetland, and Reed Creek proper. These habitats provide an excellent opportunity to study migration patterns of turtle species. Turtle traps were set weekly between September 2007 and November 2008 in each habitat. Traps were baited with either sardines in olive oil or sardines in soybean oil. Captured turtles were marked by filing marginal scutes. A total of 19 turtles were captured, marked and released: 2 *Chelydra serpentina*, 13 *Sternotherus odoratus*, and 4 *Trachemys scripta*. No specimens were captured in Reed Creek or in the pond. No specimens were recaptured. Sardines in olive oil had a 100% catch rate. Sardines in soybean oil had a 0% catch rate.