Discovery Day 2012
A forum for student ingenuity

The Discovery Day planning committee would like to give special thanks to the following:

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the student presenters,
faculty and staff mentors,
judges and volunteers

all for supporting student success
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<td>9:00 am-11:00 am</td>
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Sustainable Presentations

Sustainable Carolina is the next stage in the evolution of sustainability education and advocacy at the University of South Carolina, encompassing the efforts of the Green Quad, the Learning Center for Sustainable Futures and the Office of Sustainability. The mission of Sustainable Carolina is to educate and transform the campus and community by promoting collaborative relationships among students, faculty, staff, and community members for exploring and implementing the changes required to create a sustainable campus and society.

We want to take this day to recognize our students’ contributions to these efforts at USC. At this year’s Discovery Day, the Office of Undergraduate Research has collaborated with Sustainable Carolina to select presentations that represent their mission. Sustainable Carolina Approved presentations will be marked with this logo. Please take the time to note these “green” presentations, and support the Sustainable Carolina mission!

Scavenger Hunt

Discovery Day is a showcase of our students who have gone beyond the classroom to participate in research/scholarly projects, internships and co-ops, leadership activities, service-learning and community service, national fellowship competitions, and study abroad opportunities. As students, faculty, and staff wander through the posters, we’ve created an opportunity for a more interactive experience – join us for the Discovery Day scavenger hunt (available at Information Point). The scavenger hunt is intended to encourage attendees to visit a variety of posters and talk with presenters about their projects and experiences. The scavenger hunt also includes possible questions to spark conversation.

Tell me about your project/experience.
Why did you choose this particular project/experience?
What roadblocks did you encounter?
What did you enjoy most about this experience?
What was something surprising that occurred during your experience?
What advice would you give someone who wanted to do something similar?
What do you wish you had known before you started this?
Oral and Creative Presentations

Morning Session

Discovery Day 2012
A forum for student ingenuity
A Comparison of European and American Pedagogical Techniques as Applied Specifically to the Oboe

Briana Leaman, Music - Junior
Mentor: Dr. Rebecca Nagel, Music

My motivation for this project was to continue my research of European (specifically French) conservatory pedagogy compared to the American school and better understand how the oboe is most effectively taught and played from both perspectives (since the American tradition originated from the French).

What are the differences and similarities between the American and European pedagogical techniques as they are applied to the oboe? During the summer of 2011 I traveled to Strasbourg France for one month to attend the Conservatoire de Strasbourg as a student of Sébastien Giot. I received two lessons a week and was also able to observe and participate some other classes. The result of this experience was a new awareness of how to approach music and the oboe as well as some general pedagogical strategies that I gleaned from M. Giot’s teaching. I also was able to learn firsthand how a French conservatory operates and how this approach compares to what I have experienced in the United States. I discovered that even though the lessons I received were in another language and country the general information that was communicated was overall the same.

The differences I found between American University and French Conservatory were in the organization of the programs and tuition as well as in the deeply rooted musical tradition that exists in Europe which I believe is a foundational part of the differing approach to music at large.

The Connections Between Art and the Natural Beauty of Science

Margaret McCuen, Visual Communications - Senior
Mentor: Prof. Pam Bowers, Art

This past summer I went on an independent trip to Europe. I was able to go to Barcelona and photograph and get footage of Gaudi’s work. I have created my own montage looking at the connections between natural science and the architecture. Using architecture in this way has allowed me to understand Gaudi’s work better and has allowed a great opportunity to explore the massive sense of scale in his work.

Preserving Their Past: Using Multimedia to Document the Ward One Community

Jade McDuffie, Journalism Mass Communications Concentration - Senior
Mentor: Dr. Bobby Donaldson, History

The urban renewal that occurred in Columbia during the 1960’s was not renewal at all—it was demolition. During this time the University of South Carolina expanded at the expense of about 200 families who were forced to sell their homes businesses and churches for little money. As a student at this university I am indebted to the members of this community rich in their own unique history and culture by preserving what they lost. I will merge multimedia and historical research to document the history of the Ward One Community in the form of a web site. The goal of my project was to piece together research and documents of the Ward One Community to put into a web site. My goal is to use the skills I have learned as a student in the School of Journalism and Mass Communications like design video editing and writing to give the Ward One residents a product that
Villainy in Venice: Genre Temporality and the Fallacy of Shylock
Suzanne Brawley, English - Senior
Mentor: Dr. Esther Richey, English Language and Literature
This thesis investigates Shylock's complicated role as the villain of The Merchant of Venice and his connection with the play's temporal sequence. As a comic villain he is expected to serve a simple purpose as the impediment to the play's romantic union(s) in his relentless pursuit for revenge against Antonio. This expectation is complicated by his command over the "merry bond" his pervading presence in the play's three concurrent plots and the complexity of his psychology (1.3.170). Shylock's three month bond establishes the play's temporal trajectory. Despite his calculations he fails to recognize the detriment of his rigid dependence on legal judgment. Furthermore he is unaware of his inappropriate assessment of his enemies. His limited rationality hastens the trial scene to collect Antonio's forfeiture of flesh. The moment Shylock realizes he is the harbinger of his own conversion results in the play's anticipated comic ending through the removal of his antagonistic role. My study of Shylock includes his appearances in the play other characters' references to him and the support of outside sources. A comparison to Don John of Much Ado About Nothing and analysis of Shylock's unanswered arguments reveals the complication of his character as a conventional comic villain. Close examination of Shylock's interactions with Antonio, Jessica, Portia and others exhibits his fallacy. I hope to offer a unique understanding of Shylock's character by suggesting the parallels between his demise the progression of narrative time and time's revelatory effect on the comic plot.

Imaging the Invisible
Megan Coker, Information Science - Senior
Mentor: Dr. Allison Marsh, History
We live in a world of images seeing hundreds if not thousands as part of our daily routines. Every image represents something; with scientific images the point of having an image is that it should closely resemble the item which it represents. While it is usually easy enough to see whether an image is similar to its double in reality examining this likeness is more complicated when the original item is invisible to the human eye. How should we perceive a scientific image of something that is obscured too small or too fast for a human to see without using a tool? In our modern highly visual world we must be able to not only see an image but perceive its messages and meanings. It is not only difficult but necessary to do so; a single image can make a great difference in how someone understands or thinks about a concept. As a Magellan Research project and museum exhibit 'Imaging the Invisible' is about these ideas; examining images how we view them and the science behind them from photography to nanotechnology. From the now familiar world visible only through a microscope to fast-motion photography pioneers and the modern developments of imaging in the field of Nanotechnology "Imaging the Invisible" examines the scientific technologies which produced iconic imagery provoking thought on images and their messages then and now.
Miasma: A novel of everything and nothing  
*Rory Fleming*, English - Senior  
Mentors: Dr. Debra Rae Cohen, English Language and Literature  
Prof. David Bajo, English Language and Literature  
Miasma is a creative endeavor I have been working on for over a year. It is my first attempt at a novel proper and also my Honors College senior thesis. Miasma synthesizes many elements of my education from a seminar on 20th and 21st century avant-garde art to a course of female writers in the modernist era in the form of literary and philosophical influences. Miasma blends surrealist techniques (automatic writing stretched metaphor) with philosophical inquiry about the nature of the body/mind divide as well as arguments for and against solipsism; of all of this is set up against a backdrop of contemporary science fiction tropes. The overarching plot revolves around a young man Michael who stumbles upon an unorthodox scientist and occultist Ron who has found a way to suspend a person's consciousness in a state of lucid dreaming where everything is (or seems) possible while putting this person's physical body to sleep. He agrees to partake in this man's research to escape from a lack of fulfillment in his current life and ends up learning a lot more about life and reality than he bargained for. The majority of the story takes place within Ron’s so-called “Lucidity Machine.”

Carolina Emerging Scholars Conference  
*Dwayne Geddings*, Psychology - Senior  
Mentors: Dr. Mary Hjelm, Extended University  
Dr. Hayes Hampton, English; USC Sumter  
One of the most famous prayers that is recited daily throughout the world and the one prayer that millions easily can recall by heart is the Lord’s Prayer. This prayer that Christ taught to His disciples when they asked Him “How shall we pray” and was subsequently written down much later and taught to Christ’s followers throughout the ages. To His disciple’s simple and practical question Christ instructs them to pray in this way; “Our Father who art in heaven hallowed by thy name. Thy kingdom come they will be done in earth as it is in heaven. Give us this day our daily bread. And forgive us our debts as we forgive our debtors. And lead us not into temptation but deliver us from evil: For thine is the kingdom and the power and the glory forever. Amen” Twice this prayer takes one through temptation and redemption and a third time this prayer focuses on these two major themes when it is offered on behalf of an individual or the world in the hope for redemption. This paper focuses on these themes and explores all possible illusions to the theme from redemption to temptation.

The Changing Faces of Communication Media  
*Noël Marsh*, Religious Studies - Sophomore  
Mentor: Dr. Leon Jackson, English Language and Literature  
Last semester I took Dr. Leon Jackson’s Honors class “The Birth and Death of the Book.” For the final research paper I was intrigued by Dr. Jackson’s apprehension that the quality of college undergraduates' reading writing and general comprehension has severely declined over the last couple decades alongside the rise of electronic communication media. I began with Walter Ong’s theories of “secondary orality” to see if they still apply to a world moving beyond television telephone and radio; but as my research developed I realized that the current theories do not adequately describe the changes occurring in human communication. For centuries most learning and communication occurred through writing: the entire message in all its nuance and complexity was carried through a single-modal medium. Now with the rise of the Internet and other forms of nearly-instantaneous electronic communication most communication occurs in multimodal forms (not just through writing but also through images sounds and movement). So what happens to single-modal communication when multimodal media become the dominant forms of expression? Our conception of written communication is changing along with ideas about authorship the “sanctity” of writing and the flow and order of information (in both layout and comprehension). Research also indicates that our brains are changing to process the increasing multi-modal electronic media. The conclusions drawn from this research provoke serious thought about the nature of expression and communication through various media how to adapt to these new patterns in communication and the future of single-modal expression.

Seeing is Believing—Biological Illustration  
*Emily Phifer*, Biological Sciences - Senior  
Mentor: Dr. Chris Toumey, NanoCenter  
Scientific biological and medical illustration are well known by their results but few people actually know how they are made. One of the most famous prayers that is recited daily throughout the world and the one prayer that millions easily can recall by heart is the Lord’s Prayer. This prayer that Christ taught to His disciples when they asked Him “How shall we pray” and was subsequently written down much later and taught to Christ’s followers throughout the ages. To His disciple’s simple and practical question Christ instructs them to pray in this way; “Our Father who art in heaven hallowed by thy name. Thy kingdom come they will be done in earth as it is in heaven. Give us this day our daily bread. And forgive us our debts as we forgive our debtors. And lead us not into temptation but deliver us from evil: For thine is the kingdom and the power and the glory forever. Amen” Twice this prayer takes one through temptation and redemption and a third time this prayer focuses on these two major themes when it is offered on behalf of an individual or the world in the hope for redemption. This paper focuses on these themes and explores all possible illusions to the theme from redemption to temptation.

*Discovery Day 2012 Oral Presentations*  
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Humanities and Social Sciences

Locating the Knights of Malta in the 17th Century Caribbean
Kerri Caplinger, Anthropology - Senior
Mentor: Dr. David Goldstein, South Carolina Institute for Archaeology and Anthropology

In May 2011, I participated in the study abroad program at St. Croix USVI. This program included an archaeological field school a course that is required for the Anthropology major and would prepare me for future archaeological endeavors. This is only the beginning of achieving the career goals I had set for myself when I enrolled at the University of South Carolina in 2010. Not only did the program at St. Croix endow me with the necessary skills it takes to become an archaeologist it also enlightened me to the difficult preparations of research that takes place before one begins to dig. My particular research involved the cooperation of the National Park Service at St. Croix as well as my mentor Dr. David Goldstein in locating the Knights of Malta at St. Croix during the 17th century. What I wanted to discover was what the Knights of Malta did on the island and their connection to France. At Discovery Day I will be speaking about the influences these two entities had on St. Croix.

Gumbo and Stinky Tofu: A Creole and Taiwanese Expedition
Candra Chaisson, Biological Sciences - Junior
Mentors: Dr. Kimberly Simmons, Anthropology and African American Studies, Dr. Doyle Stevick, Educational Leadership and Policies

Food is a common thread between all cultures. There is no group of individuals that have spanned the course of history that has not used food because it is our basic means of survival and persistence. Food has a history that can be traced back to the origins and meaning from people who provided food for their families and connect it to their way of life their way of thinking their norms beliefs and values. Cuisine is not an impromptu event; it develops as a part of culture intertwined with the history of the people and the land it came from. And that is the purpose of my research. I aim to connect my study abroad experience in Taiwan with previous research I conducted on my own Creole ethnicity. It is my way of bringing it all together as I sought to explore my own origins I found a greater mix of similarities than differences between the two very distinct cultures and in the end it could all be traced down to the basic means and needs of life that bring us all together over holidays festivals gatherings and any other period of the day and that one unifying thing is food.

Charity Equality and Julius Rosenwald: Jewish-Black Relations through Educational Philanthropy in the South
Anna Janosik, History - Senior
Mentor: Dr. Lauren Sklaroff, History

Julius Rosenwald was one of the great educational philanthropists of the 20th century donating about $1.5 billion (from 1914 to 1932) to Southern African-American communities through a program dedicated to building rural schoolhouses. Using his matching-funds program more than 400 schools were built in South Carolina alone to educate and inspire thousands of black children. My goal was to identify the reasons for Rosenwald’s generosity and groundbreaking work in his unique choice of charity with the hopes that I could discover new dynamics in Jewish and Black relations of the time through the medium of education. By researching archived manuscripts of Rosenwald’s contemporaries as well as papers and biographical literature of Rosenwald himself I discovered that Rosenwald was primarily motivated by both his reformed Jewish heritage and beginning around 1910 an awakened understanding of African-Americans as “brothers” in minority persecution. In his attempts to uplift the black community Rosenwald was powerfully influenced by a group of mostly Northern reformers who believed with Booker T. Washington that the key to black equality was increasing labor skills. This “industrial education” model was an essential aspect of the ideological struggle for Black equality and Rosenwald’s promotion of that particular educational philosophy is significant in demonstrating that even a noble humanitarian cause can promote social presuppositions and values which many Blacks ultimately considered an impediment to equality. Rosenwald therefore illuminates the complex and evolving dynamics of Jewish-Black relations and the subsequent impact on critical contemporary ideologies of the unfolding 20th century which they effected.

Madame Louise Gautherot: The Violin Soloist in Haydn’s First London Concert
Diane Oliva, Music Education - Junior
Mentor: Dr. Constance Gee, Music

Although many of Haydn’s musical colleagues have been studied extensively, little attention has been devoted to Madame Louise Gautherot (c1762-1808), the violin soloist in the first Haydn/Salomon concert of 1791. Her contributions to English music life, however, cannot be doubted: in addition to establishing that a woman could rank among Europe’s greatest violin virtuosos, she introduced Viotti’s music to London and thereby helped shape the strand of romanticism that would long characterize British musical culture. Reviewers praised her as “one of the most celebrated violinists of the 1790s,” and Haydn’s estate inventory indicates that he returned to Austria with the handsome portrait of her engraved by the famed Francesco Bartolozzi. The proposed presentation, which draws upon contemporaneous newspapers and diaries, as well as previously unexamined documents in London’s Metropolitan Archives, the Westminster City Archives, and the Bibliothèque Nationale de France, will clarify aspects of her early career in France, when she appeared as a soloist at the Concert Spirituel and her later career in Ireland and England, where she settled in 1789 after the outbreak of the French Revolution. Like many other female instrumentalists, she occasionally appeared as a vocalist, performing a Mysliveček aria in Paris, and also singing in northern England. As one of the first professional female violin virtuosos, she doubtlessly helped prepare for the rise in popularity of the violin among women in the nineteenth century. Her appearances as a singer, however, may suggest her awareness of the public’s resistance to her appropriation of a type of virtuosity long considered masculine.
The Social Thought of Theodore Roosevelt

James Strickland, History - Senior
Mentor: Dr. Dorothy Pratt, History
In April 2011 I was awarded an Honors College Exploration Research Grant. For this project I explored how President Theodore Roosevelt was influenced by historical intellectual attitudes toward both the poor and the public administration. During the Gilded Age there was a clash between two concepts now known as the Social Gospel and Social Darwinism. Advocates of the Gospel applied religious ethics to social matters like inequality and crime. The Salvation Army Young Men's Christian Association and poverty houses subsequently emerged as means of charity. Social Darwinists manipulating Charles Darwin's theory of natural selection argued that aiding the poor endangered society's overall well-being. Darwinists often advocated a free market economy in which there were few “safety nets.” They coined the term survival of the fittest to frame their paradigm. Roosevelt was born into a family of businessmen and philanthropists. His wealthy father felt an obligation to aid the less fortunate. This attitude appears to have greatly influenced young Theodore and may be responsible for his reformist mindset. Using primary and secondary documents I examined both the debate between Social Gospelites and Darwinists and its implications upon Roosevelt's social thought. Secondary sources consisted largely of biographies histories and interpretations of the era. Primary sources included personal histories and the writings of Roosevelt. All of this ties into my larger questions—in what ways did Theodore Roosevelt ultimately reform American society and why?

The Effects Worldviews have on Resource Management Practices in the North American Context

Amy Worthington, Anthropology - Senior
Mentor: Dr. Gail Wagner, Anthropology

The Western worldview that humans are in control of and separate from the natural world distinctly contrasts with the Indigenous worldview that humans are inextricably connected to the natural world (Pierotti and Wildcat 2000:1334). In this paper I examine how Worldviews affect traditional resource management practices and subsistence strategies. Using a case study approach I look at two very different Native American cultures -- the Zuni and the Inuit -- to contrast the dynamic relationships between Indigenous and Western worldviews and resource management practices. Along the way I address the impact globalization and colonization have had and are still having on traditional ways of life and the health of the ecosystem.

HPV Vaccination Uptake in SC African American Women: The Role of Culture Religion and Physicians

Azza Abdalla, Biological Sciences - Senior
Mentor: Dr. Jessica Bellinger, Health Services Policy and Management

The specific aims of this study are to evaluate knowledge and preferences regarding HPV and cervical cancer prevention in AA college-aged women identify cultural and religious beliefs about HPV vaccination and explore characteristics and perceptions of physician-patient relationships in order to discover how these factors impact HPV vaccination decisions. Human papillomavirus infection is very common and most will clear from the body without clinical intervention however persistent infections with high-risk HPV types are associated with the majority of cervical cancer cases. Cervical cancer is a public health challenge in the United States and South Carolina which ranks eighth nationally in cervical cancer mortality. In addition there are significant disparities in the incidence and mortality rates of cervical cancer with African-American (AA) women at higher risk than European-American (EA) women in the state. This study will employ qualitative methodology. Phone interviews will be conducted shortly with ten (10) adult women ages 18-26 from Richland County in South Carolina. The phone conversations will be professionally transcribed and analyzed using special software to detect evidence of cultural and provider influences on the vaccination opinions and beliefs of the women.

Music Perception in Adult Cochlear Implant Users

Angela Bedell, Music Performance - Senior

Mentors: Dr. Allen Montgomery, Communication Sciences and Disorders
Dr. Kimberlee Crass, Communication Sciences and Disorders

Previous research indicates that perceived music enjoyment suffers in hearing impaired adults following cochlear implantation. Because implant users rank music as second in importance only to speech new technologies were designed by cochlear implant corporations in an attempt to enhance the sound quality of music: a music program and a personal audio cable. The objective of the current ongoing study seeks to determine if a cochlear implant user's perception of music is improved by the music program and the personal audio cable. Data is currently being collected from adult cochlear implant users who will rate eight 30 second excerpts of songs of different genres based on the natural or unnatural sound quality of music when heard through an everyday program a music program and a personal audio cable. Since data collection is ongoing conclusions cannot be determined at present; although analysis shows variations in the perceived improvement of music from each participant. Overall this project provides direct contributions to the clinical practices of mapping audiology and aural rehabilitation while examining perceived quality of life issues in adult cochlear implant users.
Why are we stuck here? An investigation into the Lifetime outcome of Children who Witness Intimate Partner Violence

_Naporsha Davis_, Psychology - Junior; USC Upstate
Mentor: Dr. Kendra Cusaac, Psychology
This past summer I participated in the Ronald E. McNair Post-Baccalaureate Program at USC-Columbia to prepare a research proposal. My presentation examines how witnessing domestic violence as a young child affects individuals in their adult life. When one witnesses domestic violence as a child it influences relationships with significant others as adults. Domestic violence can be defined as physical or emotional abuse towards a parent and witnessed by a child. It is hypothesized that if children witness domestic violence in their homes when they are young then they are more likely to become part of an intimate violent relationship later in life. Experiments and studies have been conducted to understand children who are faced with domestic violence in their home when they are young and the outcomes they may face in later relationships. A literature review of domestic violence studied the outcomes of children who witness these events in their home is the emphasis of this investigation. PsychINFO database from the year 1980 through 2011 served as the primary database for the research project. After looking through previous research findings showed the affect of witnessing domestic violence as a child had an influence on relationships as an adult.

HIV Knowledge Beliefs and Behaviors Among Latinas

_Molly Doggett_, International Studies - Senior
Mentor: Dr. Myriam Torres, Epidemiology and Biostatistics
Despite the huge influx of Latinos in the United States and their rapidly growing numbers they remain a marginalized population specifically with respect to their access to medical care. South Carolina has seen the greatest percentage increase in the Latino population in the past decade yet many remain reluctant to seek medical care due to language and cultural barriers and insurance and immigration status issues. This study targets pregnant Latina women and their knowledge and testing with regards to the HIV/AIDS disease and identifies specific knowledge gaps and specific testing stereotypes and other issues that prevent a pregnant Latina from receiving appropriate care during her pregnancy. Through two major avenues - assessing the patient’s understanding of how the disease could affect her or her child after her first visit with a doctor and assessing the patient’s intention to take an HIV test and why she does or does not desire to take the test - the research identifies specific knowledge gaps and specific reasons that Latina women do not or chose not to receive an HIV test. This study recognizes major obstacles that contribute to the marginalization of the Latino community in South Carolina and allows for the development of materials to improve the HIV knowledge and HIV testing behaviors among pregnant Latina women.

Effects of Technology and Connectedness on Community-Dwelling Older Adults

_David Smith_, Nursing - Senior
Mentors: Dr. Joan Culley, Nursing
Dr. Abbas Tavakoli, Nursing
Research illustrates the important influence of the growing use of technology with older adults and the assumption that through the use of technology older adults may feel more connected to friends and family thus enhancing quality of life. This research examined the association between technology and the phenomenon of connectedness in community-dwelling older adults. I worked with three researcher to develop a survey tool to measure the use of technology in older adults and complete this study. The technology survey the Register-Connectedness Scale and a participant demographic survey were distributed to a sample of 87 older adults from two primary sites. Data was entered into an Excel spreadsheet and SAS 9.2 was used to analyze the data. IRB approval was received from the University of South Carolina Office of Research and Compliance under an exempt status. Analysis of the data showed that 78% were female; 51% were married; more than 60% attended a technical school or had more education; and the average age was 75 years old. The Pearson correlation indicated that total activity technology was negatively associate with age (r=-0.43) and positively associated with the facing aging subscale (r=0.22). Total interest and skill in technology showed a weak linear association with facing age (R=.27). Also the total intention of using technology showed a weak positive association with being part of family (r=.24). This study will help to inform researchers about the potential role technology can play in improving connectedness and alleviating feelings of isolation in community-dwelling older adults.

Differences between Parental and Peer Social Support for a Healthy Diet in African American Adolescents

_Bailey Tackett_, Psychology - Junior
Mentor: Dr. Dawn Wilson, Psychology
Obesity rates in adolescents have risen considerably over the past three decades especially in ethnic minority youth. Approximately 40% of African American youth are classified as either overweight or obese. Previous research suggests social support specific to dietary health is associated with fruit and vegetable (F&V) consumption. Research also suggests girls benefit more than boys from dietary support provided by family members. This study examined (1) differences between adolescent perceptions of parental versus peer support for a healthy diet (2) how parental and peer support for a healthy diet impact youth F&V intake and (3) differences in the relationship between parent and peer support for a healthy diet between boys and girls. Participants (n=72 adolescents 100% African American 63% girls) completed baseline measures as part of their participation in a family-based health promotion program known as “Project SHINE” (Supporting Health Interactively through Nutrition and Exercise; NIH F31HD066944). Adolescent perceptions of parental and peer support for healthy diet were assessed with a previously validated measure and youth F&V intake was measured using three 24-hour dietary recalls. Results indicated a significant difference between parental versus peer support for diet...
with adolescents perceiving greater overall parental support. However neither parental nor peer support for a healthy diet had a significant effect on F&V intake and these relationships did not differ between boys and girls. This study highlights differences in youth perceptions of parent and peer social support and reproducing this study with a larger sample size would be beneficial.

The Degree of Potentiation and Selectivity of Magnolol and Honokiol on the Subunits of the GABA(A) Receptor

Mikhail Alexeev, Biomedical Engineering - Senior
Mentor: Dr. Janet Fisher, Pharmacology Physiology and Neuroscience

The National Center for Complementary and Alternative Medicine (NCCAM) estimates that nearly 40% of adults in the United States use some form of alternative medicine. It is important to determine their mechanism of action so that they can be used safely and appropriately. Extracts from Magnolia tree bark have been used for centuries in traditional Chinese medicine to treat a variety of neurological diseases including anxiety disorders. The active ingredients in the extract have been identified as magnolol and honokiol and these isolated compounds have been shown to be modulators of the GABA(A) receptor.

These receptors are ligand-gated ion channels which are activated by gamma-aminobutyric acid (GABA) the primary inhibitory neurotransmitter in the CNS. The subunit composition of neuronal GABA(A) receptor is heterogeneous and the pentameric receptor can contain subunits from seven different families with multiple subtypes. The goal of these studies was to determine whether modulation by magnolol and honokiol was dependent upon the subunit composition of the receptor. We used patch clamp recordings from transiently transfected cells to measure the response of receptors containing each of the six different alpha subunits. Both magnolol and honokiol significantly enhanced the activity of all the receptors regardless of the alpha subunit. Our data indicate that these two compounds are effective positive modulators of GABA(A) receptors and would be expected to reduce neuronal activity reducing anxiety and seizure activity while producing sedation. They may also interact with other medications with similar actions including alcohol.

Micro-RNA miR-21 and its role in colon cancer

Krupesh Dave, Biological Sciences - Sophomore
Mentor: Dr. Dan Dixon, Biological Sciences

Of all cancer instances each year colon cancer is the third most diagnosed and has one of the highest mortality rates. Prostaglandins comprise a group of phospholipid-based messengers and enhanced synthesis of one such prostaglandin PGE2 has been shown to contribute to colon tumorigenesis through promotion of cell proliferation migration and angiogenesis. PGE2 is produced via the metabolism of arachidonic acid by the cyclooxygenase (COX) pathway and is degraded by the tumor suppressor 15-hydroxyprostaglandin dehydrogenase (15-PGDH). Studies suggest the importance of 15-PGDH in controlling PGE2 levels as targeted disruption of 15-PGDH in mice leads to increased levels of PGE2 in tissue. Furthermore 15-PGDH expression has been shown to be downregulated in various cancers; however this mechanism remains unknown. MicroRNAs (miRNA) are small non-coding RNA post-transcriptional regulators which bind to the 3’ untranslated region (UTR) of target genes to mediate translational suppression or mRNA decay. One such miRNA miR-21 is the most
highly upregulated miRNA in all solid tumors suggesting an oncogenic capacity (oncomiR). Computer-model algorithms indicated miR-21 to have three putative binding sites in the 3’ UTR of 15-PGDH. To determine if miR-21 targets 15-PGDH through these 3’UTR targeting sites luciferase reporter constructs containing the full length 15-PGDH 3’UTR were created and co-transfected with miR-21 in HeLa cells. MiR-21 transfected cells exhibited a 2-fold decrease in luciferase activity compared to control indicating that 15-PGDH is a miR-21 target. Additionally endogenous 15-PGDH protein and RNA levels were attenuated in miR-21 transfected colon cancer cells indicating that miR-21 actively regulates 15-PGDH expression.

**A Glimpse of Reality: Increased understanding of scientific inquiry**

*Shikha Patel*, Biochemistry and Molecular Biology - Junior

**Mentors:** Dr. Douglas Pittman, Pharmaceutical and Biomedical Sciences
Dr. Mike Wyatt, Pharmaceutical and Biomedical Sciences

Thiopurines are a class of chemotherapy drugs used as immunosuppressants in organ transplant patients and for the treatment of childhood cancers. However approximately 40% of patients develop life-threatening problems later in life as a direct result of treatment. 6-thioguanine (6TG) is a thiouprine directly incorporated into the DNA. Processing of the damage by the mismatch DNA repair pathway leads to the formation of double-stranded breaks repaired by the homologous recombination (HR) machinery. RAD51D is an HR protein and absence of RAD51D leads to the formation of large multinucleated cells in response to 6TG treatment. Using live cell imaging I am attempting to determine how these multinucleated cells form. Treated and untreated mouse embryo fibroblasts (MEFs) were cultured in a 37°C chamber containing 5% CO2 and visualized using a Leica ASMDW microscope. Images were captured every three minutes and translated into individual videos. Cell division times and outcomes were determined by manually following each cell and daughter cells. The data suggest multinucleated cells form after aberrant mitotic events and subsequent fusion of the daughter cells during the second cell cycle following treatment. Current data also indicate that multinucleation is more prevalent at lower doses while interphase arrest is more common at a higher dose of 6TG. These studies have the potential to determine the mechanisms of thiopurine-induced secondary apoptosis in a neuronal cell line.

**Video time lapse imaging of mitotic catastrophe events in response to thiopurines**

*Shikha Patel*, Biochemistry and Molecular Biology - Junior

**Mentors:** Dr. Douglas Pittman, Pharmaceutical and Biomedical Sciences
Dr. Mike Wyatt, Pharmaceutical and Biomedical Sciences

To investigate if PKR activation is involved in Tunicamycin-induced apoptosis in a neuronal cell line.

*Sarah Mushtaq*, Biological Sciences - Senior

**Mentor:** Dr. Rekha Patel, Biological Sciences

The goal of this project is to determine if PKR activation in response to tunicamycin plays an essential role in apoptosis of a neuronal cell line SK-N-SH. We generated a stably transformed SK-N-SH cell line that over-expresses a trans-dominant negative mutant of PKR (K296R). Mutation of the crucial lysine 296 involved in ATP-binding renders PKR inactive. Over-expression of K296R mutant inhibits the endogenous PKR activity. The stable SK-N-SH line that over-expresses K296R mutant is designated as K11. The control cell line that was stably transfected with empty vector is designated as V. The apoptosis in response to tunicamycin treatment was measured in V and K11 cells. In neuronal cells Amyloid beta (Ab) peptide causes PKR activation and activates unfolded protein response (UPR) to trigger the onset and progression of Alzheimer’s disease resulting in apoptotic cell death. Tunicamycin blocks protein glycosylation in the endoplasmic reticulum (ER) and induces UPR response by accumulation of improperly folded unglycosylated proteins in the ER. My previous research (SURF grant) showed that the V cells had a greater rate of apoptosis than the K-11 cells thereby indicating that inhibition of PKR activity protects the cells from apoptosis. I am currently investigating the role of PKR activation and caspase-4 activation in the V and K11 cells. By understanding the molecular processes attributed to Alzheimer’s disease and its progression it is possible for newer therapeutic treatments to treat this disease. Using further experiments I can determine if PKR and caspase-4 activation is involved in inducing apoptosis.
ADSC aggregates that are 150-300μm in diameter. Oxygen tension within the micro mass correlates with the size of the aggregate. The key aggregate size range is between 150 and 300μm because the cells within these aggregates express hypoxia induced factors (HIFs), while maintaining viability to produce characteristic cartilage proteins. We have developed a novel method to track hypoxic signaling at the cellular level within three dimensional ADSC aggregates. Ultimately, our system allows us to utilize the importance of hypoxic signaling for accelerating chondrogenesis. These results are exciting because they can guide future tissue engineering groups to optimize chondrogenic differentiation in human adipose derived stem cells, and successfully precondition the aggregates for cartilage tissue implantation.

Cadmium Sulfide Nanowire Field Effect Transistors: From Synthesis to Electrical Characterization
Christopher Pinion, Chemistry - Senior
Mentor: Dr. Andrew Greytak, Chemistry and Biochemistry
Semiconductor nanowires (NWs) are quasi-one dimensional fibers composed of semiconductors such as silicon gallium arsenide or cadmium sulfide with diameters as small as a few billionths of a meter. Such NWs have a wide range of potential applications across many fields of modern science including solar energy nano-computing and biological sensing. The current-voltage characteristics of NW Field Effect Transistors (FET) represent one of the primary methods for investigating both ensemble and single NW properties; therefore the ability to reliably create such devices is of great importance for those interested in studying the chemistry and physics of NWs. In this talk I will go over the synthesis transfer FET fabrication and subsequent electrical characterization of Cadmium Sulfide (CdS) NWs in the Greytak Lab. The CdS NWs were synthesized using the Vapor-Liquid-Solid (VLS) method in a home built Chemical Vapor Deposition (CVD) system. Following growth NWs were cast onto a separate substrate via a dry transfer method. Electrical contacts for the creation of CdS NW FETs were made through deposition of lithographically defined electrodes. Initial electrical characterization revealed Schottky barriers between the NWs and metal electrodes which prevented studies of the electrical properties of the NWs. The creation of Ohmic contacts (opposed to Schottky barriers) was realized by bombarding the contact regions of the NWs with argon-ions prior to metal evaporation.

Refraction Analysis of the Lower Mesozoic Section of the South Georgia Rift Basin in Lower South Carolina
Melissa Sims, Geophysics - Senior
Mentors: Prof. Mike Waddell, Earth Sciences and Resources Institute Dr. Adrian Addison, Earth Sciences and Resources Institute Dr. James Knapp, Earth and Oceans Sciences
Seven 2-D seismic profiles totaling 240 line km were collected in early 2011 to better determine the structural control and spatial distribution of potential reservoirs and caprock for geological sequestration of CO2 in the South Georgia Rift in the lower part of South Carolina. The application of refraction analysis to map the existence of the ‘J’ basalt was conducted by Buckner in his 2011 thesis. Other geological features such as faults and local dip were identifiable using this methodology. Refraction analysis was conducted on the individual shot records of four reflection surveys SCO2-1 SCO2-4 SCO2-6 and SCO2-7 using Gedco’s Vista. The seismic velocities were catalogued using Microsoft Excel. Refraction velocities were compared to seismic velocities measured independently at wells CC-1 DOR-211 and SSW-6 where the presence of basalt was previously confirmed. Basalt velocities range from 5200 to 5800 m/s. For SCO2-6 velocities around 5600 m/s were picked suggesting the presence of the basalt along the entirety of the line.
SCO2-7 contains divergent velocities that indicate local dipping interfaces and basalt verified by the presence of basalt in well SSW-6. SCO2-1 velocity analysis indicates dipping interfaces as well as the edge of the coastal plain indicated by a sudden increase in velocities to greater than 6000 m/s. A map showing the presence of the ‘J’ basalt indicates that the basalt flow is substantially less extensive than is implied by some previous studies. Based on these results and well comparison refraction analysis appears to be an effective method for mapping geological features.

Suppression of Voters by Strategic Distribution of iVotronic Voting Machines

Skylar Smith, Computer Science - Junior
Mentor: Dr. Duncan Buell, Computer Science and Engineering
This research was conducted to determine from the GOP 2012 primary event log files what errors and complications occurred. After analyzing the data we have found an attempt at voter suppression. The State of South Carolina has open primaries. This means that anyone regardless of their political views may vote in a primary. The analysis of the GOP primary data shows that counties which tend to vote more democratically had significantly more votes per machine than counties that vote in favor of republicans. This indicates that these counties were not given enough machines. By not providing enough machines in these counties lines at polls were significantly longer. These longer lines would discourage voters from voting. Since this is a republican primary a voter who is a democrat is less inclined to wait to vote than a republican voter. This form of voter suppression would skew the votes in favor of a more conservative candidate.

Reactive Oxygen Species at the Groundwater Beach Front Interface: Fe oxidation at an Oxygen Rich Environment

Stephen Timko, Marine Science - Senior
Mentor: Dr. Tim Shaw, Chemistry and Biochemistry
In anoxic groundwater dissolved iron is found in the reduced form Fe(II). When this groundwater mixes with oxygenated seawater at a beach front interface reduced iron typically reacts with dissolved oxygen. This can lead to the formation of a host of reactive oxygen species (ROS) through redox cycling. ROS are important because of their ability to oxidize organic carbon both in the form of natural organic matter (NOM) and organic contaminants such as pesticides. Oxidation chemistry was investigated during mixing between anoxic groundwater and seawater on the barrier island Spiekeroog Germany in the North Sea in April 2011. Pore water samples were obtained at various depths during rising and falling tides and concentrations of Fe(II) determined. Evidence of rapid redox cycling of iron species was found across the beach front. Previous work has provided models describing ROS production as a function of iron redox cycling. By determining the amount of Fe(II) oxidized as a result of tidal seawater intrusion ROS potential in this system was calculated.

Worm Towers: A composting solution for a better tomorrow

Michael Young, Anthropology - Freshman
Hannah Fox, Environmental Science - Senior
Bri Farber, Anthropology - Freshman
Mentor: Dr. Jennifer Pournelle, Environment & Sustainability Program
When considering issues of sustainability and waste production every individual is interconnected within a vast network. The average American discards 480 pounds of potential compost per year and the average American household discards 1248 pounds per year. This waste is taken to landfill sites where decomposition processes are inhibited due to improper balance required by microorganisms to be able to break down the organic matter. The current solutions to mitigate this waste production have characteristically involved labor intensive and unappealing techniques. The need for a paradigm shift for how waste is managed is vital. Vermiculture has presented an alternative method for waste reduction. The innovative technique of “worm towers” and indoor bins has presented revolutionary methods to composting. Eisenia fetida “red wiggler” worms provide a rapid and low maintenance solution to household organic waste composting. The worm tower technique is essentially an underground feeder for worms to consume organic waste while concurrently enriching the surrounding soil. The indoor bins are a viable solution for urban areas and have the potential for providing income generation for the household through the sale of the worm byproduct: worm castings. The innovative nature of this vermiculture technique has the ability to raise consciousness levels and possibly influence further action towards sustainable living practices.
Customer Profitability: A Tool for Assessing and Developing Strategy
Alex Baker, Accounting - Senior
Eugene Boullain, Accounting - Senior
Mentor: Mr. Stan Smith, Accounting
Customer Profitability Management (CPM) has taken on added significance during the economic period in which we live. Now more than ever it’s important that businesses understand every aspect of their customer base. The fact that a small percentage of customers provide almost all of our profit gives us reason to disclaim the common belief that all customers are “created equal”. Marketing programs need to be well-designed and sharply focused to achieve the desired results. Most companies are functionally driven and as such our costing systems are not well suited to explain customer profitability. Many of our management techniques used in customer profitability are based on intuition - not serious analysis. The use of arbitrary allocations of order – getting and order processing costs- hide the relevance of these costs to overall customer management. Our views of customer acquisition and customer retention as separate issues hamper us. Failure to grasp the lifetime value of a customer is counter to other analytical techniques that we routinely use in other investment decisions. We will discuss these and other issues critical to developing a comprehensive approach to customer profitability that can be used to develop new strategies and assess old approaches as we seek to enhance our customer profitability.

Lean Performance Measurement Systems
Corrine Buescher, Accounting - Junior
Mentor: Mr. Stan Smith, Accounting
Global market pressures have led companies to pursue various improvement programs; these “lean practices” are designed to improve quality service and profitability. A Booz Allen Hamilton survey indicated that fewer than 10 percent of the firms surveyed demonstrated mastery of lean practices. Our research hopes to shed light on the role that the performance measurement system plays in the firm-level evaluation of the impact of lean practices. Our project objective is to survey 50-60 companies to assess the perceived importance of the qualitative aspects of performance metrics within performance measurement systems. From the survey data we will identify the qualities and deficiencies that exist in performance measurement systems currently being used. Our goal is to understand the correlation between the success or failure of a company’s lean initiatives and the effectiveness of its measurement system. The findings will be synthesized into “best practices”. Furthermore with the help of our Asian members the survey will also reach a dozen Asian companies demonstrating possible differences in measurement perspectives and interpretation of those results. We will deliver the research results through presentations at various Institute of Management Accountants (IMA) chapter meetings (throughout 2012 & 2013) IMA regional conferences (February and June 2012 & 2013) the Lean Accounting Summit (September 2012) and on Discovery Day at USC (April 2013). The research results will also be the subject of articles to be submitted to publications targeting professional practitioners (Strategic Finance Cost Management Quarterly and other regional business publications).

Carbon Neutral Athletics: Reducing our carbon footprint one step at a time
Erin Fedewa, Marine Science - Senior
Nicole Rheinlander, International Business - Senior
Mentors: Mr. Michael Koman, Sustainable Carolina
Dr. Kevin Elliott, Philosophy and Leadership Initiative
Imagine a USC sporting event with a net zero carbon footprint. This spring collaboration with Colonial Life Arena USC Athletics and the Carolina Leadership Initiative made this goal a reality. The February 29th Men’s basketball game the first carbon neutral sporting event of its kind at USC obtained a net zero carbon balance through the efforts of student-athletes. Prior to the game student-athletes planted trees and swapped energy-efficient light bulbs with the hopes of offsetting carbon emissions produced from travel electricity and waste at the February 29th game. Carbon offsetting will continue after the game as well as calculations to estimate the total tons of carbon produced from the game itself. The project aims to educate students fans and athletes about carbon emissions while setting standards for future carbon neutral events at USC.

Communicating for a Cause: South Carolina HIV/AIDS Council
Christina Galardi, Public Relations - Senior
Mathew Sebastian, Biological Sciences - Senior
Mallory Turner, Baccalaureus Artium et Scientiae - Sophomore
Mentor: Prof. Karen Mallia, Advertising and Public Relations
The South Carolina HIV/AIDS Council (SCHAC) is a non-profit organization dedicated to HIV/AIDS prevention and services for HIV-positive individuals in the state of South Carolina. Rates of HIV/AIDS in South Carolina consistently rank top 10 in the nation but the state of South Carolina cut funding for previously successful programs and the general public often does not acknowledge the seriousness of the issue. To minimize the impact of these challenges to the organization this communications plan outlines a strategy for increasing awareness of the prevalence of HIV/AIDS in Columbia S.C. and the state as a whole stressing the need for services provided through SCHAC and ultimately increasing funding for SCHAC initiatives. In the past SCHAC has been dedicated to programmatic development and has not been able to devote resources to organizational branding. Renewed focus on communications will increase the organization’s presence in the community and its professional look will make it more positively received. SCHAC representatives expressed concern that the general public does not accept the seriousness of HIV/AIDS in the community. To increase recognition of the impact of HIV/AIDS in South Carolina this communication plan chooses to reach the general public using the support of key opinion leaders.
Auditor Perceptions of the Oversight Process: A Qualitative Examination
Lindsay Johnson, Accounting - Senior
Mentors: Dr. Jennifer Winchel, Accounting
Dr. Marsha Keune, Accounting
In the last decade the auditing profession has been the subject of major regulatory reform. One substantial change was replacing the long-standing peer review system of self-regulation with an external inspection by the Public Company Accounting Oversight Board (PCAOB) for audit firms of public companies. Extant research has focused on the economic consequences of PCAOB oversight and the predictive value of PCAOB inspections and peer review reports with respect to earnings quality. In this study we focus on how auditors perceive this significant change to their environment. Specifically we gather evidence regarding auditors’ perceptions of the impact of the PCAOB oversight process as it relates to audit quality and effectiveness. Through a series of semi-structured interviews with audit partners senior managers and managers we find that auditor perception of PCAOB oversight depends on both the size of the audit firm and the perceived fairness of the PCAOB inspection team.

Garnet Black & Green
Monica Munoz, Public Relations - Sophomore
Mentor: Prof. Jeff Ranta, Advertising and Public Relations
Across the country and even across the globe individuals companies and governments have been feeling the pressure to “go green.” Society has reached a cross roads where previously debated claims such as climate change and humans; impact on the planet are now widely accepted and something can start being done to counteract the problem. It is a common line of thought that colleges and universities can serve as a catalyst for change. With their large populations ambitious young adults and vast amounts of resources college campuses have the opportunity to be a critical stepping-stone in the recent push to world wide sustainability. This project was created with the intent to discover the path to achieving sustainability in a university setting focusing firstly on how students view the importance of sustainability and secondly on how students receive their information. We also sought to find out which types of events students are interested in attending. This information was realized through surveys focus groups and personal immersion into Sustainable Carolina a campus organization dedicated to promoting sustainability throughout the institution. The insight gained through this research will directly benefit Sustainable Carolina improving events attendance and marketing as well as progressing the environmentally conscience attitudes and behaviors on campus.

Minority Achievement Student Symposium
Jordan Addison, Elementary Education - Junior
Mentors: Ms. Althea Counts, TRIO Programs
Dr. Kevin Elliott, Philosophy and Leadership Initiative
The Minority Achievement Student Symposium is a one-day networking leadership and education event for minority students in South Carolina. The target audience is underrepresented high school sophomores and juniors throughout the state – especially those students associated with TRIO programs. Students participate in four sessions – Community Service College Student Panel Financial Aid and Admissions. Students also enjoy a campus tour given by current University of South Carolina students. The lunch hour includes a keynote address by a recent USC graduate and who is a current high school English teacher. Throughout the lunch the students will be networking with current USC students. The welcome address is given by Mayor Steve Benjamin. The primary goal is that students will be able to network with each other and current USC students while also learning more about the process of entering college and what college life is truly like. A team of USC students are working together to create this event and advertise it throughout the state. MASS was made possible by the Leadership Scholars Program in partnership with the Association of African American Students. The Association of African American Students also known as AAAS will continue this initiative as an outreach program.

Fostering Future Scientific Leaders through Carolina Science Outreach
Reggie Bain, Physics - Senior
Jim Talbert, Baccalaureus Artium et Scientiae - Senior
Mentors: Dr. Edward Munn-Sanchez, Honors College
Dr. Kevin Elliott, Philosophy and Leadership Initiative
Carolina Science Outreach (CSO) is an initiative to help promote scientific literacy in South Carolina. CSO currently offers a variety of presentations addressing topics in areas such as physics chemistry biology environmental sustainability botany and mathematics etc. Through our involvement with the Carolina Leadership Initiative (CLI) over the past year we have made significant progress in widening the impact of CSO in the community and in ensuring it’s sustainability as a service organization at USC. We have recruited many new and enthusiastic members established a clear and effective leadership structure and have planned two major events that will reach out to nearly 1000 people this March in addition to the increasing number of school visits and presentations that we have done this year. We also served as “Enrichment Instructors” at the USC Center for Science Education’s annual “Summer Science Institute” in the summer of 2011. In addition to establishing a sustainable organizational and leadership structure for CSO the first of our two big events this spring consist of a presentation to the students of New Providence Elementary where we will discuss the role of leadership in scientific research and discovery and the leadership qualities of many famous scientists at their school’s leadership day. Our other main event has been working
Educational Gaming - Immunis
David Corso, Biological Sciences - Senior
Collin-Jamal Smith, Biological Sciences - Senior
Mentor: Prof. Simon Tarr, Art
Education is an integral part of the human experience. We are testing and evaluating alternative methods to facilitate education teaching and entertainment. Our idea is to meld real world information seamlessly into entertainment – enter Immunis. Immunis is a real time strategy game that immerses the player in the world of microbiology and immunology. The player takes charge of several leukocytes with unique abilities and fights against an onslaught of bacteria viruses and other pathogens. The player’s objective is to destroy enough bacteria to prevent a catastrophic infection as seen in innate and adaptive immune responses. We believe that there is a way to educate all people. The trick however lies in facilitating education at an individual level. Through gameplay we can make learning more hands-on more engaging and more personal which should aid in learning the subject matter. Starting with Immunis it is our goal to design games that teach challenge and help people understand the natural world.

Kids in the Kitchen- Healthy for Life
Melanie Dunn, Exercise Science - Senior
Mentor: Dr. Kara Montgomery, Health Promotion Education and Behavior
A cookbook will be presented that is targeted towards children between the ages of 5 and 13 years old. The idea behind this book is that by getting kids involved in the kitchen at a young age and educating them about the food that they put into their bodies childhood obesity can be combatted and healthy eating habits can be established for life. This could eventually go on to decrease their risk of: Type II Diabetes Heart Disease and adult obesity. This cookbook will also teach kids that healthy food can be (and normally is) more delicious than unhealthy food. It will also be emphasized that being healthy does not mean that you cannot have snacks or dessert. This book will have very simplistic nutrition components explained but this will not be the focus of the book. Calorie counting will not be mentioned but rather moderation and staying active. This will give the children a healthy attitude towards food that will hopefully last for life. All are recipes that can be enjoyed by children and parents alike. Each recipe in this book will have a picture of the actual dish that has been prepared and tested. There will be different sections of the book: breakfast snacks side dishes entrees and desserts.

Nursing Education and Social Media Policies
Blake Frazier, Nursing - Senior
Mentor: Dr. Joan Culley, Nursing
Social networking use has exploded in the past few years. Many healthcare professionals including nurses and nursing students use these websites such as Facebook and Twitter. After reviewing the literature related to social networking use and how it related to healthcare professions it was found that there was a research gap between nursing practice and education. Although there is information on what is and what is not appropriate for healthcare professionals to post on social networking sites little research has been done on nursing education and how social networking policies can impact the profession and nursing education. The purpose of the research is to: 1) identify the need for social media networking policies in nursing education; and 2) use data collected to contribute to the synthesis of a white paper issuing recommendations for nursing schools on the need for social media policies. This is an important topic with new information just released in the Fall of 2011 by the National Council of State Boards of Nursing in their white paper. Very few schools of nursing have social media policies and currently USC College of Nursing does not. It would be very significant to be at the forefront of creating a social media networking policy. This research is ongoing and the results from the surveys are expected to be known by April 2012. A survey has been developed to survey nursing students and educators on their perceptions of social networking and how it relates to professional nursing practice.

The Teaching of Reconstruction in South Carolina: a Study of Current Practices in South Carolina’s Public Schools
Chloe Greene, History - Senior
Mentor: Dr. Patricia Sullivan, History
The spring semester of my junior year I was awarded a scholarship to conduct research through the Magellan Program. I set out to explore what the standards on Reconstruction entailed determine through oral interviews the extent to which South Carolina high schools adhere to the South Carolina State Standards for Education in teaching the Reconstruction era and observe how the role of African-Americans during the era is presented. I planned to visit high schools in various counties in South Carolina to interview history teachers on their understanding of state standards for teaching the Reconstruction era and gain insight into how American history is taught. I would go about doing this by exploring the high school teachers’ methods used to educate high school students on the Reconstruction era and determine if the African-American role in Reconstruction is recognized and if so understand how in depth it is taught at the secondary level. My hope was that I would gain an understanding of how the teaching methods for Reconstruction at the secondary level may affect how Reconstruction is perceived and therefore taught at the collegiate level and consequently the effect the secondary level teaching can potentially have on all incoming college students but particularly African-American students.
Oral and Creative Presentations

Afternoon Session

Discovery Day 2012
A forum for student ingenuity
Real Students, Real Experiences, Real World Education: What seeing the world can do for you.

Edwin Diaz, Media Arts - Senior
College is a time when most students begin to think about how they will enter the “real world.” Where will I go? What will I do? Who will I work for? For some students, a chance to study abroad can give them insight to better prepare themselves to answer these tough questions ahead. Studying abroad is truly an eye opening experience, regardless of where one chooses to go. It is an opportunity to discover not just what the world has to offer, but what you have to offer the world. This project is a compilation of interviews with international students studying at Queensland University of Technology in Brisbane, Australia. It answers questions that most exchange students encounter in making their decision to challenge themselves to experience a semester abroad.

The Green Learning Community

Baldwin Hall, International Business - Junior
Mentor: Mr. Jason Craig, Sustainable Carolina
The Green Learning Community video project will work as a promotional film. The video will be bold, motivating and educational. Having visual documentation of our involvement experiences and passions will allow us to show others the sustainable values we practice. Students are incorporating these values by changing their daily habits and by participating in the community garden, community meals personal and group projects classroom discussion field trips and attendance at events and conferences.

Sharing Stage Combat with High School Students

Lauren Koch, Theatre - Senior
Mentor: Prof. Robert Richmond, Theatre and Dance
Last spring I received a Magellan Grant to study at the National Stage Combat Workshop in Winston-Salem North Carolina. I attended the Actor Combatant Workshop two years ago to study with teachers from the Society of American Fight Directors and returned in June for the Advanced Actor Combatant Workshop. I was interested in spreading safe stage combat not only to my USC community but also to a local high school in the Columbia area. Public schools in South Carolina have been receiving massive budget cuts year after year and no area is hit harder than the arts. It was my mission to take professional level training to the drama students at Blythewood High School who may never have been exposed to this aspect of the profession. I taught a 5-week course under the guidance of high school teacher Sandra Dietel a USC graduate. I worked with 18 students on safely falling partnering and fight illusions which culminated in an in school presentation of 8 different Shakespearean fight scenes. Whether the students continue to stay in theater professionally or keep involved in a community capacity it is important that they are exposed to as many different working artists as possible. It was my goal to bring an unusual but extremely important skill to these young artists.

Make-A-Wish

Garrett Stuart, International Business - Freshman
Mentor: Prof. Purificacion Crowe, Languages Literatures and Cultures
At age twelve I was diagnosed with Dystonia, a neurological disease which impeded my ability to walk. For years before and after the diagnoses I was in and out of a wheelchair until I finally underwent deep brain stimulation surgery during my freshman year of high school. This surgery allowed me to regain the ability to walk. Additionally because of the surgery I became a candidate for a wish through the Make-A-Wish Foundation. In the summer of my sophomore year of high school I was granted a wish. My wish was to travel to Cambodia and build wheelchairs for those who did not have them. I was lucky enough to regain the gift of mobility and wanted to pass that gift on. After returning from the trip I began to volunteer for the Make-A-Wish Foundation. I gave speeches at fundraisers helping broadcast a minor league baseball game and helped staff many events for the Make-A-Wish Foundation. All the profits from the fundraisers and events have helped to grant wishes for children with life-threatening medical conditions. Once starting college here at USC I wanted to create a Make-A-Wish Club and make Make-A-Wish part of the Carolina community. I am currently in the process of creating a Make-A-Wish club which will host fundraisers that benefit the Make-A-Wish Foundation and hopefully grant at least one wish a semester.

Community-Based Theatre: Bringing a Latin Voice to Theatre in SC

Mary Tilden, Theatre - Senior
Mentor: Dr. Victor Holtcamp, Theatre and Dance
I studied with Cornerstone Theater Company in California this past summer to learn about their methodology of community-based theatre. Community-based theatre creates professional-quality adaptations of classics and original plays based on research and stories of different communities and produces the plays with and for those very communities. My project aims to create a community-based play at USC that incorporates the Latino community at USC. I held workshops and open storytelling forums that gave me a chance to strive to better understand this community prior to the play-making process in order to get ideas about how to make art that represents their community in a truthful way. I then traveled to the Ibero-American Theatre Festival in Bogotá, Colombia to experience the Latin culture in art first-hand so that I have my own experience of Latino art from which I could draw inspiration. My goal was to celebrate the Latino community in South Carolina while also being able to draw inspiration from the representation of Latino culture in the arts in Latin America. This research will culminate in an original adaptation of Shakespeare’s Twelfth Night that involves both stories music dance and participants from the Latino community that work alongside with theatre students to create a truly interdisciplinary work.
imparting many difficult truths surrounding the devastation of a natural disaster of such magnitude.

Untold History
Tabitha Christine Rice, Liberal Studies - Junior; USC Salkehatchie
Mentor: Dr. Sarah Miller, History; USC Salkehatchie
My research examines the life of a soldier during the Civil War. My paper recounts Clinton Hatcher’s tragic story through a series of love letters. Clinton Hatcher was a proud Virginian and more than determined to serve in the Confederate Army. Through the many hardships he faced during the war he never failed to maintain an infectious positive attitude and lively demeanor. Hatcher’s budding career as a fearless soldier came to a halt at The Battle of Ball’s Bluff just five months after he enlisted. While History textbooks are laden with facts of the war an officer’s ledger an ordinary soldier’s letters depict the firsthand accounts of battle from the front lines. Through Hatcher’s letters I tell the short story of an ordinary soldier’s experiences with love camp life and battle. My goal with this paper is to accomplish what our textbooks cannot – to tell a “no name” soldier’s history.

Packaging Poe
Leah Stanley, English - Junior; USC Aiken
Mentor: Dr. Tom Mack, English; USC Aiken
My research deals with Edgar Allan Poe in South Carolina and literary tourism. I learned that Poe spent time in Sullivan’s Island South Carolina while in the Army. I visited the island to discover how he has been commemorated in South Carolina. I also made some suggestions of how the state could better exploit its Poe connections through literary tourism.

Archaic Lithic Technology of Columbia
Jonathan Whitlatch, Anthropology - Senior
Mentor: Dr. Charles Cobb, Anthropology
The archaic period (8000-1000 BC) in what is now Columbia South Carolina was characterized by growing sophistication in technology and movement of peoples. The primary material used in creating stone points and tools was quartz. A major archaeological excavation of one such archeaic site in Columbia was conducted in 2009-2010 by the South Carolina Institute of Anthropology and Archaeology. My project was an analysis of the recovered artifacts from Test Unit 6 of the Data Recovery. The artifacts consisted mostly of quartz with high frequencies of piedmont silicate and some rhyolite and chert artifacts dispersed within. The goal of this project was to provide an analysis of a sample of the test unit and evaluate the people’s uses of different materials to make different tools. There is a correlation between the quality of a raw material and the abundance of the material as to what kind of tools are made from the raw material. Thus the abundance of quartz (a low quality raw material) should be correlated with quickly made and discarded (expedient) tools. The analysis in contrast did not show an excess of expedient tools compared to the amount of formal tools and the lithic debitage left at the site. The analysis provides a hypothesis for the unexpected correspondence between poor quality raw materiality and relatively formal non-expedient technology.
Just a dare or unaware? Exploring campus drugging and sexual assault

Janae Bonsu, Psychology - Senior

Mentor: Dr. Suzanne Swan, Psychology

The overall aim of this study is to evaluate how college students are affected by sexual violence and drugging i.e. putting a drug into someone’s drink. Specifically this study will assess the prevalence of sexual violence drugging and the experiences and motives associated with these behaviors. The study is part of the third wave of a longitudinal study examining sexual violence and dating violence that has been conducted annually for the previous two years. Findings will provide data on the context of drugging and sexual assault. The study will also examine sexual assault and drugging victims’ utilization of campus resources. Findings will help inform efforts to prevent violence on college campuses.

Effects of Parenting Strategies and Parent Weight Status on the Weight Status of African American Adolescents

Caitlin Hucks, Psychology - Senior

Mentors: Dr. Dawn Wilson, Psychology
Mrs. Sara St. George, Psychology

Adolescent obesity has become a major issue for ethnic minority communities in the United States with approximately 40% of African American youth currently classified as either overweight or obese. Previous research suggests parents influence their children’s weight status through numerous parenting practices (e.g. monitoring control). However little research in the area of parenting specific to health behaviors has been conducted with African American families. This study examined (1) differences in parenting strategies for regulating adolescent eating and physical activity behaviors (i.e. monitoring limit-setting control reinforcement discipline) by parents’ Body Mass Index (BMI) and (2) how parenting strategies and parent BMI jointly impact adolescent weight status. Participants (n=72 families 100% African American 63% adolescent girls) completed baseline measures as part of their participation in a family-based health promotion program known as “Project SHINE” (Supporting Health Interactively through Nutrition and Exercise; NIH F31HD066944). Parent and adolescent BMI were calculated using objective height and weight measures. Parenting strategies for eating and activity were measured using a previously validated questionnaire. Results indicated a significant difference on the parenting strategy of control by parent BMI status with normal weight parents endorsing greater amounts of control than either overweight or obese parents. However parenting strategies and parent BMI did not significantly predict adolescent BMI. This study suggests that parental control may be related to parental weight status and highlights the need for further exploration of why this particular strategy may be less utilized by overweight/obese parents.

The Effect of Gender on Perceived Credibility of a Statement

Miroslava Radieva, Psychology - Senior

Mentor: Dr. Douglas Wedell, Psychology

This research investigated if the gender of a speaker influences the credibility of their statements. Study 1 tested the knowledge of 40 participants viewing 60 pairs of written statements about history geography entertainment and sports.
From this set 55 pairs of statements for which participants did not consistently know the correct answer were digitally recorded by eight males and eight females all of whom were native English speakers. Study 2 asked participants to rate the different characteristics of the different voiced statements on scales such as masculinity, femininity, honesty, intelligence, and friendliness. Study 3 then presented participants with pairs of statements one voiced by a female and one voiced by a male and asked them to judge which statement was true. The key research question was whether participants may be biased by the gender of the speaker to find a statement more or less credible. Analyses were run to determine whether the attribute ratings of the voices from study 2 could account for the results.

**Science and Neuroscience**

**Investigating the function of AIL7 in Arabidopsis flower development**

*Caitlin Boling*, Biological Sciences - Junior  
Mentor: Dr. Beth Krizek, Biological Sciences

This research will investigate the molecular mechanisms controlling floral organ growth and development in the model plant Arabidopsis thaliana. I will probe the function of the *AINTEGUMENTA-LIKE 7* (AIL7) gene in flower development by investigating the phenotypic consequences of ectopic AIL7 expression. The main goal of this research is to gain insight into the roles of AIL7 during flower development. In order to work towards this goal we plan to focus on two objectives. We will confirm that transgenic plants containing an ethanol-inducible AIL7 transgene exhibit increased levels of AIL7 mRNA after ethanol treatment and we will perform phenotypic characterization of flowers that constitutively express AIL7. This project will add to our understanding of a basic developmental question: how do a small number of undifferentiated cells give rise to a complex structure consisting of many different cell types organized within distinct tissues? The project will also help us to better understand stem cells since AIL7 expression is primarily restricted to floral stem cells in wild-type plants. And lastly this project adds to the global body of knowledge about flowers which are the source of fruits, seeds, and grains. An understanding of their development may help us increase food production.

**Breast Cancer**

*Rick Brown*, Biological Sciences - Junior  
Mentors: Dr. Bert Ely, Biological Sciences  Ms. Regina Wragg, Biological Sciences

The overall incidence of breast cancer in African American Women is lower than that of White African American Women however the African American Women have an overall lower survival and disease-free survival rates for breast comparison between African American and Caucasian American Breast cancer patients. Associating characteristic of poor breast cancer prognosis measured by patient and tumor characteristics which are two genetic factors of adiponectin. Adiponectin is an anti-proliferative and pro-apoptotic adipokine secreted by fat cells. The goal of this experiment is to find the connection between adiponectin and breast cancer to explain why the mortality rate of African American Women with breast cancer is higher than that of Caucasian American Women. Considering only the first phase of an analysis was completed there was no findings.

**Correlating Inflammation to Scar Tissue Formation in Skeletal Muscle Tissue Healing**

*Gerry Koons*, Biomedical Engineering - Sophomore  
Mentor: Dr. Michael Yost, Department of Surgery

The human face defines each individual to the outside world. For people especially children with facial abnormalities this most distinctive and always visible feature becomes a source of physical pain, function loss, and psychosocial and emotional turmoil. The body naturally contains muscle stem cells called
satellite cells that restore skeletal muscle tissue damaged or missing on the face due to injury disease surgical treatments or birth defects but these cells' regenerative capacity is limited. Engineers therefore want to generate skeletal muscle tissue for surgical implantation into patients' faces. However previous attempts to implant engineered tissue have been troubled by scarring that deforms the tissue structure around the site and distorts or damages the implant itself. The relationship between initial inflammatory response and subsequent long-term scar formation has not been well characterized in skeletal muscle. We thus aim to quantify and compare inflammation and scarring in images of healing skeletal muscle tissue to investigate and define this proposed relationship. After staining healing skeletal muscle tissue to highlight inflammatory cells such as neutrophils and macrophages computer imaging software is used to quantify the cells. Our laboratory has generated numerous models modulating the initial inflammatory response using novel peptides. These early inflammation levels can be compared to the later formation of scar tissue. These findings should help define the relationship between the quantity and type of early inflammation and drive the healing process towards regeneration and away from scar formation.

Skeletal muscle mitochondria size during cancer cachexia development in the ApcMin/+ mouse

John Lewis, Exercise Science - Senior
Mentor: Dr. James Carson, Exercise Science

Cancer cachexia is a wasting syndrome characterized by the progressive unintentional loss of body mass in response to a malignant growth. Skeletal muscle tissue deterioration is a significant source of weight loss, which can have the effect of compromising mobility and quality of life. Previous work has focused on the mechanisms of myofiber protein depletion; however, the manner in which cachexia affects mitochondria size of muscle is poorly understood. The purpose of this study was to examine changes in skeletal muscle mitochondrial populations with the progression of cachexia development in the ApcMin/+ mouse. Quadriceps muscles were excised from mice at various stages of cachexia and fixed in 2.5% gluteraldehyde. Electron microscopy images were taken at 15000X magnification. Mitochondrial number and size distributions were quantified using Image-J software. Severely cachectic mice demonstrated 22.0±0.7% body weight loss, wild type, WT, (0.0±0.0%) and weight stable, WS, (0.6±0.3%) had no significant body weight loss. Mean mitochondrial size was significantly smaller in the WS compared to the WT, p=0.01; but not between WT and severe mice. When mitochondria were stratified by size, 67% of WT mitochondria were 0.2um2, 87% for WS, and 71% for severe. Mitochondria ≥2.0um2 were 1% for the severe mice but not observed in the WT and WS. These findings demonstrate that mitochondria size is a skeletal muscle property affected by cachexia. Intervenational strategies that target changes in mitochondria size during cancer cachexia may attenuate wasting and improve patient wellbeing.

Studying Brain Areas Involved in Purchasing Decisions

Emily Young, Biological Sciences - Junior
Mentor: Dr. Roger Newman-Norlund, Exercise Science

In order to determine the factors that contribute to an individual's purchasing decisions we studied areas of the brain that respond to an item's perceived value usefulness and rarity in expert trading card players. Our study observes expert Magic: the Gathering players a group of consumers who must consider three characteristics with the purchase of every card. Each participant participated in one 22 minute functional MRI session during which they were shown cards of varying monetary value usefulness and rarity in a pseudo-randomized fashion. The results of these scans revealed activity in the insula of the most expert player but no players showed activation of the nucleus accumbens both areas of the brain previously linked with different aspects of the purchasing process. The results of these scans revealed activity in the insula of the most expert player but no players showed activation of the nucleus accumbens both areas of the brain previously linked with different aspects of the purchasing process. Future studies of neuroeconomics can reveal the extent to which marketing and advertising agencies should focus on their consumers' perceptions of a product's rarity and usefulness.
Modeling the First and Second Coordination Spheres of Type-2-Cu Nitrite Reductase

Alexander Brugh, Chemistry - Senior; USC Aiken
Mentor: Dr. Gerard Rowe, Chemistry; USC Aiken

The enzyme type-2-copper nitrite reductase (T2Cu-NIR) plays a vital role in the nitrogen cycle reducing nitrite to nitric oxide by transferring two protons and an electron. The ability to mimic this process through use of a synthetic catalyst could advance understanding of how the enzyme functions and prove useful for energy related applications which rely heavily on the transfer of electrons. To model T2Cu-NIR a synthetic model was designed and crafted using a trispyrazolylborate ligand modified with a pendant benzoic acid arm to mimic secondary coordination sphere effects and tert-butyl groups for steric hindrance. The completed model is to be characterized and tested for general catalytic efficiency rate and lifespan.

Changing pH and alkalinity levels throughout the SEA C-235 cruise track

Meryssa Downer, Marine Science - Senior
Mentor: Dr. Claudia Benitez-Nelson, Earth and Ocean Sciences

The goal of this project was to understand the relationship between pH and alkalinity and nitrate phosphorus chlorophyll a as a function of location and depth. Samples were collected from May - June 2011 from the Northern Gulf of Mexico through Key West and up the eastern coast to Cape Cod Ma. Water column samples were collected using a rosette CTD. We determined pH nitrate and phosphate using spectrophotometric methods titration to determine alkalinity and a fluorometer for chlorophyll a fluorescence. Our results show that the Northern Gulf of Mexico had the highest average surface pH (8.02) alkalinity (2.608 meq/L) and chlorophyll a (0.249 V) which we attributed to freshwater input from the Mississippi River. Depth profiles further showed that pH and temperature decreased exponentially with depth; opposite that of phosphate and nitrate reaching a maxima at ~ 1000 m. In contrast alkalinity remained fairly constant throughout the water column. We hypothesize that increasing CO2 nitrate and phosphate concentrations were balanced by small pH decreases caused by CaCO3 dissolution. Thus competing processes in the Atlantic Ocean maintain a relatively stable alkalinity and indicates the ability of the coastal North Atlantic to resist large scale changes in pH.

Innovative Schottky Contacts on Gallium Chalcogenide Semiconductors for High-resolution Nuclear Detectors

Rahmi Pak, Electrical Engineering - Junior
Mentor: Dr. Krishna Mandal, Electrical Engineering

The layered anisotropic chalcogenide semiconductors GaTe and GaSe single crystals have been grown by a modified vertical Bridgman technique using high purity Ga (7N) and zone refined (ZR) precursor materials (Te and Se). The grown crystals are harvested from ingots of up to 10 cm length and up to 1" diameter and have been characterized by measuring resistivity through current-voltage (I-V) characteristics and bulk carrier concentration through Hall effect measurements. Scanning electron microscopy etching characteristics and contact resistivity studies have been conducted to further characterize the grown crystals. Innovative Schottky contacts have been fabricated using high and low work function metals such as Au Ag Pd Ni Al and Mg metals. Nuclear radiation detectors of different geometries such as guard ring Frisch grid coplanar and pixellated structure have been fabricated and characterized for hand-held x-ray and gamma ray detection for Homeland security cancer diagnostics nuclear nonproliferation treaty verification radioactive waste monitoring and nuclear power plant security applications.

Spatial and Temporal Distribution of Nitrogen Species in Lake Wateree SC

Allyson Shea, Biological Sciences - Senior
Mentor: Dr. Daniel Tufford, Biological Sciences

Lake Wateree is a reservoir in the Midlands of South Carolina. It was formed by damming the Wateree River part of the Catawba River watershed in 1920. It is one of South Carolina’s oldest man-made lakes. It is commonly used for fishing boating and other recreational activities so it is crucial to understand the water quality conditions as it is directly linked to public health. The large amount of wastewater flow from Charlotte NC has been known to cause problems with regards to nutrient loading and accumulation. Nitrogen is one of the key elements involved in biological processes within lake ecosystems and it is one of the most abundant nutrients supplied by anthropogenic sources and atmospheric deposition. This project was intended to characterize the nitrogen budget in Lake Wateree and to evaluate the relative importance of spatial and temporal scales on the distribution of nitrogen species throughout the lake depth profile. Samples were taken in January March May June July August and September 2011. Seven sites were chosen (four embayments and three channels) at the south end of the lake a decision based on exploratory field work during summer 2009. Water samples were analyzed for inorganic nitrogen species (nitrate nitrite and ammonia) and total dissolved nitrogen concentrations. Sediment samples were also taken at the same time and analyzed for total nitrogen content. The data showed that there is both a strong seasonal and spatial patterns with regards to nitrogen species in Lake Wateree.

Graphene Based Wireless Sensor for the Detection of Nitrogen Oxide

James Tolson, Electrical Engineering - Sophomore
Mentor: Dr. Goutam Koley, Electrical Engineering

The layered anisotropic chalcogenide semiconductors GaTe and GaSe single crystals have been grown by a modified vertical Bridgman technique using high purity Ga (7N) and zone refined (ZR) precursor materials (Te and Se). The grown crystals are harvested from ingots of up to 10 cm length and up to 1" diameter and have been characterized by measuring resistivity through current-voltage (I-V) characteristics and bulk carrier concentration through Hall effect measurements. Scanning electron microscopy etching characteristics and contact resistivity studies have been conducted to further characterize the grown crystals. Innovative Schottky contacts have been fabricated using high and low work function metals such as Au Ag Pd Ni Al and Mg metals. Nuclear radiation detectors of different geometries such as guard ring Frisch grid coplanar and pixellated structure have been fabricated and characterized for hand-held x-ray and gamma ray detection for Homeland security cancer diagnostics nuclear nonproliferation treaty verification radioactive waste monitoring and nuclear power plant security applications.
microprocessor to read an input convert it to a desired output display that output on the LED display and finally transmit the data wirelessly to a computer. The calibration of the sensors is still a work in progress but initial test data shows that the graphene based sensors are indeed a viable option for NO2 detection.

**Study of the Strong Force via Polarization Observables in Meson Photoproduction Nuclear Reaction**

**Weizhi Xiong**, Physics - Senior
Mentor: Dr. Yordanka Ilieva, Physics and Astronomy

Here we present a new method to estimate the polarization observable beam spin asymmetry (Sigma) from experimental data on nuclear reactions initiated by linearly polarized photon beam. We use the Maximum Log-Likelihood (LL) method to determine the estimator for Sigma and its uncertainty. We construct the probability density function (p.d.f.) of the azimuthal angle, $\phi$, according to the physics dependence of the cross section of a nuclear reaction on $\phi$, in which Sigma is a parameter. To test our estimator, we applied it to randomly generated events similar to real data from the $\gamma d \rightarrow pp\pi^-$ reaction occurring when a photon strikes a deuterium target. We analyzed samples generated with, and without, detector acceptance folded in the p.d.f., where we extract the functional dependence of the detector acceptance from real data taken with the CLAS detector at Jefferson Lab. We find that the value of Sigma estimated from the LL method is consistent with the true value and our estimator is unbiased. We show that the LL method yields an estimate for Sigma that has a smaller uncertainty than estimates obtained from fits to azimuthal distributions. We have applied the LL estimator to real data of the nuclear reaction taken at Jefferson Lab. The results for Sigma using the estimator are consistent with results obtained by other statistical methods. Ours is a new and original study which supports the rich N* physics program based on polarization observables that is currently being run in Hall B at JLab.

**Representations of Election and Post-Election Discourse in Rwandan Media**

**Darby Kirven**, International Studies - Senior
Mentor: Dr. Ronald Atkinson, History

Seventeen years after experiencing a genocide that killed nearly a million people, Rwanda, a small landlocked country in eastern Africa has emerged as a favorite of the international donor community and model of economic progress and development in the region. Three summers of living and studying in Rwanda has provided insight into the nation’s post-conflict evolution. The purpose of the study was threefold. First, I continued research begun in the summer of 2010 that examined the public political discourse in both English and Kinyarwanda newspapers and magazines before and after presidential elections. Secondly, I sought to examine the extent which the dominance of a single political party and ideology affects public debate. Lastly, I received language tutoring in the local language Kinyarwanda. Preliminary research demonstrates a lack of nuance in public discourse discussing politically-related issues. Few local media outlets challenge a dominant narrative that overwhelmingly supports the current regime led by President Paul Kagame’s Rwandan Patriotic Front (RPF) party. Local Kinyarwanda media outlets that do publish critique of the existing government (however sensational or minimal) have become virtually nonexistent vis-a-vis temporary suspension or permanent expulsion from the public discourse. In Rwanda today, there is a serious need for the opening up of discursive space – one that enables media outlets to publish information without fear of retribution from the current single-party government.

**The Effect of Superstitious Beliefs on the Resolution of Self-Control Dilemmas**

**Addison Litton**, International Business - Senior
Mentor: Dr. Thomas Kramer, Marketing

Superstitions are beliefs that are inconsistent with the known laws of nature or with what is generally considered rational. The presence of superstition in any given society is closely related to that society’s perceived locus of control. In cultures where an “external” locus of control pervades consumers believe that their behavior is controlled by forces outside of themselves and thus are inclined to believe in “passive” superstitions like luck fate or astrology. These types of beliefs are most prevalent in Eastern societies. In contrast, consumers from cultures marked by an “internal” locus of control are less likely to foster these types of superstitions because they believe that their behavior is determined largely by factors within themselves. Western societies typically exemplify a more “internal” locus of control. My Magellan research seeks to explore consumer impulsivity as it relates to locus of control and passive superstitions in Eastern versus Western cultures. In every society, consumers often encounter choices between immediate temptations and long-term goals. Impulsive behavior often results from these immediate temptations resulting in unplanned or unintended outcomes. With my research I hope to test whether consumers from Eastern societies are more
inclined to impulsivity than Western consumers given their “external” locus of control and their belief in passive superstitions. I will accomplish this by administering a cross-cultural survey questionnaire measuring the correlation between locus of control and impulsivity in consumers from Western versus Eastern societies.

**Current NFL Collective Bargaining Agreement vs Previous - Main Similarities/Differences**

*Tyler McBride*, Sport and Entertainment Management - Senior  
Mentors: Dr. John Grady, Sport and Entertainment Management  
Dr. Tom Regan, Sport and Entertainment Management

The purpose of this study was to focus on the issues that surrounded the NFL lockout in 2011 specifically analyzing the differences in the newly ratified collective bargaining agreement (2011-2020) versus the expired agreement (2006-2011) and the impact the new agreement will have on the league teams and players. The research focused on the following specific areas of the two agreements: the league salary cap rookie wage scale player's percentage of league revenue minimum contracts player health/safety and retired player benefits. Both of the collective bargaining agreements are long detailed and contain every potential issue that could be disputed between players and the league itself. The five main focus points were established to answer formulated research questions. Once the research questions were determined a literature review was conducted to develop an understanding of existing knowledge outline and their relevance to the topic and research questions. Through analyzing the two agreements the researcher looked for main points of agreement in both CBAs and analyzed the substantive terms of the agreements themselves. This was done using library databases the internet and materials that professors in the SPTE department provided. Research was done to find the previous and current collective bargaining agreement salary cap team payrolls and player salary statistics for five years previous through the current season.

**The Northern-Southern Divide: A Critical Case Analysis of Capital Punishment in Texas and Illinois**

*Emily McCarney*, Criminology and Criminal Justice - Senior  
Mentors: Dr. Todd Shaw, Political Science  
Ms. Melissa Kupfer, TRIO Programs

There is an extensive debate over the controversial subject of capital punishment in the United States. However what is puzzling is although thirty-four states currently have the death penalty sixteen states and the District of Columbia prohibit the practice altogether. Not one of those fifteen states is located in the southern region of the United States. The two main problems that structure this research are: the overwhelming number of executions that occur in the South in comparison with the North and the absence of repeal in the South. These problems lead to the question: why does such a stark division exist in the United State? In order to explore this problem a critical case analysis of two states was conducted. Texas was used to represent the South because since capital punishment was reinstated in the United States in 1976 Texas has executed 468 death row inmates whereas Illinois has only executed total of 20 death row inmates. Illinois was chosen to represent the North because as of March 9th 2011 it is the most recent state to repeal capital punishment. Three factors were examined within each state: a brief history of capital punishment racial disparities on death row and recent issues regarding exoneration and clemency.

**The Impact of Social Capital Space and Class on Atlanta Black Politics**

*James McCoy*, Political Science - Senior  
Mentors: Dr. Todd Shaw, Political Science  
Mr. Kasim Ortiz, Health Services Policy and Management

This presentation provides preliminary results related to a larger research project that seeks to understand how political behavior is influenced by social capital space and class. Previous research related to social capital has never sought to understand how the changing conceptions of communities influence one's notion of black linked fate or group solidarity/consciousness. This is particularly true for the influence of these aspects on political behavior. We seek to understand this relationship through: (1) gathering social capital data within the city boundaries of Atlanta Georgia; (2) gathering electoral data from precincts within the city boundaries of Atlanta Georgia; (3) overlaying the above two layers of data with 2009 census population and economic estimates for Atlanta Georgia; and (4) completing a preliminary analysis of the relationship between black neighborhood's socioeconomic status and levels of social capital. The outcome is to evaluate how these aspects influenced levels of support by black constituents for black and non-black mayoral candidates. Although this research project is still in its infancy we are formulating a new concept of understanding collective activism by adding various components in a new innovative manner. The larger project will provide new insight into how an individual’s notion of a community impacts their political behavior.
Intergenerational Dance: Building Community through Dance
Jennifer Coffey, Dance - Junior
Amanda Nelson, Dance - Junior
Mentor: Dr. Mila Parrish, Theatre and Dance
Intergenerational Dance: Reaching Connecting and Building Community looks at the ways communities are changed when movement activities are used to share life experiences create new awareness of the self and others. In the year long research project the research team Jennifer Coffey and Amanda Nelson in collaboration with dance faculty Dr. Mila Parrish collaborated with a group of elementary school students and their parents grandparents and great-grandparents to form three generations of intergenerational community. Participants learned about dance studied and discussed dance and created a performance piece together. The Intergenerational Dance program necessitates varying levels of collaboration in the creation of a new dance. All activities are designed to promote contact and ongoing opportunities for mutual investment and collaborative relationships among generations. In the process of creating and sharing dances participants’ levels of engagement increased as a result of the collaborative relationships. The research team selected compassion as the theme for the curriculum as it would bring rich and engaging conversations as well as artistic inspiration addressing concepts of relevance connotation of meaning and social influence. Benefits from participation in intergenerational dance for young people include enhanced cognitive performance improved attitudes towards aging and increased emotional development (empathy compassion and awareness of the needs of others). Benefits to seniors include increased health and activity levels improved attitudes towards the younger generation self-discovery and improved community engagement. Forming an intergenerational community creates relationships in and through movement where everyone can dance.

Development and Implementation of the “Super Healthy Kids” Program for Children at the Pinehurst Community Center
Kizer Crum, Exercise Science - Senior
Mentor: Dr. Mindi Spencer, Health Promotion Education and Behavior
The purpose of this project was to develop and implement an interactive health promotion program focusing on nutrition and exercise for African American children and assess changes in knowledge and behavior over time. The Pinehurst After-school Program was selected for implementation of the project. A preliminary needs assessment was conducted with key stakeholders and approximately 15 African American children ages 6-10 were recruited to participate. The program itself was based off the 10-week “Lively Ladies” program (Klebanof, 2002), where the participants meet twice a week for 1-2 hour sessions. It was modified to be more age-appropriate and then at the request of the children, renamed “Super Healthy Kids.” Investigator responsibilities included creating learning objectives for lesson plans, scheduling cooking and physical education activities, and setting up football and basketball clinics. A one-group, longitudinal pre-test/post-test design was used to assess whether the program changed the participants’ health knowledge and behaviors. The post-survey for this ongoing study will be administered the 21st of March and results
will be discussed during the presentation. Community-based health promotion programs are necessary in order to reduce the burden of chronic diseases within the African-American population. The Super Healthy Kids program illustrates the importance of community engagement in public health. This program demonstrated that investigator presence throughout the process and guidance upon program completion is critical in order to foster trust and promote success and sustainability in community-based interventions.

**Dig in! The Impact of Parental Involvement on At-Risk Youth and Academic Outcomes**  
**Jasmine Horton,** Secondary Education - Senior; USC Upstate  
Mentor: Dr. Jennifer Parker, Sociology, Criminal Justice and Women's Studies; USC Upstate  
This study identifies factors contributing to a decrease in parental involvement from elementary through high school. This study develops ways to get and keep parents involved in their child’s education and designs an after school program to educate parents on the effects of their involvement. This study demonstrates that the more involved a parent is in their child’s academics the more likely the child will be successful. The first phase of this project is to classify a district of at-risk schools and their parental involvement. The second phase is to find ways in which parents can be involved and stay involved. The final phase involves the development of an after-school program where two sets of student and parents will be compared.

**Education Reform in Modern Britain: Targeting the Disadvantaged**  
**James Strickland,** History - Senior  
Mentors: Dr. Valinda Littlefield, History  
Dr. Dorothy Pratt, History  
This research focuses on how effectively recent education reforms in urban England target groups of students who traditionally perform the worse: namely children from impoverished backgrounds recent immigrants and minorities. In July 2010 the Parliament of the United Kingdom passed the Academies Act an extensive piece of legislation that allows for both the transformation of state schools into semi-autonomous “academies” and the implementation of largely deregulated “free schools.” Free schools (the focus of my research) are institutions established by parents teachers administrators and charities. They operate outside the jurisdiction of local authorities and have great discretion in teacher hiring and pay and pedagogical methods. They are funded and inspected by state authorities and do not charge tuition. In September 2011 24 free schools began operations across England with additional applications awaiting review by the Secretary of Education. Some schools are former independent (private fee-charging) schools while others are completely new. Several have opened to great acclaim in various areas of London which is where I conducted research. This presentation includes my findings.
Function of HER2 signaling in breast cancer stem cells

Andrea Daamen, Biological Sciences - Senior
Mentor: Dr. Hexin Chen, Biological Sciences

Human epidermal growth factor receptor 2 (HER2) is an oncogene that is overexpressed in 20-30% of breast cancer patients and is associated with poor patient prognosis due to its therapeutic resistance. Several studies have shown a relationship between the expression of HER2 and an increase in the prevalence of cancer stem cells. According to the cancer stem cell hypothesis these stem-like cells may be responsible for tumor initiation and maintenance and so contribute to treatment resistance. However the exact signaling pathways downstream of HER2 which are important for the regulation and maintenance of this cancer stem cell population are largely unknown. The major signaling pathways stemming from the HER2 receptor were identified and tested using western blot analysis of MCF10A and MCF7 cell lines in which HER2 was overexpressed. Then a siRNA HER2 knockout in the MCF10A cell line was created and used to identify those pathways which rely on HER2 expression. In particular it was discovered that active forms of Akt and Shc proteins were downregulated with a siHER2 knockdown. Inhibition of Akt and Shc activation with chemical inhibitors resulted in reduction of CSC population suggesting of their important functions in maintenance of HER2-positive CSC population. In the future understanding HER2 signaling pathways and their relation to cancer stem cells could be essential in discovering new treatment methods targeting this therapeutic resistant population.

Identification of Dual-Target Drugs for Alzheimer’s disease

Darien Davda, Biomedical Engineering - Senior
Mentor: Dr. Melissa Moss, Chemical Engineering

Alzheimer’s disease (AD) is the most common form of debilitating dementia; it produces symptoms of long-term memory loss, linguistic incapability and chronic cognitive failure. Biochemical studies have shown that the amyloid-beta protein (Aβ) forms aggregates that deposits across the brain and these aggregates are fundamental to the disease symptoms. Aggregation of monomeric Ab begins with a lag phase following by rapid growth during which soluble aggregates are created. These aggregate intermediates eventually form fibrils which deposit as Aβ plaques in AD patient brains. In addition AD brains exhibit deficits in the neurotransmitter acetylcholine. Currently FDA approved drugs reduce Acetylcholinesterase (AChE) activity in order to improve AD symptoms. However AChE inhibitors could additionally have the potential to stop Aβ aggregation. This project evaluates the inhibitory potential of several derivatives of a known AChE inhibitor on Aβ aggregation. Aβ monomer was aggregated in the presence of NaCl to promote nucleation and excess molar quantities of AChE inhibitors. The effect of inhibitors upon both nucleation indicated by an extension of the lag time to aggregate appearance and the extent of aggregation was determined. Effective inhibitors were identified as those that delayed nucleation or curtailed the extent of fibril formation.

Developing a Structure-Property Relationship for Synthetic Lectins: Structural Optimization Towards Novel Cancer Diagnostics

Hannah Gamble, Chemistry - Senior
Mentor: Dr. John Lavigne, Chemistry and Biochemistry

Synthetic lectins provide a unique potential for cancer detection diagnoses and treatment. The ability of synthetic lectins to detect abnormal glycosylation is based upon the covalent yet reversible interactions that occur between boronic acids and glycoproteins; this ability may be further optimized by altering the amino acid construct of these boronic acid functionalized synthetic lectins. Herein is described the optimization of the synthetic lectin design by the sequential mutation of the amino acid construct. It is believed that specific amino acids may play a role in the ability of the synthetic lectin to selectively bind to certain target analytes. Further understanding of this component of the synthetic lectin design will provide valuable insight into the fundamentals of how synthetic lectins bind to certain glycoproteins. This information will be useful for defining binding affinity and selectivity between similar glycoproteins thus potentially leading towards the creation of novel cancer diagnostics.

Function Characterization of FRO4 and FRO5: Members of the Arabidopsis Ferric Reductase Oxidase Genefamily

David Harris, Biological Sciences - Sophomore
Mentor: Dr. Erin Connolly, Biological Sciences

Iron deficiency afflicts approximately 3 billion people worldwide; many of these people acquire their iron primarily from plant-based foods. In addition approximately 30% of soils are considered iron deficient and crops grown in these soils have reduced yield. While our understanding of iron uptake from the soil has improved in recent years we still know very little about iron distribution to and from leaves. Acquiring more knowledge in this area would allow for the genetic manipulation of certain staple crops such as rice to include more nutrients in the edible portion of the plant. These modified plants could benefit consumers who suffer from anemia or a lack of iron. Once plants have taken up iron from the soil it is crucial for iron to be mobilized to seeds. Previous data has shown that genes known as ferric reductase oxidases (FROs) show expression in flowers of the model plant Arabidopsis thaliana and may function in loading essential iron into the seeds as they are formed. In order to validate that two of the FRO genes function in loading of iron to the seeds plants are being grown hydroponically in iron-sufficient and iron-deficient media and their expression will be monitored using semi-quantitative RT-PCR. Flowers of hydroponically grown plants will be harvested and RNA will be isolated and used to synthesize cDNA. Semi-quantitative RT-PCR will then be used to quantify the abundance of FRO gene transcripts using actin as a control.
Determining Genotype to Phenotype Relationships via Genotyping by Sequencing (GBS)

Katherine Hicks, Marine Science - Junior
Mentor: Dr. Steve Kresovich, Biological Sciences
The research I am currently doing for my Magellan Scholarship is analyzing the impact and effectiveness of genotyping by sequencing (GBS) for agricultural and medical population genetic studies to determine the link between genotype and phenotypic variation. In plants GBS can be used to identify and understand the genetic basis of important plant phenotypes such as disease or drought tolerance. In a similar vein with humans GBS can be used to determine genetic basis for diseases such as lupus. In my research I have extracted the DNA from different sorghum plants representing selected parents by using a Gel Qiagen kit. Once the DNA has been extracted I take a gel image of it. I am now preparing to send my DNA samples and their images (noting DNA quality) to Cornell University for sequencing. Once we have the data I intend to perform a series of statistical tests to associate genotypes with observed phenotypes. I plan to characterize the different genotypes of the sorghum that are key sources of phenotypic diversity for agricultural production worldwide. I also plan highlight the connections between this molecular population genetic approach to agriculture with potential applications to personalized medicine. GBS is a potentially powerful and cost-effective tool that can reveal the genetic basis of important phenotypes. This capability is fundamental to the better understanding of genetics.

Effect of Apoptosis-Inducing Reagents on Rat Brain Microvascular Endothelial Cell Survival: A Model of Diabetes

Jessica Kaczmarek, Chemistry - Sophomore
Mentors: Dr. Adviye Ergul, Georgia Health Sciences University, Department of Physiology
During the summer of 2011 I held an internship at the STAR Program at Georgia Health Sciences University the third oldest continuously operating medical school in the southeast located in Augusta GA. The STAR Program is a 9 week internship in which students work closely with a mentor to complete a biomedical research project. The title of my project and my poster is “Effect of Apoptosis-Inducing Reagents on Rat Brain Microvascular Endothelial Cell Survival: A Disease Model of Diabetes.” Over 20 million patients in the United States have been diagnosed with diabetes. Diabetic complications mostly involve disease with the vasculature. Complications include retinopathy peripheral arterial disease coronary artery disease and stroke. Diabetes induces microvascular remodeling in the brain which is linked to diabetic cerebral complications such as microbleeds (stroke) and vascular dementia. Stroke outcome is worse in diabetic patients compared with non-diabetic patients. Endothelial cells isolated from diabetic cells can be used as a model system to study diabetes. My hypothesis was that rat brain microvascular endothelial cells (rbMECs) isolated from diabetic rats have decreased survival and increased apoptosis when challenged with stress when compared with rbMECs isolated from control rats. The findings from my experiment clearly suggest that cells isolated from diabetic and non-diabetic rats behave differently when subjected to the same conditions of stress.

Base Excision Repair Status and PARP Inhibition in Breast Cancer Cells

Nathan Mitchell, Pharmacy - Sophomore
Mentor: Dr. Michael Wyatt, Pharmaceutical and Biomedical Sciences
In the effort to develop better chemotherapy drugs the effects of poly-(ADP-ribose) polymerase (or PARP) are being investigated. PARP is a protein active in the DNA repair base excision repair (BER). When a healthy cell experiences single strand breaks PARP will recognize and initiate repair. When PARP is inhibited cells will repair the damage with a different pathway homologous recombination (HR). Some breast cancer types are known and many others are suspected to be defective in HR. Inhibiting PARP in these cells results in cell death. To test the effectiveness of PARP inhibition the sub cellular localization of PARP and XRCC1 another BER protein was observed. In this experiment breast cancer cell lines were treated with a PARP inhibitor ABT 888 in concentrations of 10^-5 and 1 micromolar and compared to an untreated control. The different cell lines were examined including sublines of the original parental cells that were proficient or deficient in another protein that participates in BER. These cells are being compared to examine what happens when BER is inactivated by genetic mutation. The ability of ABT 888 to change the nuclear localization of XRCC1 and PARP was determined by fluorescent microscopy. This experiment will clarify how PARP inhibition operates and its effects on the other proteins involved in the BER pathway. The clinical implications are to better understand which cancer types will be susceptible to PARP inhibition by knowing the status of the BER pathway and which patients can be treated with PARP inhibitors.

Protein-based Mass Spectrometric Investigation of Breast Cancer Cell Lines

Lauren Stephens, Chemistry - Senior
Mentors: Dr. Stephen Morgan, Chemistry and Biochemistry  Dr. Qian Wang, Chemistry and Biochemistry
Traditional approaches to analysis of biochemical systems associated with human disease involves identification of target molecules and study of biochemical transformations. The growth of “omics” (proteomics metabolomics) has shown behavior of biochemical systems inherently involves factors acting synergistically. Further development of matrix-assisted laser desorption time-of-flight mass spectrometry enables comprehensive fingerprinting of cellular proteins. Different forms of normal and cancer cells were cultured and pretreated in a series of steps involving cell suspension solvent extraction sample sterilization surfactant treatment sample fractionation and matrix selection. Typical mass spectra of cells are complex patterns with over 100000 data points with ion m/z values as high as 35000. By using established bioinformatics techniques for dimensionality reduction coupled with multivariate pattern recognition (specifically linear discriminant analysis) we have successfully used these patterns for discrimination between normal and cancer cell lines. The data analysis produces a representation of each set of cell patterns by a cluster of points defined by combinations of relevant mass spectral peaks. The results of this project are of importance because differences found between cancer cell lines and normal cells can lead to discovery of new cancer protein biomarkers and potentially to automated diagnostics. This research places us one step closer to understanding the complex systems associated with human disease and potential for chemical discrimination between breast cancer cells and normal cells at a biochemical level.
Fabrication and Testing of CdZnTe Radiation Detectors
Brandon Dewese, Electrical Engineering - Junior
Mentor: Dr. Krishna Mandal, Electrical Engineering
Cadmium Zinc Telluride (CZT) is a II-VI semiconductor material that can be used to detect nuclear radiations at room temperature. The CZT radiation detectors are very useful to identify the presence of hazardous and illicit nuclear materials that threaten our national security. The goal of this research is to characterize CZT crystals for the opto-electronic and charge transport properties and then evaluation through radiation testing for room temperature operation. We have used different techniques for CZT wafer preparation CZT material characterization detector fabrication and testing. The specific objectives accomplished include: fabricated CZT detectors clearly identified isotopic radiation sources such as 137Cs and 241Am and demonstrated an impressive energy resolution of 1.4% for 662 keV of 137Cs and 4% for 59.5 keV of 241Am.

Enhancing Natural Interaction Systems with Smartphones
Jason Isenhower, Computer Science - Junior
Mentor: Dr. Srihari Nelakuditi, Computer Science and Engineering
Natural interaction systems are becoming increasingly popular among consumers thanks to the development of devices such as Microsoft’s Kinect. It is the most prevalent natural interaction system on the market but there are a number of hardware limitations and environmental conditions that reduce or completely eliminate its ability to track the user. This project sought to take advantage of the fact that many users have a smartphone in their pocket while interacting with the Kinect by providing the sensor readings from the accelerometer and other sensors on the phone to the Kinect. Since the phone is always on the user it is free from the environmental conditions that adversely affect the Kinect. In addition the sensors on the phone provide a much higher sampling rate than the video tracking of the Kinect. An app was written to send the sensor readings from the phone to a computer hosting a Kinect. By using this link the phone and Kinect sensor data are being compared during various non-optimal tracking scenarios to determine whether or not the phone can increase the robustness and accuracy of the Kinect.

Mitigation of Carbon Catalyst Support Corrosion in Polymer Electrolyte Membrane Fuel Cells
Diana Larrabee, Mechanical Engineering - Junior
Mentor: Dr. Xinyu Huang, Mechanical Engineering
Fuel cell technology has the potential to greatly reduce pollution in large cities and to lower carbon emissions. Polymer electrolyte fuel cells (PEMFCs) convert chemical energy from a fuel into electricity and could replace the combustion engine in automobile. The cathode of PEMFCs must survive an aggressive environment from transient operation with start-stop freeze-thaw cycles and dynamic load-cycling operations. Developing better corrosion-resistant supports for platinum catalyst can help to extend the life and to reduce cost. For this project carbon nanotubes (CNTs) were used to support platinum nanostructured catalysts in the cathode of a PEMFC. Graphitic CNT provided added resistance against carbon corrosion observed in conventional carbon black. These cathode materials were tested for performance and durability. An adapted US Department of Energy accelerated stress test protocol for carbon corrosion was utilized to determine and project the durability of PEMFC components under simulated automotive drive cycle conditions. Periodic testing was done to monitor corrosion and degradation. To test the electrodes polarization curves were evaluated to characterize the electrochemical performance in the working fuel cell. Cyclic voltammetry was employed to directly determine loss of active catalyst surfaces material characterization detector fabrication and testing. The specific objectives accomplished include: fabricated CZT detectors clearly identified isotopic radiation sources such as 137Cs and 241Am and demonstrated an impressive energy resolution of 1.4% for 662 keV of 137Cs and 4% for 59.5 keV of 241Am.

Low-Cost Nanoreinforcement for Cement-Based Materials
English Player, Civil Engineering - Senior
Mentor: Dr. Fabio Matta, Civil and Environmental Engineering
This research is aimed at tailoring low-cost graphitic nanomaterials for incorporation into cement-based composites (such as concrete) with superior tensile strength and damage tolerance. Multi-wall carbon nanotubes (MWNs) and graphene nanoplatelets (GNPs) were used as “nano-reinforcement” in cement paste and mortar. GNPs and CNTs are dispersed in water and added to the mix as an aqueous suspension. The crack-bridging effect of graphitic nanoreinforcement controls the growth and propagation of nanocracks and their coalescence into larger cracks and damage. This effects result in larger deformability without collapse with improved energy absorption. We ran a series of tests to understand the chemical affinity of nanoreinforcement with cementitious matrices including transmission and scanning electron microscopy analysis and compressive strength tests on nanoreinforced mortar cubes. A remarkable increase in strength was noted for some cubes where the nanoreinforcement used was selected for further testing to understand the effects on important mechanical properties.

Investigate method to produce high performance electrode (for PEM fuel cell) using an electro-spinning technique to distribute carbon catalyst and ionomer in a controlled manner.
Joshua Sightler, Mechanical Engineering - Senior
Mentor: Dr. Xinyu Huang, Mechanical Engineering
An electrospinning method to produce a fuel cell electrode was investigated. The goal is to achieve a fuel cell electrode layer with low platinum loading in the form of a nano-fiber web network. The nanofibers containing supported platinum nano-particles carbon nanotube and carrier polymer were spun onto an aluminum foil substrate attached to a grounded rotating drum type collector. The fiber mats were attached to an electrolyte membrane by a decal transfer method to create a membrane electrode assembly (MEA). Performance of the MEA’s was characterized using polarization curves as well as power density curves.
Electrochemical analysis was also done in order to quantify the availability of the catalyst deposited in the electrode. Platinum catalyst loading was measured using X-Ray Fluorescence (XRF) and was found to be approximately 0.1 mg/cm². Initial polarization results show a current density of 810 mA/cm² at 0.6 V and a power density of 486 mW/cm² which is very impressive considering the low amount of platinum catalyst used.

**Low Temperature Isotherms for Electrocatalysts Contaminants**

Ryann Teel, Chemical Engineering - Senior

Mentor: Dr. John Van Zee, Chemical Engineering

Fuel cells have been proposed as an alternative source of electrical power for transportation and stationary applications. These fuel cells use air which may be contaminated by sulfur compounds at very low levels. It has been shown that the fuel cell performance is decreased at ambient temperatures when relatively high concentrations of SO₂ have been used to model airborne sulfur contaminants. It has been shown that effect of SO₂ strongly depends on concentration and can result in significant loss of performance and even deactivation of fuel cells. In previous work it has been shown that as the adsorption temperature was increased the coverage amount of SO₂ bonded compared to the number of available binding sites on the Pt/C electrocatalyst decreased. However data is lacking for the exposure at cold temperatures. These data will be useful for understanding the fuel cell performance in a very cold environment for example a fuel cell operating in a northern state during winter. My project focused on collecting data at these sub-ambient temperatures. Results suggest that as the adsorption temperature is decreased the coverage increases. This means that at lower temperatures SO₂ is more likely to poison a catalyst in a fuel cell resulting in decreased performance or deactivation of the fuel cell.

**Enhanced Flow Boiling by Fluid Separation in Microgap**

Tsegaye Yemame, Mechanical Engineering - Junior

Mentor: Dr. Chen Li, Mechanical Engineering

Boiling heat transfer in microchannel heat sinks has attracted significant interest due to its capability for dissipating the high heat fluxes encountered in the thermal management of microelectronics. The main purpose of this research is to conduct a comprehensive experimental investigation of flow boiling heat transfer in microchannel heat sinks covering a range of subcooled and saturated boiling conditions. The subcooled and saturated boiling regimes are studied in the lower quality range up to 20%. Heat flux temperature and pressure drop measurements are used to construct boiling curves.

**Understanding Phosphorus Constituents with Depth in an Oxic/Anoxic Basin**

Melissa Bennett, Marine Science - Senior

Mentor: Dr. Claudia Benitez-Nelson, Earth and Ocean Sciences

Phosphorus (P) was measured within sinking particles and from plankton tows in the Cariaco Basin Venezuela. This contains both oxygenated and anoxic waters. Therefore P cycling can be examined relative to oxygen concentration and depth as multiple studies suggest that the oceans may go increasingly anoxic with changing climate. Particle samples were collected using sediment traps at 5 depths (150-1200m) from 2005 to 2007 and analyzed using SEDEX, a sequential extraction method that separates various P phases by chemical reactivity. Plankton tow samples were collected within 1 mile of the Cariaco station where the sediment trap mooring is located in the eutrophic zone (upper 100 m) from 2008-2010. In this study we will compare the results of the sediment trap samples (sinking particles) with the plankton tow samples to evaluate if preferential remineralization in certain P compounds occurs with depth.

**Distribution and Habitat Characteristics of the Green-fly Orchid (Epidendrum magnoliae) in Four Coastal Plain Counties of South Carolina**

Marvin Brown, Biology - Junior; USC Beaufort

Mentor: Dr. Eran Kilpatrick, Biology; USC Salkehatchie

The green-fly orchid (Epidendrum magnoliae) is the only epiphytic orchid found outside of Florida in the continental U.S. and is considered rare or uncommon in South Carolina. From May – August 2011 green-fly orchid searches were performed in Allendale Bamberg Colleton and Jasper Counties South Carolina within the Ashepoo Coosawhatchie Edisto and Savannah River watersheds. Multiple habitat variables were measured at host trees and along transects within each study site. A total of 363 colonies were recorded on 51 different host trees. Green-fly orchids were found on eight different tree species with 94% of colonies occurring on water elm (Planera aquatica) water tupelo (Nyssa aquatica) swamp tupelo (Nyssa biflora) and bald cypress (Taxodium distichum). Host trees had an average height of 17.6m and average dbh of 47.1cm. The average colony height across sites was 6.8m with smaller heights recorded near the margins of oxbow lakes and larger heights recorded within cypress tupelo swamp forests. Bryophytes were observed in 29% of colonies with resurrection fern (Pleopeltis polyodioides) and Spanish moss (Tillandsia usneoides) observed as commensals with 19% and 14.6% of colonies respectively. Colonies occurred at various orientations on subcanopy trees with a northward orientation observed most frequently for colonies in canopy trees. This study produced two county records (Bamberg and Jasper) for the green-fly orchid and added three locality records for Allendale and Colleton Counties. Mature stands of swamp forest should be maintained in the Coastal Plain to sustain epiphytic orchid populations which could serve to recolonize regeneration in harvested stands.
The role of individual behavior type in mediating indirect interactions

John Gatto, Marine Science - Senior
Mentor: Dr. Blaine Griffen, Biological Sciences
Within the intertidal oyster reefs of South Carolina the toadfish Opsanus tau influences the behavior of the mud crab Panopeus herbstii and has an indirect positive influence on bivalve survivorship. This phenomenon is known as trait mediated indirect interactions or TMII for short. TMII moreover is influenced by individual trait variation and their responses to predator cues. We further investigated these two concepts in order to determine how individual trait variation will influence TMII in this common food web. Using predator cues individual variation was measured by analyzing the time spent in refuge while predator cues were present. Individuals were then placed in artificial oyster reefs and allowed to forage for 48 hours both with and without predator cues in order to determine mussel survivorship. Upon further investigation crabs from two levels of the intertidal were collected in order to determine the spatial distribution of individual traits. Crabs from both the intertidal and subtidal regions were collected and tested under similar conditions. These experiments moreover demonstrate that the spatial variation of these crabs is not random but related to the same behavioral response. These investigations provided further evidence to aiding in our understanding of TMII and how it is used to influence community structure.

An Inquiry into Karst Conditions in Allendale Barnwell and Burke Counties

Virginia Goodyear, History - Senior; USC Aiken
Mentors: Dr. Bill Pirkle, Biology/Geology; USC Aiken
Dr. Frank Sym, Biology/Geology; USC Aiken
Karst conditions in the upper coastal plain of South Carolina and Georgia are known to exist however the upper limit is less defined based on actual data. The USGS National Karst Map presents karst data of 1:7.5 million making the resolution for the karst zone boundary in the upper Coastal Plain highly uncertain. Recent large excavations in central eastern Georgia and LiDAR acquisition over the Department of Energy Savannah River Site in South Carolina have provided direct observations of karst conditions which are located outside of the upper boundary of the USGS National Karst Map. Empirical observations from the large excavations in eastern Georgia as well as the Savannah River Site in South Carolina were used to evaluate the geomorphic expression of sinkholes on the topography. The pre-excavation topography was correlated to actual karst conditions noted in the large excavations including open caves and collapse structures. Using historical data acquired from the US Corps of Engineers at the Savannah River Site an actual sink hole was located using LiDAR imagery. Using this geomorphic expression from the pre-contruction topography and the LiDAR imagery from SRS as a baseline similar surface features were mapped using the LiDAR imagery in ArcGIS. These features were then evaluated against published carbonate lithologic maps in the region (Harris and Colquhoun) to evaluate the distribution of features along regional strike and dip. These data provide local control to better establish the boundary of karst conditions in the upper Coastal Plain of eastern Georgia and western South Carolina.

Constraints on the Origin for the Garnet Pyroxenites from O‘ahu Hawaii

Won Howell, Geological Sciences - Senior
Mentor: Dr. Michael Bizimis, Earth and Ocean Sciences
Mantle xenoliths represent physical fragments of the earth's mantle that are occasionally brought to the surface by volcanism. As such they allow us to investigate these two concepts in order to determine how individual trait variation will influence TMII in this common food web. Using predator cues individual variation was measured by analyzing the time spent in refuge while predator cues were present. Individuals were then placed in artificial oyster reefs and allowed to forage for 48 hours both with and without predator cues in order to determine mussel survivorship. Upon further investigation crabs from two levels of the intertidal were collected in order to determine the spatial distribution of individual traits. Crabs from both the intertidal and subtidal regions were collected and tested under similar conditions. These experiments moreover demonstrate that the spatial variation of these crabs is not random but related to the same behavioral response. These investigations provided further evidence to aiding in our understanding of TMII and how it is used to influence community structure.

Dissolved Organic Carbon in South Carolina Water Systems

Elise Kennedy, Marine Science - Sophomore
Mentor: Dr. Ron Benner, Biological Sciences
Dissolved organic carbon or DOC is used to estimate the amount of organic matter dissolved within marine and freshwater ecosystems and is an important component of the global carbon cycle. The purpose of the following study is to determine and record the DOC concentrations of a number of inland and coastal water systems within South Carolina. Water samples were collected from a series or rivers and coastal areas and filtered at several different time points. The carbon concentration of each sample was determined through a DOC analysis and a CDOM analysis using a spectrophotometer. These results could potentially be used to estimate both the amount of biological activity occurring in the water systems studied and the amount of DOC currently being added to South Carolina’s coastal waters.

Predicting patterns of thermal stress in Mytilus californianus

Nicole Kish, Marine Science - Senior
Mentor: Dr. Brian Helmuth, Biological Sciences
In the marine intertidal zone a complex interplay of factors including air temperature, water temperature, wind speed and solar radiation drive the body temperatures and thus the levels of physiological stress of the organisms that live there. And yet the most common approach for estimating temporal and spatial patterns in stress mortality and shifts in species distributions is the use of single environmental variables such as air temperature as proxies. We analyzed the strength of the relationship between aerial (low tide) body temperature and air and water temperature at Hopkins station California using biomimetic sensor data and weather station data collected immediately adjacent to the site. Data collected by biomimetic sensors which were designed to mimic the thermal characteristics of the intertidal mussel M. californianus were collected continuously over a 7 year
In a cyclonic eddy, the largest phytoplankton contributed 30% of the biomass, but accounted for 2% of the primary productivity. At the edge of the eddy, the 2-20 μm size class contributed 62% of the biomass, but had undetectable rates of primary productivity. Near the surface, however, contributions to biomass and primary productivity were ~ proportional. These findings give a better understanding of the contributions of phytoplankton to the biological carbon pump in the Sargasso Sea and will help food web modelers better predict how changes in the ocean’s food web will influence the cycling of carbon in the ocean.

Artemia franciscana as a Model System to Test for Pathogenicity of Environmental Vibrio parahaemolyticus Strains.

**Savannah Klein**, Marine Science - Senior
Mentor: Dr. Charles Lovell, Biological Sciences

Vibrio parahaemolyticus is a marine bacterium that causes gastroenteritis in humans when ingested in raw or undercooked seafood. Clinical strains found in patients suffering from *V*. *parahaemolyticus*-induced gastroenteritis typically contain one or more hemolysin genes that are uncommon or not found in strains of *V*. *parahaemolyticus* isolated from the environment. This has lead to the assumption that hemolysin gene products (toxins) are essential to *Vibrio parahaemolyticus* pathogenicity. Genes and regulatory factors other than hemolysin genes may also be involved in pathogenicity but little direct evidence for pathogenicity in the absence of toxin production is available. No rapid reliable and low cost method for screening *Vibrio parahaemolyticus* strains for virulence has been available. This project employed Artemia franciscana (a brine shrimp) in a high throughput bioassay to screen environmental *Vibrio parahaemolyticus* strains for pathogenicity. *Vibrio* strains were collected from the pristine North Inlet salt marsh at the Belle W. Baruch Institute in 2010 and 2011. Sequences of the housekeeping gene Recombinase A (recA) were used to confirm that the environmental strains were *V*. *parahaemolyticus*. The strains were screened for three hemolysin genes and were then used to infect the brine shrimp. Our results show statistically significant rates of brine shrimp mortality among *Artemia franciscana* cultures treated with *V*. *parahaemolyticus* strains containing known hemolysin genes.

Size-Fractionated Primary Productivity in Sargasso Sea Phytoplankton

**Lindsay Vendetta**, Biological Sciences - Senior
Mentor: Dr. Tammi Richardson, Biological Sciences

Phytoplankton vary in size and taxonomic composition, and are consumed by differently-sized grazers. Numerical models of trophic interactions and carbon flow through marine food webs often assume that if a particular size fraction of phytoplankton accounts for some percentage of the phytoplankton biomass, then that size fraction will make the same relative contribution to total rates of primary productivity. However, being “present” does not always mean being “active”. My research question is: Are size-dependent contributions to phytoplankton biomass always directly proportional to contributions to total primary productivity? I participated in a research cruise in the Sargasso Sea in July 2011 where I measured primary productivity of three sizes of phytoplankton (0.7-2 μm, 2-20 μm, and 20-200 μm). Size-fractionated biomass was measured by scientists on the same cruise. I found that primary productivity and biomass do not always scale proportionally, especially at the depth where chlorophyll is maximum (=chl max).
The effects of the winter of 2009-10 on the distribution of *Mytilus galloprovincialis* and *M. edulis*

*Drew DeLorenzo*, Marine Science - Sophomore  
**Mentors:** Dr. Thomas Hilbish, Biological Sciences  
Ms. Rhiannon Rognstad, Biological Sciences

The effect of climate change and extreme climatic events on ecological systems is poorly understood within many species. The winter of 2009-2010 one of the coldest in recent European history affected the spatial distributions of two mussel species *Mytilus galloprovincialis* and *M. edulis* particularly within a hybrid zone between these species in southwest England. The degree of allele frequency change and the mechanism(s) that created this change was investigated using annual high spatial resolution distribution data from 2009 to 2011 allowing comparisons of relative species abundance. Size-specific species composition data were analyzed in conjunction with temperature data from each site allowing us to test hypotheses regarding what effects the unusually cold winter of 2010 may have had on species distribution. *M. edulis* is more adapted for colder waters and is expected to shift southwards. We hypothesized that the mechanism of range expansion involved increased reproduction in *M. edulis* relative to *M. galloprovincialis* in cold years thus the increase in the frequency of *M. edulis* alleles should be more pronounced in the small size classes. Distribution data supports this hypothesis showing changes in small size classes but not in larger sizes suggesting that temperature alters reproductive success and thus allele frequencies.

Detection of floodplain microtopography and sediment flux at Congaree National Park using ground-based LiDAR

*Stewart Bryant*, Geography - Senior  
**Mentor:** Dr. John Kupfer, Geography

Congaree National Park (NP) protects and manages the largest remaining tract of bottomland hardwood forest in the United States. Human activities and impacts have influenced the current landscape within the park boundaries. The importance of sediment inputs and the consequential effects on vegetation processes the focus of this proposed work is not well known but was identified as one of the foremost research needs for the park at a research symposium held in 2008. Commonly practiced methods of measuring sedimentation rates capture changes in floodplain surfaces for only small plots (ca. 1m²) and are labor intensive. Ground-based LiDAR also known as terrestrial laser scanning (TLS) uses light detection and ranging to create highly accurate three-dimensional images. The TLS scanner sweeps a laser beam over an area of interest and is able to record millions of 3D points providing measurements of distances up to roughly 100 m with vertical accuracies of 2-5 mm. This study represents the first time that the TLS methodology was employed for mapping floodplain erosion and sedimentation. The project is ongoing but terrestrial laser scanning has been used to create highly detailed topographic maps of soil surface elevations on six of twelve permanent sample areas linking patterns of erosion and deposition to vegetation dynamics geomorphic history and soil properties. Repeat scanning will offer the ability to capture a time-series of topographic changes in the field and increase the potential to analyze space-time patterns of landscape change.

Sensibly Sensing Cardiac Activity of Intertidal Animals

*Nicholas Burnett*, Biological Sciences - Senior  
**Mentors:** Dr. David Wethey, Biological Sciences  
Dr. Fernando Lima, Biological Sciences  
Dr. Brian Helmuth, Biological Sciences  
Dr. Mackenzie Zipay, Biological Sciences

The effect of temperature on the physiological performance of organisms is an important component to understanding and predicting species responses to climate change. Intertidal organisms are thought to be particularly sensitive to extreme temperatures and are therefore used as the basis for many climate change models. This project assesses the use of novel heartbeat sensor to measure the response of several intertidal species to thermal stress in water and in air. Establishing the limits and versatility of this newly refined technology may facilitate many more ecologically relevant physiology experiments and improve our understanding of species responses to stressors in the environment.

Phytoplankton Community Composition and Abundance in Lake Murray SC

*Erin Fedewa*, Marine Science - Senior  
**Mentor:** Dr. Tammi Richardson, Biological Sciences

Phytoplankton serve an essential role in the food web as primary producers and thus as a food source for higher trophic levels. Shifts in community composition therefore affect both the structure and function of aquatic ecosystems. Despite Lake Murray’s close proximity to Columbia and its importance as a tourism and recreational area little research has been done on the phytoplankton that inhabit the watershed. Therefore this study aimed to establish baseline conditions of current seasonal variations in phytoplankton abundance and community composition. Analyses conducted with high performance liquid chromatography (HPLC) photopigments and a Matlab-based chemotaxonomy program (ChemTax) indicated that community composition varied spatially across three study sites on Lake Murray over the course of one year. In addition abundance of all major algal groups increased during summer months. These results will therefore serve as a guideline for future assessments of human-induced changes in the lake.

Understanding the composition of Phosphorus in Suspended Particles

*Erin McParland*, Marine Science - Junior  
**Mentor:** Dr. Claudia Benitez-Nelson, Earth and Ocean Sciences

Phosphorous (P) is an important nutrient utilized by all marine organisms (Benitez-Nelson et al. 2007). As naturally and anthropogenic induced climate change occurs biological production is likely to become increasingly P limited (Benitez-Nelson et al. 2004). Yet our understanding of P composition and how this changes both spatially and temporally is poorly known. In this study...
the P composition of suspended particles at the oxic/anoxic interface of the Cariaco Basin Venezuela was examined with a sequential extraction method that separates suspended material into specific P phases (loosely bound P oxide bound P authigenic P detrital P and organic P). Samples were collected from April 2008 to March 2011 at depths ranging from 1 to 1310 m. Suspended matter P concentrations decreased exponentially from the surface to ~200 m but had a large subsurface peak at the oxic/anoxic interface equivalent in magnitude to surface concentrations. We hypothesized that this increase is due to an increase in biological activity associated with chemosynthetic bacteria. Our sequential extraction results demonstrate that iron oxide associated P dominates within suspended particles above and below but that loosely bound P dominates within the peak. Loosely bound P is composed of a significant fraction of organic compounds that are likely derived from biological activity confirming our hypothesis that bacteria at the oxic/anoxic interface are converting dissolved P into particulate forms. These findings suggest that oxygen availability does play a significant role in P composition in the Cariaco Basin.

**Release from Parasites Can Enhance Climate-driven Range Expansion**  
**Paul Miller**, Biology - Junior; USC Beaufort  
Mentor: Dr. Stephen Borgianini, Biology; USC Beaufort  
From May to September 2011 Uca minax (Red-Jointed Fiddler Crabs) were collected from downestuary and upestuary sites on the Broad River Beaufort County SC to compare Bopyrid isopod parasite infection rates along an estuary. The original hypothesis for this project was that the range of U. minax population may be expanding to the upper reaches of the estuary partially due to release from the isopod Leidya distorta. Unsuspected L. distorta infection only occurred in the upestuary oligohaline site. Condition indices we measured indicate that there is no significant difference in environmental stresses between populations. Previous to this project L. distorta had only been found to infect U. minax in one case in a specimen that was collected from Savannah Georgia in 1970. Other than the one sample in U. minax L. distorta was only detected in the Uca congener U. pugilator (3.7% infection rate) which is known to occupy mesohaline estuarine habitats in the South Atlantic Bight. These previous studies documenting the presence of L. distorta did not indicate location or salinity parameters within the estuary. I collected three juvenile females two mature females and one male from our oligohaline site while none were found in the euhaline population. The previous L. distorta specimen from U. minax was a young adult female. No males were described. We plan to compare genetic markers in L. distorta specimens found in U. minax to those collected from U. pugilator in the same estuary to determine if they are conspecific.

**Anuran Species Detection and Site Occupancy in the South Carolina Coastal Plain Using the North American Amphibian Monitoring Program**  
**Paul Thomas**, Biology - Sophomore; USC Aiken  
Mentor: Dr. Eran Kilpatrick, Biology; USC Salkehatchie  
The North American Amphibian Monitoring Program (NAAMP) was established by USGS to monitor breeding anuran populations. NAAMP was implemented in South Carolina in 2008 and is a collaborative program drawing participation from a variety of public and private entities. This study investigated species detection and site occupancy along two NAAMP routes near Allendale and Grays South Carolina. Both routes occur in the Coastal Plain a region containing a diversity of wetlands providing breeding habitats for 26 anuran species. Calling anurans were sampled at 10 stops along each route from January 15 – February 28 (Window 1) March 15 – April 30 (Window 3) and May 15 – June 30 (Window 3). From 2008 – 2011 a total of 31 surveys were conducted along both routes representing 310 five minute samples that detected 20 species. Eighteen species were detected on the Allendale route and 17 species were detected on the Grays route. Spring peepers (Pseudacris crucifer) southern cricket frogs (Acris gryllus) southern toads (Anaxyrus terrestris) Green treefrogs (Hyla cinerea) were detected most often. The oak toad (Anaxyrus querulus) and pig frog (Lithobates grylio) were unique to the Allendale route while upland chorus frog (Pseudacris feriarum) and eastern spadefoot toad (Scaphiopus holbrooki) detections occurred only on the Grays route. The most diverse stops were proximal to open pond cypress ponds with dense herbaceous cover. Tupelo swamp forest and gum ponds were the least diverse habitats surveyed. NAAMP continues as a comprehensive statewide monitoring effort providing an extensive database available to the public.

**Testing the Cretaceous Ice Hypothesis: Nd Isotopes of Southern Ocean Sediment**  
**Marissa Wright**, Geological Sciences - Senior  
Mentor: Dr. David Barbeau, Earth and Ocean Sciences  
Evidence from paleosols and carbonate weathering models suggest that the Late Cretaceous had a hot supergreenhouse climate due to CO2 concentrations exceeding 35°C and high-latitude temperatures in excess of 20°C. However, the Late Cretaceous was punctuated with large (25 m) and rapid (1 million year) sea-level changes, recorded as well-developed successions in the global stratigraphic record. These changes suggest a glacioeustatic control, as the only known mechanism of such drastic changes is glacial growth and decay. Because continental glaciation tends to increase the weathering of bedrock and production of sediment delivered to the oceans, circum-Antarctic marine sediment flux would be expected to increase during periods of glaciation. Sm-Nd analysis of Cretaceous terrigenous sediments from Ocean Drilling Project site 690C is being utilized to detect a potential glaciation event at the 69 Ma Campanian-Maastrichtian boundary. This boundary records the largest, most documented sea-level changes of the Late Cretaceous. The Sm-Nd isotope system is ideal for this research, as the region of East Antarctica adjacent to this study’s ODP sites is dominated by Archean-Proterozoic crust, thus the epsilon Nd value of sediment delivered to the ocean during glaciations would be more negative than non-glacial background levels; furthermore, Nd isotopes from terrigenous sources are robust in ocean sediments because they are not readily influenced by weathering processes, sediment transport, or diagenetic reactions.
Mentoring a Student Leader
Elisa Bonnin, Chemistry - Junior
Mentor: Mr. Jim Burns, Honors College
In the Fall of 2010 I participated in the Drop Everything and Lead (DEAL) Program sponsored by the Honors College. In 2011 I came back to the program as a peer leader. My job was to mentor another DEAL Program participant and help her design and implement a service project that would benefit either the University community or the Columbia community as a whole. I was assigned to an Honors College freshman named Erin Steiner. Over the course of the Fall semester I worked with Erin to make sure that she was aware of all the resources available to her as a DEAL Program participant. I reviewed her activity and gave her advice. I did not step in and take care of things for her instead allowing her to lead by herself. I learned that sometimes in order to lead you have to step back and allow the people you are leading to accomplish things on their own particularly when you are mentoring them and helping them develop their own leadership skills. This was difficult for me because I like to control the situation. I think that this experience really helped me to grow as a person and gave me valuable leadership experience.

Edibles on Campus
Nichole Dunst, Retailing - Senior
Mentor: Ms. Katie Coley, Outdoor Recreation
Edibles on Campus is an initiative by USC Outdoor Recreation’s Sustainability department attempting to plant edible trees and bushes throughout the University of South Carolina campus. Throughout this semester-long project we planted a total of 13 fruit trees - these consisted of 2 kiwi 2 grapes 2 plums 2 pomegranates 4 blackberries and 1 fig tree. They were planted at the Pendleton Street Garage on November 21 2011.

Lessons in Leadership 5.0 and Bringing OrgSync to USC
Coy Gibson, Political Science - Sophomore
Mentors: Dr. Patrick Hickey, Nursing and Capstone Scholars Program  
Dr. Kevin Elliott, Philosophy and Leadership Initiative
Beginning in May 2011 I applied to the Carolina Leadership Initiative. After 11 months the initiative I started at the State House redirected and evolved into a completely different project. From my involvement in Student Government as well as my work as a resident mentor I have a commitment to student engagement outside the classroom primarily through student organizations. Each semester student organizations suffer from a variety of issues: poor election transitions aged organization constitutions absent advisors and lack of simple communication from the elected leadership to members. Over this past year I directly experienced the difficulty that the general student body faces in communicating with student organizations. My research team compiled ideas and input from student surveys organizational meetings and University offices to examine the root causes of apathy and frustration. Consistently the feedback we received pointed to a lack of effective and efficient communication between groups current participants and potential members. This project offers a solution in the form of OrgSync. This organizational management system is a tool for communication across campus. It operates similar to social networking sites in that each student advisor and administrator creates a profile. OrgSync goes further to connect students to organizations through functions such as “joining” organizations due collection through PayPal a specialized calendaring system an easy-to-use website builder and even a co-curricular transcript generator. Observers of my presentation will have the opportunity to demo OrgSync followed by a discussion on the ramifications it could have at the University of South Carolina.

Strategies for Designing and Implementing a Green Leadership Program Through Sustainable Carolina Project Teams
Sam Johnson, Biological Sciences - Senior
Baldwin Hall, International Business - Junior
Samantha Sundquist, Environmental Science - Junior
Bryan Zingmark, Management - Senior
Mentor: Dr. David Whiteman, Political Science
Sustainable Carolina is a unique campus organization that brings together faculty staff students and community members to find effective solutions to making our campus more sustainable and improving student engagement in leadership development project planning political action and creating innovative solutions for the environmental problems of the future. Our organization has a number of grant-funded projects that further our organizational goals while providing students with an opportunity to cultivate their personal interests in sustainability and to work directly with USC departments and community groups in implementing these projects. Multiple projects are centered on developing programs or initiatives that train students on the principles of ‘green leadership’ a term that Sustainable Carolina has developed that encompasses all of the principles that we believe are critical for a new model of collaborative-based leadership. Green leadership projects include the establishment of a lecture series on the diversity of ways to be a green leader a series of workshops that educate on green leadership issues incorporating students from Poli 477 into the Sustainable Carolina structure and expanding the scope and efficacy of student groups like the Eco-reps in addressing green issues. Our students have also been involved in creating educational videos about our work and the leadership opportunities that we offer. All of these projects are aimed at addressing the underlying factors that have contributed to our wasteful society and address these problems with complex solutions that address these problems on multiple levels and attempt to solve other associated problems as well.
EcoRep Programming: Higher Education Peer-to-Peer Outreach Programming for Sustainable initiatives

Rebecca Marasco, Sociology - Junior

Mentors: Ms. Margaret Bounds, Environmental Sustainability
Ms. Renee Dickman, Environmental Sustainability

EcoReps at the University of South Carolina are a committed student organization focused on student outreach for sustainable initiatives integrated in the Carolina community. In the past year the creation of a sustainability-focused program has developed a strong foundation cultivating student peer leaders and environmentally literate students. The fall semester is utilized for training selected students on environmental issues following a model of No Impact Man and No Impact Week. Experiencing a week of sustainable living strengthens an awareness of environmental issues our global community faces today. In the spring semester EcoReps use community based social marketing techniques through peer-to-peer outreach to engage students in a deeper level of sustainable living. One of the most notable achievements is the Green Dorm Room Certification among on-campus students. This extends the promotion of sustainable practices in hall government and allows residents to get to know their in-house EcoRep. Representatives also had the privilege of presenting at the Student Leadership and Diversity Conference. University of South Carolina hosted the 1st annual EcoRep conference this spring. This conference allows regional Ecoreps to interact with other student leaders involved in sustainable outreach initiatives. Students share strengths and weaknesses of the program as well as develop and demonstrate leadership and facilitation skills. The conference served as a fantastic opportunity for networking among EcoReps from 11 Carolina schools.

LGBTQ commUNITY Development Program Description

Ben Muller, Chemistry - Senior

Mentor: Dr. Kevin Elliott, Philosophy and Leadership Initiative

I have always desired to leave a legacy at Carolina. Over the past three years I have been heavily involved with an on-campus group that I joined as a member of USC Student Senate. The organization consists of several student senators and Drew Newton the Safe Zone GA. We drafted a proposal to create an on-campus resource center for LGBTQ (Lesbian Gay Bisexual Transgender and Questioning/Queer) students because there was no existing place on-campus for this community to go to have an educational and supportive experience. Drew Newton created an extensive benchmarking program containing information about how similar institutions have shown support for their LGBTQ communities. Through these presentations and interactions with the administration we gained their support and they chose to create a position in OMSA for an LGBT Programs Coordinator—the first step of many to come. In the spring of 2011 I received a $7000 grant to participate in the Leadership Scholars Program. I designed this grant to piggyback my previously mentioned efforts and promote unity among USC’s LGBTQ population and Allies while also creating cross-cultural awareness. The kick-off event occurred at the “commUNITY Picnic,” a barbeque during Welcome Week for the LGBTQ individuals and Allies to meet each other and gain knowledge about campus and community resources. In the remaining months of the academic year workshops discussions and events tailored to LGBTQ interests were also held. The newly created LGBT Programs Coordinator will use this grant as a sustainable model to continue similar efforts.

The Regalia for Hope Project: Providing Handmade Earrings for Female Cancer Patients to Champion Hope

Elizabeth Ruth Wilson, International Business - Senior

Mentors: Ms. Stefanie DiDomenico Burke, Leadership Programs and Women’s Student Services
Ms. Regina Wragg, Biological Sciences
Dr. Kevin Elliott, Leadership Initiative and Philosophy

In 2010 an estimated 73,9940 women were diagnosed with cancer of all sites. Many of those women suffered hair loss or thinning from chemotherapy drugs such as Adriamycin Methotrexate Cytoxan and Taxol and from radiation and hormonal treatments. Hair loss can influence low self-esteem and women generally cope with the loss through the use of accessories. Hair scarves dramatic makeup and glamorous earrings accentuate their bold bald look and their persona embodies female strength. I have always loved making jewelry and during my brother’s battle with cancer I noticed female cancer patients wore earrings to beautify their hair loss. That observation revealed an opportunity for service. In January 2011 I started the Regalia for Hope (RforH) Project that focuses on increasing the self-esteem of female cancer patients by providing them with handmade earrings. Each pair is uniquely designed and hangs on a card handwritten with a message of optimism—a small package that reflects patients’ pulchritude and champions hope. Sponsored by USC’s Leadership Initiative the organization aims to inspire patients by placing less attention on their diagnosis and more focus on their beauty. The project has had tremendous impact in the Carolina community. More than 1850 earrings pairs have been delivered to nine hospitals and oncology centers in South and North Carolina. The project’s sustenance is being planned and RforH may become a 501(c)(3) organization that will provide earrings to hospitals throughout the Southeast.
Investigating the effect of an educational pharmacy camp on high school students’ confidence and perception

*Kristen Ammay*, Pharmacy - Sophomore

*Laura Jeffcoat*, Pharmacy - Sophomore

**Mentors:** Ms. Nancy Culberson-Taylor, Clinical Pharmacy and Outcomes Sciences  
Dr. Betsy Blake, Clinical Pharmacy and Outcomes Sciences

This study was designed to analyze the impact of an educational pharmacy camp on high school students’ interest understanding confidence and perception of pharmacy. Students attended a five day pharmacy camp during which they learned about various areas in pharmacy and participated in hands-on activities. The survey was administered on the first and last days of the camp to determine the change in students’ perceptions of pharmacy. Descriptive statistics were utilized to compare pre- and post-camp responses and reliability was assessed using Cronbach’s alpha. All students completed the pre- and post-survey. The survey responses indicated that students had an increased interest in most pharmacy areas. The number of students that indicated they were most likely to attend pharmacy school increased from 21.1% (before camp) to 52.6% (after camp). Along with an improved understanding of the various fields the responses demonstrated an increase in confidence performing pharmacy-related tasks. Contrary to our expectations the students’ trust in a pharmacist’s ability to provide health-related information declined slightly as well as did their agreement that pharmacists’ interactions with patients are significant and that pharmacists play an important role in diagnosing diseases. The pharmacy camp was effective at improving the students’ knowledge and interest in the pharmacy field. The results from this study enhanced our understanding of high school students’ views on pharmacy and can be utilized to improve this pharmacy camp.

Data should continue to be collected in future years to increase the sample size and statistical power of the results.

An Educational Survey Evaluating Available Geriatric Assessment Tools for Appropriate Medication Prescribing

*Ushma Desai*, Pharmacy - Senior

**Mentor:** Dr. Karen McGee, Clinical Pharmacy and Outcomes Sciences

**Purpose:** Practical assessment tools for prescribing and monitoring of pharmacotherapy for geriatric patients is scarce in the medical literature. The assessment tools such as Beer’s List Medication Appropriateness Index STOPP criteria and START criteria are difficult to use in clinical practice. The importance of this survey tool was to assess knowledge of healthcare practitioners about geriatric assessment tools to develop an understanding of the perceived importance of these assessment tools and to confirm that a new assessment tool would be beneficial. Methods: The primary objective of this study is the conduction and interpretation of a survey given to practitioners to assess the need of an updated practical assessment tool of medication appropriateness in the elderly population. Survey was conducted on healthcare practitioners from different practice sites such as ambulatory care hospitalists VA and academia within Columbia SC. Results: Tables and Graphs on practitioners’ demographics medication classes to avoid geriatric syndrome risk assessments and use of geriatric assessment tools are available for viewing on poster. Conclusion: 87% of participants believed there is a need of an updated practical assessment tool of medication appropriateness in the elderly population. 82.6% of participants believe their practice site would highly benefit from an updated geriatric assessment tool. 96% of participants use Beer’s List for safe prescribing and 40% use a combination of Beer’s STOPP and START criteria.

Stability and Compatibility of Antimicrobial Lock Solutions: A Systematic Review

*Julie Edwards*, Pharmacy - Senior

**Mentor:** Dr. Brandon Bookstaver, Clinical Pharmacy and Outcomes Sciences

Among patients with central venous catheters in place over 250,000 cases of central line-associated bloodstream infections (CLABSIs) occur annually in the United States and are now considered non-reimbursable by the Centers for Medicaid and Medicare Service. Antibiotic lock therapy (ALT) involves placing a highly-concentrated antimicrobial plus an additive into the catheter lumen for prevention or treatment of CLABSIs. The purpose of this project is to review the available data on the compatibility and stability of antimicrobial lock solutions used in ALT. Medline and International Pharmaceutical Abstracts were utilized to search the literature using the search terms “antibiotic lock” (322 citations) “antimicrobial lock” (497 citations) and “antifungal lock” (53 citations). Twenty-six articles met the inclusion criteria for review and 54 articles that did not meet the stability and compatibility testing standards were also included. Vancomycin and gentamicin have the most data available. Other glycopeptides such as teicoplanin and other aminoglycosides such as amikacin and tobramycin have some data but it is significantly less robust. Beta-lactam antimicrobial agents with data include ampicillin, ceftazolin, cefotaxime, tetracyclines, clavulanic acid and pipercillin-tazobactam. The data set also includes daptomycin, linezolid, minocycline, doxycycline, ticagrelor, ciprofloxacin, levofloxacin, moxifloxacin, rifampin and ethanol. Antifungals including fluconazole, micafungin, caspofungin, and amphotericin are also discussed. Additives discussed in the data set include heparin trisodium citrate, and ethylenediaminetetraacetic acid (EDTA). Stability and compatibility data is integral to appropriate ALT selection and future research is essential to confirm stability of additional combinations needed for clinical use of ALT in prophylactic and treatment modalities.

Use of antibiotic lock therapy in central-line associated bloodstream infections in cancer patients: A systematic review.

*Farah Kablahout*, Pharmacy - Senior

**Mentor:** Dr. Brandon Bookstaver, Clinical Pharmacy and Outcomes Sciences

In cancer patients central venous catheters (CVC) are used for administration of chemotherapy blood products and total parenteral nutrition. CVCs provide entry points for bacteria and subsequent bloodstream infections and despite prevention measures infections often occur. Research suggests that antimicrobial lock therapy (ALT) may decrease the incidence of infection. I conducted a systematic
review of the available evidence to determine the most appropriate use of ALT in cancer patients with indwelling CVC. A literature search was performed using open access journals through Google Scholars and Medline. The terms “antimicrobial lock solution” “antibiotic lock solution” “oncology” “hematology” “prevention” “treatment” “cancer” “CLABSI” and “central venous catheter” Case reports case series and prospective or retrospective studies involving cancer patients were included. In vitro data and published literature missing outcomes of interest including clinical success dwell times of the solution and type of solution were excluded. Most effective type of antimicrobial agent used dwell times in the catheter duration of therapy and success/failure rates for prophylaxis and treatment were identified. A total of 70 articles were identified through the search methodology and 24 of those were deemed cancer related. Following all exclusions 17 articles remained and were evaluated for this review; 5 on ALT in prevention and 12 on ALT for treatment. Preliminary results suggest ALT with vancomycin ciprofloxacin and gentamicin is effective in this population. Data analysis is ongoing. Healthcare providers should consider ALT as a prophylactic option for reducing CLABSI rates in high-risk cancer patients.

Mentor: Dr. April Miller, Clinical Pharmacy and Outcomes Sciences

Hemodynamic Targets and Vasopressor Use in Neurogenic Shock
Maryjoy Lepak, Pharmacy - Senior

Patients with acute spinal cord injury and neurogenic shock (NS) develop poor outcomes if their blood pressure is not managed appropriately. Vasopressor agents are often used to manage blood pressure during the acute stages of NS. However, treatment is often difficult due to the unique pathophysiology of NS and limited data support the use of a specific agent. The purpose of this study is to determine if specific vasopressors are more effective at maintaining hemodynamics in NS. A retrospective multicenter cohort study of adult patients with SCI and NS from 2003-2010 was conducted. Patients receiving dopamine (DA) or phenylephrine (PE) treatments were evaluated. Data on dosage dose adjustments duration of therapy mean arterial pressure (MAP) systolic blood pressure (SBP) heart rate (HR) and outcomes based on the American Spinal Injury Association (ASIA) scale were compared between groups. Intent to treat analysis was performed on 11 PE and 15 DA patients. Goals of optimal vasopressor therapy were SBP readings ≥85 mmHg and MAP readings between 85-90 mmHg. Results demonstrated a similar percentage of SBP readings ≥85 mmHg (92.6% of PE versus 99.5% of DA) (p < 0.0001). Percentage of MAP readings within 85-90 mmHg differed between groups (32.9% of PE versus 12.9% of DA) (p<0.0001). A higher incidence of tachycardia (HR>100) was found in the PE group (21.4% of readings) versus the DA group (12.4% of readings) (p<0.0001). No differences in outcome were seen among patients with recorded ASIA scores. Overall PE was associated with more tachycardia than DA but maintained similar SBP readings in NS patients.

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A multi-center characterization of antipsychotic use for the treatment of delirium in medical ICU patients
Allison Meyer, Pharmacy - Senior

Mentor: Dr. April Miller, Clinical Pharmacy and Outcomes Sciences

Delirium is defined as disturbed consciousness or change in cognition developing over a short time. The incidence of delirium in ICU patients is as high as 80% in some studies and is associated with several negative outcomes. Although the data are not robust clinical use of atypical antipsychotics (AA) for ICU delirium is an accepted practice at many institutions. The objective of this study is to characterize antipsychotic use for delirium treatment in medical ICU (MICU) patients. MICU patients receiving an antipsychotic between January 2006 and January 2010 at two academic institutions were selected for study inclusion. Retrospective review was performed and indications for antipsychotic use dosing risk factors for delirium and benzodiazepine and opioid use were recorded. Since QTc interval prolongation can be a side effect of antipsychotics QTc intervals were collected. Twenty-nine patients (45%) received an AA for a baseline psychiatric disorder with the remainder receiving agents for agitation/anxiety (14%) or undocumented reasons (42%). Haloperidol (54%) risperidone (25%) and quetiapine (24%) were the most frequently prescribed antipsychotics. Risperidone was the most frequently prescribed AA at one institution (47%) while quetiapine was most common at the other (50%). Of the 81 patients with baseline EKG’s present 48 patients (59%) had QTc intervals >450 mseconds. Twenty-four patients (44%) with QTc intervals received haloperidol. Atypical antipsychotics were frequently used for pre-existing psychiatric conditions. The choice of AA was most often based on continuation of home medication. Haloperidol was primarily used for ICU delirium.

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Evaluation of pharmacist knowledge of rescue seizure medications in pediatric patients
Courtney Perry, Pharmacy - Senior

Mentor: Dr. Christina Piro, Clinical Pharmacy and Outcomes Sciences

Purpose: Rectal diazepam is the most commonly used pre-hospital rescue seizure medication in pediatric patients. A newer dosage form intranasal midazolam has shown increasing use over rectal diazepam due to its more rapid onset fewer hospital admissions and elimination of social awkwardness associated with rectal administration. The primary objective of this study is to assess pharmacist preparedness to counsel patients on rescue seizure medication use. Methods: This IRB-approved prospective survey-based study includes data collected over 4 months from South Carolina-based community pharmacists. Pharmacist perceived knowledge of ability to counsel on and pharmacist interest in education on rescue seizure medications was assessed. Outcomes were analyzed using descriptive statistics. Reported results will be used to develop a pharmacist-directed continuing education program. Results: A total of 56 pharmacists completed the survey. Approximately 80% (n=45) and 34% (n=19) never received educational information regarding intranasal midazolam or rectal diazepam respectively. Over 40% of pharmacists do not provide patients with supplemental information on the administration of either medication. Twenty-three (41.8%)
patients receiving a minimum of 3 consecutive days of SMX/TMP were eligible for inclusion in this retrospective review. The primary endpoints of incidence of hyperkalemia and elevated Scr were defined as potassium greater than 5.0 mEq/L (6.0 mEq/L for severe hyperkalemia), and an absolute increase of 0.5 mg/dL or 50% above pre-treatment baseline, respectively. For secondary evaluation, the population was divided into two groups: “high-dose” SMX/TMP (≥ 10 mg/kg/day) and “low-dose” SMX/TMP (10mg/kg/day). One hundred patients, 50 per study arm, met inclusion criteria. In the high-dose group 48% (24/50) of subjects experienced an AE compared to 40% (20/50) in the low-dose group (p=0.545). The overall incidence of elevated Scr, hyperkalemia, and severe hyperkalemia was 24%, 35% and 8%, respectively. The rates of elevated Scr were similar between the two groups. The occurrence of hyperkalemia was 46% (10% severe) in the high-dose group versus 24% (6% severe) in the low-dose group (p=0.035). Results demonstrate a significant rate of elevated Scr and hyperkalemia in hospitalized HIV-infected patients receiving SMX/TMP. Risk of hyperkalemia appears greater in HIV-infected patients receiving high-dose SMX/TMP, stressing the importance of prudent monitoring.

Impact of video case-based learning on knowledge retention and student satisfaction

Bradley Wagner, Pharmacy - Senior

Kristina Rokas, - Senior

Mentors: Dr. Christina Piro, Clinical Pharmacy and Outcomes Sciences
Dr. Brandon Bookstaver, Clinical Pharmacy and Outcomes Sciences

Studies suggest combination-style learning significantly increases student knowledge retention. However few data exists on the significance of incorporating VCBL in the pharmacy curriculum. The objective of this study is to determine VCBL’s impact on knowledge retention and overall learning satisfaction among a pharmacy student audience. This randomized controlled parallel group study was approved by the Institutional Review Board of the University of South Carolina. Second and third year pharmacy students were randomized to VCBL or traditional case based learning (TCBL) for three 30 minute sessions. Students were randomized to VCBL or TCBL week 1 crossed over week 2 and then re-randomized week 3 to topics not in the existing curriculum. Knowledge retention was assessed through a pre-test and 2 post tests one immediately following intervention and at 6 weeks. Results were reported using descriptive statistics. Overall learning satisfaction was assessed through pre and post-surveys via Likert scale. Forty-three pharmacy students participated in this study. Knowledge retention scores were not statistically different between TCBL and VCBL methods. Pre-test score averages for TCBL and VCBL were 37.0% and 36.5% respectively. Immediate and 6 week post-test averages were 88.6% and 71.6% for TCBL methods and 89.9% and 72.1% for VCBL methods respectively. Learning satisfaction was higher in VCBL with more students rating their satisfaction as excellent. Based on student retention and satisfaction results VCBL may be best utilized adjunctively to case-based learning to provide a more satisfying unique and realistic learning experience.

Observational Study of Dexmedetomidine in Trauma Critical Care Patients

Kristina Rokas, Pharmacy - Senior

Mentors: Dr. April Miller, Clinical Pharmacy and Outcomes Sciences
Dr. Brianne Dunn, Clinical Pharmacy and Outcomes Sciences

Dexmedetomidine is an alpha-2 adrenergic agonist that provides sedation anxiety and analgesia without respiratory depression. This property is beneficial in critically ill trauma patients who are being weaned from mechanical ventilation. There are few data on dexmedetomidine in a trauma intensive care unit (ICU) setting. This study aims to evaluate the safety and efficacy of dexmedetomidine in this population. Patients admitted to the Trauma ICU without traumatic brain injury who received dexmedetomidine for &amp;#8805;12 hours were included. Medical records were reviewed to evaluate the efficacy of dexmedetomidine at producing desired sedation levels on the Richmond Agitation and Sedation Scale (RASS) doses used and adverse events including bradycardia (heart rate60bpm) and hypotension (mean arterial pressure70mmHg). Thirty-four patients met inclusion criteria. Approximately half of patients presented with injuries to the extremities chest or abdomen. Twenty-four patients (70.6%) were male. The average age was 38.9 years old. The marginal mean dosage received was 0.854mcg/kg/hour. Seventeen patients received mean doses 0.7mcg/kg/hour the maximum manufacturer recommended dose. Dexmedetomidine was administered for a median of 75.5 hours (range 15-313 hours). Most RASS scores (69.1% 363/525) were in the desired sedation range (-2 to 1). There were a total of 118 episodes of bradycardia in 11 patients (3.8% 118/3121). There were a total of 237 episodes of hypotension in 24 patients (7.8% 237/3033). These results suggest that trauma ICU patients receive high doses of dexmedetomidine spend most of the time in the desired sedation range and have minimal drug-related episodes of significant bradycardia or hypotension.

Hyperkalemia and increased serum creatinine (Scr) are known adverse events (AE) associated with SMX/TMP therapy. The purpose of this study is to determine the incidence of hyperkalemia and elevated Scr in HIV-infected patients receiving SMX/TMP and to assess a dose-dependent relationship. Hospitalized HIV-positive

Adverse events secondary to sulfamethoxazole-trimethoprim in HIV-infected hospitalized patients

Caitlin Shamroe, Pharmacy - Senior

Mentors: Dr. Brandon Bookstaver, Clinical Pharmacy and Outcomes Sciences
Dr. Celeste Rudisill, Clinical Pharmacy and Outcomes Sciences

In the hospital setting, sulfamethoxazole-trimethoprim (SMX/TMP) is commonly used in management of Pneumocystis jiroveci pneumonia in HIV-infected patients. Hyperkalemia and increased serum creatinine (Scr) are known adverse events (AE) associated with SMX/TMP therapy. The purpose of this study is to determine the incidence of hyperkalemia and elevated Scr in HIV-infected patients receiving SMX/TMP and to assess a dose-dependent relationship. Hospitalized HIV-positive
Processes words containing visual and haptic information
Neha Jaggi, Biological Sciences - Senior
Mentor: Dr. Svetlana Shinkareva, Psychology
Previous research has shown that there is a perceptual disadvantage for processing haptic stimuli (Connell & Lynott 2010). When people were asked to respond to the arrival of a perceptual stimulus; they were slower to detect tactile stimuli than visual stimuli even though they were told which modality to expect (Spence et al. 2001; Turatto et al. 2004). The purpose of the current project was to determine whether language processing relies on perceptual systems by demonstrating a similar perceptual disadvantage for processing words that possess haptic properties in comparison to visual properties. We used 97 visual and 97 haptic concepts with two properties for each to look at reaction times for judgments of haptic concept-property pairing verses reaction times for judgments of visual concept-property pairings. The visual concepts (for example sand) and the haptic concepts (for example forehead) were judged on the basis of whether one of the two properties accurately described the concept. Preliminary data shows there is a trend towards longer reaction times for haptic concept-property pairings which indicates that perceptual processing occurs when making judgments about words with visual and haptic properties.

Toxic Synergy Between the HIV-Tat1-86 and Methylphenidate in Rat Midbrain Cell Cultures: A Baseline Model for Prenatally Infected HIV Youth With ADHD.
Donna McNeil, Biological Sciences - Senior
Mentor: Dr. Rosemarie Booze, Psychology
Methylphenidate (MPH) a common dopamine agonist is one of the most commonly prescribed medications for children with ADHD. The HIV+ population's diagnosis of ADHD is nearly five-fold to that of the normal population and previous studies have shown that strong dopamine agonists significantly increase HIV-TAT1-86 toxicity in the brain. In this study we used fetal rat midbrain cultures to study the possible synergistic effects of HIV-TAT and MPH using live/dead cytotoxicity assays. We obtained the toxicity profile and curve of the drug in culture prior to HIV-TAT application. Using this data we applied HIV-TAT1-86 to two specific concentrations of MPH approximately corresponding to normal serum levels of the drug in humans. We found and plotted significant effects against appropriate controls. The hope is that this research will be a stepping stone for clinicians to aid in the proper pharmacological management for HIV positive youths living with ADHD.

Left and right amygdalar differences in the number of parvalbumin-positive neurons
Elisabeth Oliver, Chemistry - Junior
Mentors: Dr. Marlene Wilson, Pharmacology Physiology and Neuroscience
Dr. Ryan Butler, Pharmacology Physiology and Neuroscience
Dr. James Fadel, Pharmacology Physiology and Neuroscience
The amygdala is a centrally-located brain region and is important in emotional regulation such as the management of fear and stress. Past studies have shown that the right-hemisphere amygdala is more sensitive to the onset of pain and emotional stress than the left. Parvalbumin is a phenotypic marker for...
an inhibitory interneuronal population. Parvalbumin-positive neurons in the basolateral complex inhibit Ca\(^{2+}\)/calmodulin-dependant protein kinase II (CAMKII) positive neurons which is an excitatory projection neuronal population. This study sought to estimate the number of parvalbumin-positive neurons in the left and right basolateral complex (BLC) within the rat amygdala. After anesthesia animals were perfused with 4% paraformaldehyde and brains were harvested. Every third section throughout the amygdala was immunohistochemically-stained for parvalbumin. The optical fractionator method was then performed using the Microbrightfield Stereologer system to obtain an unbiased estimate of the number of parvalbumin-positive neurons in subdivisions through the entire BLC. The lateral amygdala was divided into dorsolateral ventrolateral and ventromedial divisions. The basolateral amygdala was divided into posterior anterior and ventral divisions. The results indicate that there are significantly more parvalbumin-positive neurons in the left basolateral amygdala compared to the right basolateral amygdala. Future directions include investigating differences in CAMKII-positive neurons as well as other interneuronal populations which contain calretinin calbindin and somatostatin in the left and right amygdala and total number of neurons in these amygdala regions. The parvalbumin data suggests that there is more inhibitory control of CAMKII projection neurons in the left basolateral amygdala than in the right basolateral amygdala.

Parental Support for Diet in African American Mother-Daughter versus Mother-Son Dyads

Rebecca Schimmel, Psychology - Senior
Mentors: Dr. Dawn Wilson, Psychology Ms. Sara St. George, Psychology

Obesity is a growing problem within the African American community with nearly 40% of youth classified as either overweight or obese. The African American community is known for its close familial relationships and recent increases in families with females as the primary parental figure. Thus African American youth may often receive support for healthy behaviors from female caregivers. Previous research suggests parental support for engaging in a healthy diet is associated with increases in fruit and vegetable intake. Furthermore mother-daughter dyads have been shown to be more cohesive than mother-son dyads. However it is not yet clear if differences exist in how daughters versus sons perceive support for a healthy diet from female caregivers. This study examined adolescent perceptions of parental social support for a healthy diet in mother-daughter versus mother-son dyads. Participants (n=66 mother-adolescent dyads 100% African American 63% mother-daughter dyads) completed baseline measures as part of their participation in a family-based health promotion program known as “Project SHINE” (Supporting Health Interactively through Nutrition and Exercise; NIH F31HD066944). Adolescent perceptions of parental support for a healthy diet were assessed with a previously validated measure. Results indicated no significant difference in how daughters versus sons perceived social support for a healthy diet from mothers. Despite the non-significant findings this study expands the way parental social support for diet is examined by taking into account youth perceptions of specific provider support. Conducting similar studies using larger sample sizes may thus be beneficial.

How Does Attending to Multiple Items Correlate with Verbal and Non-Verbal Abilities?
Matthew Shannon, Psychology - Senior
Mentor: Dr. Melanie Palomares, Psychology

Enumeration is the ability to quickly quantify the number of objects in the visual field. Since the ability to accurately enumerate objects improves with age and practice (Halberda & Feigenson 2008) better enumeration scores should reflect greater ability to rapidly identify specific visual objects such as words in a sentence. We compared the ability of children (ages 6-11) to enumerate sets of dots on a computer screen with their scores from two standardized assessments of verbal and non-verbal abilities. We measured enumeration accuracy for two different groups of dots (sets of integers from 1-10 and multiples of ten from10-100). Children were administered the Woodcock Johnson III Test of Cognitive Abilities (WJIII) which compares the verbal comprehension concept formation and visual matching abilities of individual children against national averages. The Gray Oral Reading Test-4 (GORT-4) was also administered to evaluate oral reading ability by measuring speed and accuracy. Although we found that reading fluency correlated with non-verbal abilities we also found that enumeration accuracy had a stronger relationship to standardized non-verbal scores than reading fluency. With more participants we hypothesize that children’s ability to attend to multiple objects at once would be strongly related to the speed of object processing in the visual field for both verbal and non-verbal tasks.

Prenatal Intravenous Nicotine Increases Sensitivity to Methamphetamine Reinforcement in Rats.

George Weinberg, Psychology - Senior
Mentors: Dr. Steven Harrod, Psychology Mr. Ryan Lacy, Psychology

Tobacco smoking during pregnancy is associated with increased substance abuse in offspring. Preclinical research shows that in utero nicotine exposure alone alters the neurodevelopment of reward systems and thus influences motivational behavior in mature offspring. The present study was aimed to determine if intravenous (IV) prenatal nicotine (PN) exposure altered offspring’s sensitivity to the reinforcing effects of methamphetamine (METH). Pregnant females were administered PN IV nicotine (0.05 mg/kg/injection) or IV prenatal saline (PS) 3x/day on gestational days 8-21. Adult offspring were tested using a METH self-administration procedure. Rats were first trained to respond for sucrose reinforcement (26%; w/v) using operant conditioning chambers. Following catheter implantation offspring acquired operant responding for METH (0.05 mg/kg/injection) according to a fixed-ratio (FR) 3 schedule of reinforcement. Following stable responding offspring were tested on varying doses of METH (0.005-1.0 mg/kg/injection; FR-3) according to a Latin-square procedure. PN and PS animals exhibited standard inverted U-shaped dose-response curves; however the PN animal’s curve was shifted to the left indicating that PN animals were more responsive to lower doses of IV METH relative to PS controls. This suggests that the IV PN model induced robust and long-lasting changes in the sensitivity to highly rewarding drugs such as METH. This further suggests that PN exposure via maternal cigarette smoking will alter the reinforcing effects of METH.
during later stages of development and influence substance abuse vulnerability in adult human offspring.

**The Effect of Daily Stressors on Adolescent Coping Skill Development**

*Jessica Wilder*, Psychology - Senior  
Mentors: Dr. Mark Weist, Psychology  
Dr. Leslie Taylor, Psychology

This research study sought to examine the development of coping responses by children and adolescents in particular as a factor in dealing with the effects of daily stress. My goal was to use the information gained to identify which coping strategies are the most and least effective when it comes to dealing with various stressors. I hoped to used the information gained to develop a proposed program for how youth in South Carolina and the Columbia area can best handle stressful situations. To accomplish this I developed a survey that identified the level and type of stress in the lives of the participants and then identified their primary coping strategies and how high their subsequent levels of anxiety were. I hypothesized that seeking social support would be the most effective coping strategy in lessening anxiety and relieving the effects of stress and that avoidance would be the least effective. We found that the amount of stress in the participants' lives was positively correlated with the number of active coping skills (such as seeking social support). We also found that an unusually high number of participating students scored in the abnormal range for daily stressors and life difficulties- suggesting that the youth in the targeted area would benefit greatly from some training in dealing positively with their circumstances. I would like to bring the results of our survey back to the participating schools and make a presentation regarding the results and what adolescents can do to actively cope with high levels of stress.

**Visual apprehension of small and large numerosities**

*Breana Carter*, Psychology - Senior  
Mentor: Dr. Melanie Palomares, Psychology

For small and large numerosities, we evaluated the subitizing capacity, as well as accuracy and precision of visual enumeration. Subitizing is the rapid and accurate enumeration of small numerosities, usually between 3 and 5. We asked adults to visually enumerate by “ones” (1-9) or by “tens” (10-90), and then asked the to enumerate by “ones” (1-19) or “fives” (5-95). To analyze whether the ratio differences, 1 to 2 and 1 to 3, is responsible for enumeration, we compared the accuracies for ratios of 10 to 20, 10 to 30, 5 to 10, and 5 to 15. We found that the enumeration functions of “ones” and “tens” and “ones” and “fives” have different characteristics, which is consistent with the presence of two number systems. We found a subitizing capacity for 1-3 elements, but not for 10-30 or 5-15 elements, which suggests that subitization is limited to small numerosities (4 elements) and is independent of the relative ratio between quantities. Moreover, we found a strong effect of context, showing enumeration accuracy depends on the set of possible numerosities in the task.

**Context effects on Endorsement and Perception of Political Issues**

*Addison Fay*, Psychology - Senior  
Mentor: Dr. Doug Wedell, Psychology

We conducted a survey of USC students to see if the contexts of specific political domains show significant difference in participants' preference based on a six point scale from Strongly Agree to Strongly Disagree. The seven political domains we examined were gun control abortion national debt immigration income taxes arts fundingand environmental conservation. Our pretesting determined that these domains were significantly related to participants only degree of conservatism and that the states differed in the expected way on a six point scale from Very Liberal to Very Conservative. We created two versions of this study one with liberal contextual items and one with conservative contextual items. Both versions included two target items one moderately liberal and one moderately conservative. Participants first rated their political position on 39 items. Next they were asked to rate their agreement for one context of the seven political domains and finally were asked to rate their attitude on the same seven domains. The focus of our research was twofold. First will participants shift their preference for target positions based on context? Second will participants shift their perceptions of how liberal or conservative the target positions seemed based on the context they experience? Research with perceptual stimuli show strong context effects but political attitudes may be less susceptible to these effects.
animal’s motivation for reinforcement. Given that our previous results showed that offspring exposed to prenatal nicotine were more sensitive to METH (0.005 mg/kg/inj), it is hypothesized that such offspring will be increasingly motivated to respond for 0.005 0.025 or 0.05 mg/kg/inf METH. The results of this study will help further our current understanding of alterations in motivation for illicit drugs amongst humans exposed to prenatal nicotine via maternal cigarette smoke.

Limitations on statistical summary representation as a result of task set size and variability.

Anne Payne, Biological Sciences - Junior
Mentor: Dr. Melanie Palomares, Psychology

The limited capacity of memory makes statistical summary representation necessary to process the large amounts of information from the world around us. Previous research indicates that information from a set such as size (Ariely 2001) or orientation (Dakin et al. 2009) can be accurately represented by a summary statistic. We attempted to see the limitations of statistical summary representation by answering three questions: 1) Does task (identification of a member vs. identification of the mean) affect our ability to judge the mean length or a member length of a set? 2) How does set size (n=2349) affect this ability? 3) What role does variability play in this ability? Across four experiments we investigated how sets are represented. In experiments 1-2 participants viewed a set of lines that was either vertically or randomly oriented and were asked to identify the set's mean length or the length of an individual member. In experiments 3-4 participants viewed a set of lines that was either uniform or random in length and were asked to identify the mean orientation or the orientation of an individual member. We found that mean-identification was consistently superior to identification of a member and that there is no effect of set size or variability of an irrelevant feature. Our results indicate that participants tended to choose the mean of the set even when asked to choose the member suggesting an inherent mechanism for averaging similar objects into a manageable representation that can be easily stored and retrieved from memory.

Investigation of Response Resistance on the Development of Activity Based Anorexia in Rats

Nicole Streeb, Psychology - Senior; USC Aiken
Mentor: Dr. Edward Callen, Psychology; USC Aiken

The specific aim of the proposed study was to test the effects of effort on operant running behavior in rats as it applies to the phenomenon of activity based anorexia. Activity-based anorexia (ABA) has been demonstrated in the lab where a restricted eating schedule is combined with daily access to a running wheel. Research has investigated some of the behavioral aspects of ABA but little has been done to investigate the effects of running effort on enhanced behavior. This study has investigated the effects of high effort versus low effort using an established animal model of ABA. Specifically we investigated whether high wheel resistance (greater effort) would attenuate the usual ABA effect and whether changing response effort would change the pattern of running.
Exploring the Benefits of Writing-Based Interventions

Virginia Diane Woodbrown, Psychology - Senior
Mentor: Dr. Suzanne Swan, Psychology

According to some research the process of expressive writing leads to better outcomes for those suffering from some psychological as well as physical difficulties (Baikie & Wilhelm 2005). This evidence suggests that writing-based interventions could be powerful mental health tools. We hypothesize that conducting a six week Writing-based Healing Intervention with a small Columbia-based population (some currently receiving counseling support and some seeking counseling support) will result in improved self-esteem improved communication skills and improved optimism for those participating. Our intervention will encourage participants to express themselves on paper and to share their writings with others in the group in a supportive and attentive environment. Beginning in March we will meet once a week for six weeks and will administer a brief pre- and post-survey to each participant in order to ascertain the program’s overall effectiveness. My presentation will describe our pilot methods and descriptive data including information we glean from our surveys regarding participants’ pre-group desires and post-group outcomes. I will also exhibit data regarding participants’ own impressions of the process as well as data we collect regarding the general content of participants’ writings themselves. This exploration of the benefits of expressive writing on mental health is an important step in developing an understanding of how this kind of intervention might benefit those in need of mental health services.

Effect of Parental Education Motivation and Self-Efficacy on Adolescents Weight Status and Physical Activity

Lee Woods, Psychology - Senior
Mentors: Dr. Dawn Wilson, Psychology  Ms. Sara St. George, Psychology

Obesity rates for ethnic minorities have increased across the United States with an estimated 40% of African American youth currently classified as overweight or obese. Previous research suggests US youth from lower versus higher socioeconomic backgrounds may be at greater risk for obesity and engage in less physical activity (PA). In addition parents have been shown to influence a variety of youth-related health outcomes. Although previous research has examined the effect of social parenting factors (e.g. parental support) on adolescent weight status and PA it is not yet clear how a parent’s intrapersonal variables (i.e. motivation self-efficacy for PA) relate to adolescent weight or PA. This study examined the effect of parental education motivation for PA and self-efficacy for PA on adolescent weight status and PA. Participants (n=72 families 100% African American) completed baseline measures as a part of their participation in “Project SHINE” (Supporting Health Interactively through Nutrition and Exercise; NIH F31HD066944) a family-based health promotion program. Primary caregivers completed surveys to assess their education motivation and self-efficacy. Adolescent body mass index (BMI) was calculated using objective height and weight measures and PA was assessed using 7-day accelerometry estimates. Results from multiple regression analyses indicated that parental education motivation and self-efficacy together were not predictive of adolescent BMI.

Physical activity data are currently being processed; as such analyses examining the impact of parent variables on youth PA are forthcoming. This study will help add to the literature on how parental intrapersonal factors may influence adolescent health outcomes.
Social Sciences I

Why Gossip Hurts: An Evaluation of the Effects of Gossip on Reputation
Stevie Chamberlain, Psychology - Senior
Mentor: Dr. Brent Simpson, Sociology
The purpose of the project is to assess the effects of morality-related gossip on reputation. Specifically the project is designed to evaluate reputation based on a moral or immoral act done by an individual; additionally it seeks to determine whether that reputation is comparable to that of one formed by non-moral (amoral) related gossip. Current research demonstrates the powerful effects of a person’s reputation on how he or she is treated by others. What is unaddressed in the current literature is how reputations emerge and solidify (or change) via networks or chains of morality related gossip. This research would examine exactly that question focusing especially on how reputations become increasingly moral or immoral through gossip. Because of this gap in the current literature we set out to design a method to measure the differences in reputation based on the content of the gossip (either moral or immoral). After a series of pretesting the current procedure uses a methodology similar to that of the childhood game the Telephone Game. We introduce a piece of ostensible moral or immoral gossip about an anonymous other to participants in the lab allowing them to transmit the story from person to person down the communication chain. After recording the new “gossip” we then examine how the ostensive story (and the anonymous other’s reputation) changed as a result of the transmission. Currently we are in the process of collecting data; the results of the study will be available and presented at Discovery Day.

Sustainable Landscaping at USC
Jimmy Graham, International Studies - Senior
Mentor: Dr. David Whiteman, Political Science
This project was carried out through Magellan mini grant funding with the aim of creating a model sustainable landscape outside of the Green Quad Learning Center. The immediate goals of the landscape were to reduce energy consumption provide free food to students and reduce pollution. The longer term goal of the landscape was to demonstrate to students as well as faculty the benefits of sustainable landscaping specifically that landscaping can have not only an aesthetic function but also can function as a source of food (thus reducing reliance on external and non-local food sources) and means for sustainability. The landscape addressed these goals in several ways. To begin with the landscape was created as a bio swale i.e. it was shaped in a way that maximized the retention of rainwater. As such it required less watering and therefore less energy. This shaping also prevented storm drain run off from carrying pollutants into Rocky Branch Creek. Further only native and/or edible plants were used which are more fit to survive and therefore require less watering and energy and serve a practical purpose respectively. Also by coordinating with USC campus landscaping on this project we hoped to create somewhat of a norm for sustainable landscaping or at least promote the concept (as it requires less work and less money). Finally by placing this garden in an area with high student traffic the landscape essentially promoted itself with its aesthetic appeal and food production thus demonstrating the benefits of sustainable landscaping.

Educating and Engaging Students in Green Building Techniques and Ideas Through Sustainable Carolina.
Chelsea Hoggle, Insurance and Risk Management - Junior
Karen Schmit, Mechanical Engineering - Freshman
Kristen Lococo, Marine Science - Senior
Davis Johnson, Business Administration - Sophomore
Mentor: Dr. David Whiteman, Political Science
Sustainable Carolina is invested in greening our environment as well as greening ourselves. A subset of our projects focus on improving our physical surroundings and bringing students faculty and staff in close contact with organic gardening and low impact development opportunities and practices. Through multiple grant-funded programs Sustainable Carolina has been involved in creating and maintaining the Carolina Community Garden at the West (Green) Quad and has expanded the size crop and technique diversity and resources available to the garden through student-designed grant-funded projects. Students have created a campus-wide composting program and are designing a consistent and aesthetically composter design that will be piloted at the Honors Dorm and implemented across the campus. Students also have been involved in installing rain-collecting bioswales and rain barrels to slow water and pollutant runoff into the local watershed. These projects are intended to be launching points for university-wide initiatives that will be student-initiated and student led but be fully supported by a coalition of campus departments community groups and student organizations as well as Sustainable Carolina. These initiatives will lead to community gardens across campus greater engagement in the Rocky Branch Watershed post-consumer composting at residence halls and more students trained in green building techniques. By developing these skills and providing unique

Locating Cannibalism on St. Croix: Shedding Light on Cultural Practice
Claudia Labarre, Anthropology - Senior
Mentor: Dr. Carlina de la Cova, Anthropology
This project evaluates possible skeletal evidence for human cannibalism in Pre-Columbian Caribbean specifically the collections at Fort Frederik Fort Christiansvaern and Sandy Point National Wildlife Refuge in St. Croix USVI. The purpose of this research is to advance knowledge and cultural understanding of cannibalism as an aspect of human behavior either real or as a tool of subjugation. I use multiple established methodologies to assess archaeological evidence for cannibalistic behavior (evidence of butchered food preparation intentional perimortem breakage etc.) all of which may be recognized visually. The project further evaluates whether historical accounts of cannibalistic behavior reflect pre-contact indigenous social practices or merely dehumanizing sensationalist propaganda. This study addresses an extremely sensitive subject and I have attempted to uphold academic and personal integrity throughout by addressing all possible alternatives to any evidence given whether historical or archaeological. This will help to understand the unique cultural history.
of St. Croix. This research was designed around a four-week study abroad archaeological field school in St. Croix United States Virgin Islands (USVI) completed May-June 2011. The purpose of participating in a field school abroad was to garner practical knowledge of my program through experiencing another culture and taking part in an archaeological excavation. The purpose of developing the project was to incorporate the results into a larger report. This report is meant to impact the current population of St. Croix by connecting them with cultures that preceded them through archaeological evidence from the field school and previously excavated artifacts.

Online Design in a Post PC World

Denishia Macon, Visual Communications - Senior
Mentor: Prof. Van Kornegay, Journalism and Mass Communications
The goal of this project is to design a mobile website with improved function and versatility for the iPad. The amount of users accessing the web via mobile technology has increased exponentially over the past few years. It is essential for companies, stores, and iPad application developers to ensure that their websites are capable of being properly displayed for mobile tablet screens. The images of a website layout will be presented and compared among three technologies (i.e. computer, mobile phone, iPad) in an effort to reveal the problems that arise from websites that are only formatted for computer screens. We propose the implementation of responsive web design to change orientation based on the screen display size as a solution for this problem. We will also propose a prototype of a website designed to function properly on a smaller screen by taking a theoretical approach to the best design strategy for a mobile site. Website analytics is significant in that it measures collects analyzes and reports internet data for purposes of understanding and optimizing web usage. This method will be used to assist with the design of the website to help with choosing the right buttons configuring the best layout for optimized experience and using the right location for display. Through the use of responsive web design and website analytics we will explore design strategies for the site that will improve its interface for mobile usage.

Bartolus’ De Insulis In Context

Del Maticic, Classics - Sophomore
Mentor: Dr. Catherine Castner, Languages Literatures and Cultures
The fourteenth century Italian jurist Bartolus of Sassoferrato was the most renowned Italian legal figure of his day and he contributed fundamental Latin works to the Western legal system. A prime example is Bartolus’s Tyberiades or Treatise on Rivers which examined complex property law in alluvial lands by means of dream-inspired Euclidean geometrical diagrams. As an undergraduate research project that began in February 2012 and that will extend to become my Honors College senior thesis I am translating and contextualizing the heretofore un-translated second book of the tract On Islands. Furthermore I will reproduce images from medieval manuscripts and early modern printed editions of the tract held by the Vatican Library. Based upon these materials I will examine the bold progressivism of Bartolus’ jurisprudence and his strong ties to Classical and Medieval literature. Moreover I will investigate the tract’s reception in later juridical traditions especially in France where it inspired an entire genre of legal cartography called Tyberiades. I feel this project is needful because although recognized in European scholarship The Treatise on Rivers has long deserved access to Anglophone audiences. My translation will offer them access to a rich example of Classical reception embodied in a highly influential medieval response to modern legal problems. Furthermore the tract and its reception demonstrate that bitterly contentious twenty-first century legal debates such as judicial activism and the relationship between property ownership and the environment raged even in fourteenth century Italy.

Basque Folk-Dancing and Concepts of Identity

Mary Miller, International Studies - Senior
Mentor: Dr. Heather Hawn, Political Science
The goal of my research is to discover whether or not participation in folk-dance groups has any impact on personal political activity or identity within a Basque folk-dancing group of Spain. I will be interviewing both members of the group in question citizens of the local area who are not affiliated with the group and American students studying abroad. I will prepare for these interviews and the topics involved by doing background research on political participation and the politics of dance and the Basque Country.

Examining Root Causes of Socioeconomic Gaps Between the Greater Indian Population and Indian Muslims

Tariq Salim, Biomedical Engineering - Junior
Hassieb Din, Biomedical Engineering - Junior
Mentor: Dr. Maimuna Huq, Anthropology
Recent findings have supported the suggestion that there is a socioeconomic gap between Indian Muslims and other Indian populations. These findings are backed by quantitative statistical evidence including lower literacy rates, lower employment rates and higher poverty rates for Muslims relative to the rest of the Indian population. I Reports have indicated that the socioeconomic gap can be partially accounted for by suppressive government policies particularly at local levels. Our aim was to investigate these matters further by engaging with local Muslim communities on the ground. We wished to examine differences in issues faced by these populations as compared to other groups within India. Our findings support recent evidence suggesting a suppressive environment surrounding Muslims in India. Furthermore in response to previous reports the Government of India has suggested solutions calling for increased integration of Muslim communities. However our conclusions support different objectives including programs geared towards decreasing social stigma towards Muslims as well as an increased allocation of resources towards Muslim communities promoting self-sufficiency.
**The Games Our Minds Play: Using Game-Theoretic Models to Understand Construal Cognition and Interdependence in Social Dilemmas**  
*Alexander Severson*, Political Science - Senior  
Mentor: Dr. Brent Simpson, Sociology  
The aim of this project is to assess whether involvement in a social dilemma has an impact on individuals' subjective perceptions of that dilemma. This project also tests if there are correlations between game endorsement and prosociality generalized trust political orientation and personality traits. Previous research has found that people tend to view real-world conflict in terms of a predictable small set of game models and that perceptions of interdependence in negotiation situations are related to certain conflict-related variables such as political ideology worldview and mortality-salience (Halevy 2006). The hypothesis of this project is that an individual is personally involved in a social dilemma then the individual will endorse cooperative game models (Maximizing Difference Assurance) of social dilemmas at higher rates than competitive models (Prisoner's Dilemma Chicken). This hypothesis is tested through use of an online survey instrument and employs a between-subjects experimental design. After being randomly assigned to one of two conditions and asked to respond to standard social and personality measures participants were asked to read paragraph descriptions of three different social dilemma scenarios. Participants were then asked to ordinally rank subsequent game matrices based on their perceptions of how accurately matrix outcomes represented the reality of the social dilemma. Data analysis is currently underway. Future avenues of research can explore whether our findings hold in n-person dilemmas whether our findings hold in iterative dilemma situations and whether individuals' beliefs about others' construal impacts their own construal.

**Special Events at Racing Venues**  
*Scott Shinbaum*, Sport and Entertainment Management - Senior  
Mentors: Prof. Todd Koesters, Sport and Entertainment Management  
Dr. John Grady, Sport and Entertainment Management  
The purpose of this study was to understand how special events surrounding a mega-event and at purpose-built venues are used to increase venue attendance and repatronage and to create and maximize revenue as well as sponsorship value and activation opportunities. One research question guided this exploratory study: How do event organizers use special events and related mega-events to increase revenues attendance and repatronage and sponsorship activation opportunities? An exploratory case study methodology was used in order to develop an understanding of the types of events organizers use to increase revenue patron experience and sponsorship activation opportunities. Through the use of in-depth interviews with three event organizers post-event print articles and observations at events an understanding of the successes and failures of various types of special events emerged. The findings from the study suggest that ancillary entertainment events used to complement a mega-event provide a noticeable positive effect on ticket sales patron experience and sponsorship opportunities. Furthermore fan fests related to these mega-events provide a successful avenue for direct marketing activation initiatives for sponsors. The findings also indicate that separate festival events at racing venues pose a financial risk to the venue when self-promoted. However the use of an outside promoter removes risk from the venue and festival facility rentals are a successful revenue stream for the venue.
The Politics of Higher Education

**Chris Fedeli**, Political Science - Senior
Mentor: Dr. Christian Anderson, Educational Leadership and Policies
This research analyzes the relationships and interaction between various aspects and branches of state governments with their institutions of higher education in support of an upcoming book by Dr. Anderson. Chapter titles include: The Role of the Governor, The Legislature, Lobbying the Legislature and The Tensions of State Relations. Specifically it has involve me reading and annotating numerous articles on these subjects many of which take the form of statistical studies to find correlation between certain political economic or demographic factors and outcomes such as funding graduation rates or the passage of legislation.

A Comparison of Select Retailing Programs in Higher Education Across the United States

**Rachel Gannon**, Retailing - Senior
Mentor: Dr. Marianne Bickle, Retailing
Retailing is a growing industry supplying the United States with 42 million jobs. More than 90 programs offer retailing curriculum at the Higher Education and/or Technical College level throughout the United States. Each program offers a different emphasis to fit the main focus of the department and/or college. The purposes of the study was to (a) analyze and compare select retail departments by comparing courses offered and required curriculums and (b) to provide recommendations for the University of South Carolina’s Department of Retailing program. The programs investigated included: Auburn University (Auburn AL), Colorado State University (Fort Collins CO), Ohio State University (Columbus OH), Oklahoma State University (Stillwater OK), University of Missouri (Columbia MO) and the University of South Carolina (Columbia SC). Program curriculum from these institutions was examined for similarities and differences. Data were tabulated. Results revealed a trend for offering a strong background in accounting economics and principles of retailing buying shopper analysis marketing textiles multi-national retailing pre-internship seminar and an internship. Differences among the institutions were based on expertise in the faculty composition the department (i.e. other programs offered) and location of the institution.

Aspirations or Reactions?: Understanding the Development Needs of Women in Rural Ghana

**Meagan Gunning**, International Studies - Senior
Mentor: Dr. Edward Carr, Geography
While existing livelihoods are an important foundation for rural development projects and policy assuming that they are essentially reactive closes off serious consideration of the role of aspirations in livelihoods which might greatly limit our understanding of how and why people do what they do to make a living. Thus our project informs wider concerns for the place of gender in development. At the same time evidence from this project will encourage development organizations to rethink how they approach development pathways and look beyond management of risk and problems to include peoples aspirations as a part of why they go about making a living the way they do. By emphasizing the analysis of locally-defined goals and aspirations behind existing livelihoods we hope to facilitate improved project planning that will save money currently wasted on development projects that continually need to be restructured and fixed. To conduct this project we travelled to the rural Ghanaian village of Ponkrum to research for two months in the summer of 2010. We interviewed the women in the village and their husbands in order to have a medium of comparison. In addition to interviews we observed their daily activities and lifestyles throughout the course of our stay. The project allowed us to discover that development organizations need to take into consideration the aspirations and plans of the local people in order to implement a successful project.

Altruistic Covers and their Effect of Dishonest Behavior

**Michael Lee**, Sociology - Sophomore
Mentor: Dr. Brent Simpson, Sociology
In today’s society more than criminals violate the law. There are opportunities at every corner to behave dishonestly from evading taxes to cheating on a high school test. Explaining this behavior is crucial for understanding how it happens and how it can be prevented. This project looks at one reason why people might behave dishonestly: the presence of an altruistic cover. Participants were recruited to participate in an experiment in which they think they are given a puzzle task for measuring skill in math. Their pay for the study depends on the number of puzzles they solve and they are given 5 minutes to solve as many puzzles as possible. There is then an opportunity to cheat and over-report the number of puzzles they solved receiving more money. We specifically looked at whether people were more likely to cheat if they had an altruistic cover for their actions. An altruistic cover is a rationale or reason for a dishonest behavior that makes the dishonest person seem to have good intentions. We gave some people the opportunity to cheat for only themselves some people the opportunity to cheat for a charity and some the opportunity to cheat for both themselves and a charity. We predicted that the mere presence of an altruistic cover would make people more likely to cheat for their own gain.

The Effect of Anti-Immigration Laws and the Current Economic Downturn on Access to Health Care on the Mexican Migrant Population in South Carolina

**Payal Patel**, Public Health - Senior
Mentor: Dr. Myriam Torres, Epidemiology and Biostatistics
Through the past years there has been a large influx of Latino immigrants into South Carolina. There has been a particular increase in the Mexican immigration into the state. They are the largest faction of the Latino community in South Carolina. Over the past years there has been a significant increase in anti-immigrant sentiment in the state. Recent South Carolina Immigration legislation is particularly severe. For the project the effect of anti-immigration sentiments socio-cultural integration socioeconomic status and immigration and migration statuses will be studied in relation to the health status of the Mexican migrant population in South Carolina. Over the past year Mexican interviews have
Discovery Day 2012

Bringing Winston-Salem Together: A Case Study of Rebranding in Minor League Baseball
Randall Stewart, Sport and Entertainment Management - Junior
Mentor: Dr. Khalid Ballouli, Sport and Entertainment Management
At the highest level of professional sports, teams rarely undergo a full-scale rebranding. Instead, logos are changed, alternate jerseys are introduced, and colors are tweaked in an effort to increase merchandise sales or appeal to a different segment of the population. In lower levels of professional sports, however, rebranding efforts are much more common. In an average offseason, 13 Minor League Baseball teams choose to rebrand. In 2009, the Winston-Salem Warthogs became the Winston-Salem Dash, but experienced major setbacks in stadium construction, public relations, and attendance. The transformation of the Warthogs into the Dash saw the team overcome both unforeseen and self-inflicted obstacles to build a strong brand in the three seasons after the transition.

Researching and Promoting Sustainability at USC
Ross Roessler, Computer Engineering - Junior
Mentor: Ms. Katie Coley, Outdoor Recreation
Sustainability is a very important topic in today’s world. As we use and expend more resources it becomes our duty to reduce our use of nonrenewable resources and take care of the environment. For this research project we researched student awareness about sustainable initiatives around campus and undertook many projects to promote and increase our sustainability. Initially we gave out surveys collecting information on student knowledge of tree plantings and gardens around campus. Then we engaged in many activities to promote student awareness. We set up marketing tables around campus advertising for sustainable events held various tree plantings around campus and increased our advertising through social media. Currently our two largest projects are the Carolina Community Gardens plots of land available for student groups to rent and grow their own food and creating a tree planting campus map designed to create a fun and educational walking tour showcasing our trees around campus. In the future we will be re-surveying students to see if awareness of sustainable initiatives around campus has increased. In addition we will be hoping to receive feedback to see how we can raise awareness even more in the future. We have already realized that while many students are aware of the sustainable events on campus many others have no idea and we need to increase our marketing so all students can have a chance to engage in these activities.

Conflict Resolution Education of Students at the University of South Carolina
Kevin Stam, Social Work - Junior
Mentor: Prof. Susan Parlier, Social Work
Conflict is a natural part of life and a constant and inevitable part of human interaction. With the existence of conflict comes the opportunity to resolve and transform it. There are a set of different skills and techniques that are widely accepted in resolving and transforming conflict effectively and peacefully. This research will look into what college age students at the University of South Carolina have learned about these skills and techniques as well as in what settings they have learned them. Also this research looks at the different perspectives and views that this population brings to situations of conflict. The hypothesis is that college age students have learned little about conflict resolution due to a lack of conflict resolution education in their lives.

Are we getting the health information we need from the mass media?: Consumers’ Perceptions about Online Health and Medical News
Eleasa Van Slooten, Public Health - Junior
Mentors: Dr. Daniela Friedman, Health Promotion Education and Behavior
Dr. Andrea Tanner, Journalism and Mass Communications
Consumers today have many media sources to choose from when getting health information. This study examined consumers’ perceptions and opinions about health information in the mass media specifically on local television news and news websites. A sample of 17 women and 15 men participated in in-depth interviews or focus groups. Recurrent themes within and across groups were examined. Consumers’ understanding of online health news was assessed using a modified Cloze test and the Shortened Test of Functional Health Literacy in Adults (S-TOFHLA). Findings revealed that both men and women perceived that the media sensationalized traditional and online health news however they often turned to the media and Internet to search for health and medical information. Participants demonstrated adequate comprehension of online health news as evidenced by their Cloze and S-TOFHLA scores. These results pave the way for the mass media to tailor health reports to consumers’ comprehension levels and present the information in a way that will motivate consumers to engage in healthy behaviors.

Discovery Day 2012
Poster Presentations 105
Poster Presentations
Afternoon Session

Discovery Day 2012
A forum for student ingenuity
Beyond Boundaries: The Home of the Birth and Rebirth of Art Italy in art history
Rachel Borgman, Art Studio - Senior

When I was given the Beyond Boundaries award I had the amazing opportunity to study art at the International School of Painting Drawing and Sculpture in Umbria Italy and learn about the importance of Italian art and history. I learned about Italian culture by meeting individuals in the town festival in Montecastello di Vibio an annual celebration held in the small medieval fortress town in the Umbrian landscape. I did studies from works of Renaissance Baroque and Medieval art during my visits to Rome Florence Perugia Assisi and Monterchi in Tuscany. There I visited St. Peter’s Basilica The Santa Maria della Vittoria Church Borghese Gardens and Museum Capuchin Crypt and Church Pantheon Arch of Constantine Coliseum Uffizi Museum Basilica of St Francis Assisi Cathedral Museo dell Madonna de Parto. I saw works by featured artists including Bernini Michelangelo Botticelli Caravaggio and others. During my visits I began to understand the importance of the landscape and the spiritual world on this pivotal moment in art history these were concepts that would have a shaping influence on my own ideologies as I developed my future artwork.

Natural Sympathies
Rachel Borgman, Art Studio - Senior
Mentor: Prof. Robert Lyon, Art

To explore the importance of the animal in conveying the spiritual experience of the natural world to the individual I looked to key texts. These included Emerson's Essays Walden Pond Watership Down Saints and Animals in the Middle Ages Beak of The Finch and biblical and Greek literature. Looking to various sources has given me an individual understanding of transcendental thought through scientific spiritual and ethnographic perspectives. For example I drew from the experiences of St. Francis and his sermon to the birds and the Grants and their research with finches. This is an exploration of how mankind throughout history has mourned the decline of rural settings and our minds have hearkened back to romanticizing images of nature and the ideals of life they convey. Today we feel a sense of loss as we drift in a world of spiritual disillusionment and loss of individual customs and beliefs that are associated with wildlife. To better inform these concepts I visited nearby areas that represent images of earthly familiarity including Congaree Swamp Table Rock State Park Columbia Zoo Natural History Exhibitions and have volunteered at the Wildlife Rescue Center. As a result of my research I have created visual works that encompass my ideas. They include: "The Lions of St. Jerome" "The Visions of St. Hubertus" "Prince with a Thousand Enemies" "The Rabbits of Richard Adams" "The Grant's Finches" "Leda and the Swan" "The Birds of St. Francis" and "Diana and Actaeon."
**The Traditional Media of a Graphic Novel**

*Payton Frawley*, Sport and Entertainment Management - Freshman  
Mentor: Prof. Northrop Davis, Art  
The modern world relies heavily on technology to create fast solutions to what we want to accomplish. In order to break away from this and learn more traditional methods of creating comic books I have researched different techniques to understand the value of traditional media as well as how it contrasts from digitally created comic books. Specifically by creating my own comic introduction I learned the basic idea of how to use screentones featured in manga as well as use pen and nib that many artists utilize. I have compiled simple tutorials on what I have learned about these media. In addition I have interviewed comic creators to understand their own techniques that differ from person to person to show that comic book creation is not an exact art form. In this process I have discovered the difficulty of traditional methods. There are many benefits to traditionally made graphic novels but some problems do occur that digital media is able to eliminate. However digital media has its own issues that traditional media does not. This is important to understand as these elements of each art form can be utilized correctly to achieve a certain look but in a present day world where the easiest method is often desired traditional media is forgotten and the benefits of it are no longer realized.

**Not Your Grandma's Knitting Circle: Fiber Arts in the New Millennium**

*Hillary Hudson*, Anthropology - Senior  
Mentor: Dr. Drucilla Barker, Women's and Gender Studies  
My research focuses on the ways in which globalization has facilitated the renewed attention to knitting and through the Internet assisted in the formation of collective groups. In today’s global world fiber arts forms are being re-contextualized and reinstated in the lives of modern day women and men. This has brought about new movements in fiber arts to “DIY” or do-it-yourself. The goal of this project was to explore the ways in which globalization and the Internet relate to the formation and maintenance of collective knitting groups. Part of my research documented the differences between the knitting cultures of Asheville and New York as well as the difference in the type of group I encountered during my fieldwork. I also studied how these groups use social media and websites like ravelry.com to communicate and enhance the group’s experience. I situated this project around the idea that people organize collectives to counter the alienation of global capitalism. I was surprised to find that although there are strong friendships and knitting collectives on the Internet these bonds do not necessarily translate off the web. When I started this project I had hoped to find that the Internet would be cohesively integrated into the groups I had studied. This was not the case but what I did find is that each person that I encountered did depend upon the Internet for online communal support or for the furthering of his or her craft.

**Changing Columbia: A Non-Profit Graphic Design Collaborative**

*Ashley Holliday*, Art Studio - Senior  
*Mary Elkin*, Art Studio - Senior  
*Kaylen Saxon*, Art Studio - Senior  
Mentor: Prof. Stephanie Nace, Art  
In the world and the Columbia area today we live during a time of unrest whether it be politically economically or social. These current conditions call out for help and as designers and students it is our calling to help out in any way we can. Our impact will be the effective nature design has on a society. Design plays a significant impact on non-profit organizations due to the fact that our society is largely driven by social media. Graphic design will provide a gateway for people in the community to become aware of the issues of non-profit organizations. The impact of our involvement in this project will cause the people of the community to focus on sight-driven advertisement. Our focus began with non-profit organizations in Columbia that we felt would benefit from our project the most. Throughout the experiences we’ve learned how complex and important it is to work on a project like this as a group. We have discovered that when designing non-profit work there is a great deal of give and take. Grace has been recognized as a huge factor for a service learning project as this. Ultimately we have to remember that even though it is design work it is also a service to the organization and community. Sometimes doing good for others is enough no matter what the cost and together we are able to create something that is both meaningful to the non-profit organizations as well as the community it impacts.

**Identity Formation: Race and Gender in Morrison’s Song of Solomon and Faulkner’s Absalom Absalom!**

*Ashley McClary*, English - Senior  
Mentor: Dr. Qiana Whitted, African American Studies  
The quest for identity and individuality is an oft-explored theme in literature. Within works of both fiction and non-fiction alike readers are bombarded with accounts of personal success despite the odds. More often than not these tales focus on the internal struggles of one individual that culminate in his or her struggle upon unrealized potential. Perhaps texts of this nature are so abundant due to a widely held belief in the necessity of solitude for personal growth. For the audience there exist fundamental principles inherent to the idea of the “self-made man”: the creation of such an individual requires introspection and self-reliance—externalities merely provide the willpower to push away from tribulations and the motivational drive to pursue lofty goals. Toni Morrison and William Faulkner go beyond simply exhibiting the development of one individual. They probe into the lives of fringe characters to not only portray the universality of human error but to illuminate the darkest secrets and imperfections of the protagonists in terms of their environment. In their literature identity is not constructed merely as a result of internal will but due to a standard of normality reinforced by a community of external onlookers. Similar to Faulkner’s denizens of Yoknapatawpha County or Morrison’s small closed communities the role of the perceptive reader becomes more than that of an impartial bystander. Authors William Faulkner and Toni Morrison offer insights on character development that muddle superficial concepts concerning the formation of individuality.
Choosing the best of two possible HIV/AIDS treatments

**Fran Clark**, Biological Sciences - Senior
Mentor: Dr. Erin Connolly, Biological Sciences

Because antiretroviral therapies known as Highly Active Antiretroviral Therapy (HAART) has had dangerous side effects and viral resistance I am proposing other options be explored as possible treatments for HIV-1 infection. I used recently published primary journal articles and literature on the topic of HIV/AIDS treatments to compare two new possible methods of treating HIV-1 infection including: chemokine receptor type 5 (CCR5) antagonists and inhibition of the protein galectin-1. Since researchers have been successful in identifying those individuals in the population that have a genetic mutation that inhibits the expression of CCR5 receptors which allows the individuals to avoid infection and in the rare case of infection show slower progression to Acquired Immune Deficiency Syndrome (AIDS) than that of typical patients I propose the use of treatments that reduce the expression of CCR5 receptors (CCR5 antagonists) be used to treat HIV-1 infection. This type of treatment could have far reaching implications for the successful treatment of HIV-1 infection by reducing side effects and the incidence of viral resistance.

Characterization of Craniofacial Defects in the itchy Mouse

**Katie Harris**, Exercise Science - Senior
Mentor: Dr. Lydia Matesic, Biological Sciences

Mice lacking the ubiquitin ligase Itch have visible craniofacial abnormalities such as flattened midface and frontal bossing of the forehead region. These changes are echoed in humans lacking the ubiquitin ligase ITCH. Because craniofacial defects are a huge financial psychological and social burden on affected individuals and their families efforts are being made to prevent and improve treatment for various abnormalities. Understanding these abnormalities in the itchy mice could elucidate novel targets for therapeutic intervention in human patients. We have collected skulls from 61 itchy and 61 wild type mice identified key anatomical landmarks and performed a comparative morphometric analysis of those landmarks to quantify these differences in two dimensions using both digital caliper measurements as well as measurements generated from high resolution digital photography. Preliminary analysis has revealed that there are significant differences in skull size within mice of different genotypes and of different ages particularly in the skull length nose and nasal bone length and upper jaw length. We are in the process of extending this analysis to three-dimensions utilizing quantitative microCT. These measurements more precisely define the craniofacial abnormalities associated with lack of Itch and suggest mechanistic roles for this ligase in the development of this region.

HPV16-Mediated Transformation of Cultured Human Cells

**Schyler Kidd**, Biological Sciences - Junior
Mentor: Dr. Lucia Pirisi-Creek, Pathology and Microbiology

The homeobox gene SIX1 has been previously identified as associated with late stages of human papillomavirus type 16 (HPV16)-mediated transformation in vitro and advanced cervical cancer in vivo. Based on these findings we sought to establish how SIX1 is overexpressed in HPV16-transformed cells and determine the functional role of SIX1 in the context of HPV-mediated transformation in vitro. Our aim was to determine the mechanism by which SIX1 is overexpressed in human keratinocytes (HKc) transformed by transfection with HPV16 DNA in comparison with normal HKc. In particular the role of Rb and p53 tumor suppressors in the control of SIX1 expression in normal HKc was investigated. Based upon preliminary results both Rb and p53 activities must be inhibited in normal HKc in order to observe SIX1 overexpression. Normal HKc were treated with small interfering (si)RNA against Rb and p53 one at a time and also in combination as well as control (si)RNA. Specific gene products are detected by analyzing mRNA using Real-Time RT-PCR. Cells treated with (si)RNA observed by microscopy showed an inhibition in cell growth 48 hours after transfection. Cells transfected appeared large and with prominent nuclei and were unable to finish mitotic division. This effect was more pronounced in the cells transfected with the siRNA against Rb. We are currently conducting the real-time RT/PCR assays necessary for us to determine the levels of expression of Rb p53 and SIX1 in the RNA extracted from transfected cells.

Comparative Succination of Proteins by Endogenous Fumarate and Alkyl Fumarate Pharmaceuticals

**Allison Manuel**, Exercise Science - Senior
Mentor: Dr. Norma Frizzell, Pharmacology Physiology and Neuroscience

Succincation the modification of thiol groups in protein by reaction with fumarate in high glucose medium and by mitochondrial dysfunction in encephalopathies. Alkyl fumarates are used for treatments of many mitochondrial diseases including Parkinson’s syndrome. The purpose of this study is to compare the reaction of fumarate monomethylfumarate (MMF) and dimethylfumarate (DMF) with adipocyte proteins and glutathione. Methods: Adipocytes grown in 5mM or 30mM glucose or in 5mM glucose treated with 500uM fumarate MMF or DMF. MMF- and DMF-modified proteins were treated by saponification with 0.1 M KOH to expose protein succination. Western blotting with anti-2SC antibody was used for detection of succinated proteins. Glutathione (GSH) was measured using a fluorescence assay. Results: Succination was increased ~10-fold in adipocytes grown in 30 mM vs. 5 mM glucose and following saponification 100-fold in proteins from MMF- or DMF-treated cells. All reagents produced similar patterns of protein succination on western blots. GSH was significantly decreased by MMF and DMF but not by fumarate or 30 mM glucose. Conclusion: MMF and DMF are more reactive than fumarate with thiol groups in protein. Saponification of MMF- and DMF-modified proteins increased detection of protein succination. The methyl esters of MMF and DMF modified proteins are stable in the cell but can be exposed by saponification. MMF and DMF but not fumarate produced a significant decrease in cellular GSH concentration. Similar patterns of protein succination were detected with all reagents.
Effect of terminal end charge on self-assembly and tumor suppression characteristics of hybrid polymer-peptide nanoparticles

Romel Menacho Melgar, Biomedical Engineering - Senior
Mentor: Dr. Esmaiel Jabbari, Chemical Engineering

Nanoparticles (NPs) for drug delivery can be modified using peptides to increase specificity and decrease their size and distribution. This project investigated the effect of the charged end group in self-assembling peptides when conjugated with poly(lactide acrylate). Peptides with positive charge (lysine CV6K2) and negative charges (aspartic acid CV6E2 and glutamic acid CV6D2) were compared. Particle size and distribution were measured by light scattering. Also release kinetics were measured using spectrofluorometry. Cancer cell uptake characteristics and cell viability were measured using 4T1 cells. No significant differences in NP diameter size distribution or release kinetics were found between positively charged NPs and negatively charged NPs. However positively charged NPs showed significantly higher cell uptake and lower cell viability than negatively charged NPs.

Physical Destruction of Cells

Andrew Patterson, Electrical Engineering - Freshman
Christine Jiang, Biological Sciences - Freshman
Mentor: Dr. Rich Showman, Biological Sciences

Hygiene is an important factor in everyday life; however there is a tradeoff between sanitation and practicality. In a lab sanitation is very important so specialized cleaning materials and rigorous cleaning practices are suggested. In other locations there may not be a need for such high levels of sanitation. Or one may not have access to even basic cleaning materials such as soap in water. As a result materials like wet wipes or hand sanitizer have been created so people can at least maintain some level of cleanliness when more effective cleaning materials are not accessible. Our project goes a step farther by assuming even less availability – in the case that you forgot your hand sanitizer at home. For example could you kill some of the germs on your hands with nothing more than rubbing your hands together? It might not be as efficient as hand sanitizer but it might be better than nothing. In this experiment surface swabs will be taken for three case studies: a control group hand-sanitizer group and hand rubbing group. They will then be cultivated overnight in an incubator and be counted the next day to compare population size among the three cases. The bacterial cell count will indicate whether rubbing hands will result in a significant decrease of the cell population.

Exploration of the Peromyscus Epilepsy Genetic Model

Susan Payne, Biological Sciences - Junior
Mentor: Dr. Gabor Szalai, Biological Sciences

This experiment explores the location and effects of an epilepsy modulator gene in Peromyscus maniculatus bairdii. This was done by mating 100 different animals so each mating pair consisted of one wild-type parent and one epileptic parent. The offspring and their offspring were phenotypically tested to determine the severity of their seizures. Genetic tests were performed and compared to the known Peromyscus genome in order to locate the modulating gene. Phenotypic tests were done by individually putting each subject into a soundproof cage and raising the white noise up to a sound intensity of 110 dB while recording the reactions. The results were put into a database to be used to analyze the results. These results were compared to determine if the age of the parents the gender of the subject or the number of previous seizures had contribute to the seizure severity. It was hypothesized that as parent age increases so too does epileptic severity that the gender plays no role in the severity as the location of the modulator gene is hypothesized to be on chromosome 1 or chromosome 23. Additionally it was suspected that as a subject has more seizures it will become more sensitive to audiogenic stimuli. Although the research continues there is an increase in seizure severity with the increase in age of the parents. The results show no correlation between the gender of the subject and the severity of their seizure and a slight correlation in the number of previous seizures and seizure severity.

Osteogenic differentiation of adipose-derived stem cells in varied oxygen concentrations

Amanda Williams, Biomedical Engineering - Junior
Mentor: Dr. James Blanchette, Chemical Engineering

Thousands of people suffer non-union bone defects which cannot heal due to musculoskeletal diseases and injuries every year. Bone tissue engineering is a promising treatment option for these patients. The goal of my work is to study the impact of oxygen levels on osteogenesis (differentiation of stem cells into osteoblasts). Oxygen levels at defects sites are very low (0-3%) but most research is performed in atmospheric conditions (20% oxygen). This hypoxic environment will activate hypoxia inducible factor-1 (HIF-1) a transcription factor that helps cells adapt to low oxygen availability. Through the use of a HIF-1 activity marker local oxygen levels have been correlated with HIF-1 protein levels HIF-1 activity and markers of osteogenesis in mesenchymal stem cells. These cells were cultured in 2D and 3D (encapsulation in poly(ethylene glycol) gels) cultures in both hypoxic (1% oxygen) and normoxic (20% oxygen) conditions. HIF-1 activity notably increased over time in 1% oxygen corresponding with a significant reduction in osteogenesis as measured by alkaline phosphatase activity mineralization and osteonectin expression. These results will provide guidance to many research groups focused on repair of non-union bone defects.
**Value of Pre-transplant Cardiovascular Screening Tests in Predicting Outcome in African American Renal Transplant Patients**

**Constants Adams**, Biological Sciences - Senior
Mentor: Dr. Kenneth Chavin, Medical University of South Carolina

Nearly half of deaths amongst kidney transplant patients are due to cardiovascular events occurring post transplant. Therefore it is necessary that candidates for kidney transplantation receive comprehensive cardiovascular evaluations prior to undergoing surgery in order to identify and assess the risk level of post transplant cardiovascular complications. Previous studies have shown utility in correlating cardiovascular (CV) screening tests to post surgical outcomes in renal transplant recipients; however these studies have in general lacked a large number of African American (AA) patients. Problem: The purpose of this study was to determine whether the tests identified as having the highest predictive value in non-AA patients can be applied to AA patients. Methodology: This was a retrospective cross sectional analysis of all potential transplant recipients evaluated at our center between January 2002 and December 2003. The patients were divided into two groups initially (AA vs. non-AA) to determine if ethnicity impacts the type of CV screening tool that best predicts clinical outcomes after transplant. We identified 351 patients that had cardiovascular evaluations during this time period; 142 (40%) of these had transplants between March 2002 and July 2010; 97 of which were AA (68%). Baseline demographics were similar with the exception of pre transplant hyperlipidemia (higher rate in non-AAs) family history of diabetes and hypertension (higher rate in AAs). Results: This analysis demonstrated that stress tests and standard echocardiogram results did not correlate with post-transplant outcomes irrespective of ethnicity (p>NS). EKGS demonstrated that more AAs have a history of infarctions (56% vs. 36% p=0.031) but this did not correlate with post transplant outcomes (Hazard Ratio (HR) 0.73 p=0.568). The only CV screening test that consistently correlated with post-transplant outcomes across all multivariate models was cardiac catheterization results (HR 3.9 to 26 p<0.05). Conclusion: Cardiac catheterizations have the best predictive value for post transplant outcomes in AA patients which is similar to the data in non AA transplant recipients.

**Genotyping Breast Cancer DNA Using Cell Lines to Categorize Differences in the Adiponectin Gene**

**Shandrea Foster**, Biological Sciences - Freshman
Mentors: Dr. Bert Ely, Biological Sciences
Ms. Regina Wragg, Biological Sciences

Adiponectin is a hormone that is secreted by fat cells inside of the body. People who produce a significant amount of adiponectin have a lower risk of developing breast cancer, BrCA. The purpose of this experiment is to show specific alleles for known mutations within ADIPOQ and ADIPOR1 in breast cancer cell lines. Our null hypothesis is that there is no difference in allele frequency of ADIPOQ and ADIPOR1 single nucleotide polymorphisms, SNPs, between different BrCA cell lines. The following BrCA cell lines were chosen because of their ability to model a particular subtype of breast cancer: The five cell lines analyzed were T470, MCF10, HCC38, BT20, and MCF7. The SNPs that will be genotyped include rs1501299, rs266729, rs2241766, rs822395, rs822396, and rs1726866. To find the genotypes of the cell lines DNA will be copied using Polymerase Chain Reaction, PCR. Alleles for specific SNPs will be determined using Restriction Fragment Length Polymorphism reactions or sending the post-PCR samples to an external facility for DNA sequencing. The significance of this study is demonstrated that stress tests and standard echocardiogram results did not correlate with post transplant outcomes irrespective of ethnicity (p=NS). EKGS demonstrated that more AAs have a history of infarctions (56% vs. 36% p=0.031) but this did not correlate with post transplant outcomes (Hazard Ratio (HR) 0.73 p=0.568). The only CV screening test that consistently correlated with post-transplant outcomes across all multivariate models was cardiac catheterization results (HR 3.9 to 26 p<0.05). Conclusion: Cardiac catheterizations have the best predictive value for post transplant outcomes in AA patients which is similar to the data in non AA transplant recipients.

**Effects of Differential Gene Expression on the Aging Process**

**Cameron Bell**, Biological Sciences - Senior
Mentor: Dr. Jeff Dudycha, Biological Sciences

Aging is a necessary consequence of life and can be affected by a series of tradeoffs that is summarized by an organisms’ life history. Through differential gene and protein expression, organisms age at varying rates and consequentially have differing lifespans. This differential gene expression can be utilized to better understand the aging process by examining which genes are expressed at up-regulated in long lived individuals. Daphnia are an ideal model organism to examine gene expression due to their sexual reproduction and the natural occurrence of the ecotypes Daphnia pulex and D. pulicaria, which exhibit distinct lifespans due to their habitat and temporal restrictions. This project examined aging by answering the following question: Do Daphnia clones that show different lifespans also show alternative expression levels of Sir2, Sirt4, GCN-2 Kinase, and hsp40? I hypothesized that genes that aid in the aging process will be up-regulated in Daphnia with longer lifespans. In this experiment, I tested for expression levels of ecotypes with proven different lifespans. I divided 24 groups equally among two D. pulex and two D. pulicaria clones, which I further split into three biological replicates of young Daphnia and three replicates of old Daphnia classified by the point at which 25% of the original population was still alive. The mRNA was then isolated from each group and analyzed for gene expression using quantitative PCR. Finally I compared expression levels within the clones between young and old individuals.

**Fabrication of Mineralized Nanofibers and Highly Aligned Nanofibers for Bone Regeneration**

**Ankur Kumar**, Chemical Engineering - Junior
Mentor: Dr. Esmaiel Jabbari, Chemical Engineering

Bone tissue is a composite matrix mainly composed of mineralized parallel collagen nanofibers. The parallel collagen fibers provide the structural support and locations for cell adhesion and the mineralization provides the mechanical strength necessary for bone formation. The purpose of this work was to investigate the method of electrospinning to develop highly aligned poly(lactic-co-glycolic acid) (PLGA) nanofibers and to enhance the mineralization on the
anastomotic leaks may result from poor continuity in suturing or staple methods. Soft tissue sealants are applied above an anastomotic junction to disperse high stresses by sutures and staples providing a barrier to leakage from compromised connection sites and reducing the risk of infection or hemorrhage. Current materials such as fibrin glues and cyanoacrylate derivatives are limited by a functional tradeoff between adhesive strength and biocompatibility. Previous studies suggest that tissue-specific material design which exploits the surface chemistry of targeted tissues can overcome traditional sealant limitations. In our study primary porcine renal artery tissue was immersed in aqueous solutions containing fluorescently labeled microspheres with tethered aldehyde amine carboxyl or sulfate reactive groups. Quantitative microscopy of the perivascular surface indicated a higher concentration of immobilized aldehyde and amine microspheres interacting with the tissue motivating the choice of aldehyde-amine reactive chemistry to be featured in our vascular sealant. Our methodology for complete material characterization involved swelling and erosion studies mechanical testing of material adhesion strength and stiffness and biocompatibility/cytotoxicity studies. These studies were carried out for each of five material formulations with titrated reactive chemistries. We found that the mechanical and functional properties of the material plateaus with increasing aldehyde content while cytocompatibility is monotonically reduced.

Identification of novel biomarkers of mercury-induced immune dysregulation in humans

Jonathan Motts, Biological Sciences - Senior
Mentor: Dr. Jennifer Nyland, Pathology and Microbiology
Background: Mercury (Hg) is an ubiquitous environmental contaminant causing both neurotoxicity and immunotoxicity. Given its ability to amalgamate gold Hg is used in small-scale gold mining. The goal of this project was to identify novel serum biomarkers of Hg-induced immune dysregulation. Methods: A reanalysis of serum samples from an epidemiological study on miners working in Amazonian Brazil was completed on stratified samples (based on Hg level and antinuclear autoantibody titer) using a protein microarray to probe for the induction of elevated auto-antibodies. Results: We found statistically relevant correlations between high levels of Hg exposure and certain auto-antibodies. The antibodies were then analyzed in terms of immune system pathways. Pathways examined include those involved in antigen presentation oxidative stress and macrophage signaling/activation. Auto-antibodies identified as novel biomarkers include antibodies to the following proteins: interferon induced transmembrane protein (IFITM-1) STAT-6 FKBPL heat shock transcription factor (HSF-1) colony stimulating factor (CSF-1) ghrelin/obestatin prepropeptide (GHRL) metalloendopeptidase inhibitor (TIMP-1) peroxiredoxin (PRDX-2) glutathione S-transferase alpha (GSTA-1) and chaperonin (HSPD-1).

In vitro Fertilization Techniques in Peromyscus maniculatus

Lauren Talley, Biological Sciences - Senior
Mentor: Dr. Gabor Szalai, Biological Sciences
Peromyscus maniculatus have grown to become one of the most desired animals in transgenic and genomic research in the United States. One way to improve our strides in genomics is to establish a modified protocol for in vitro fertilization. Through this process we can elucidate a better method of establishing transgenic mice. Peromyscus females were superovulated through injections of several hormones that ultimately created a predetermined schedule of their reproductive cycles. Oocytes were collected into a dish of M-2 media while a male was sacrificed for sperm. Sperm was then transferred to the dish filled with oocytes to be fertilized in vitro where they were then transferred to a petri dish filled with HTF. These cells were then incubated in a CO2 gas chamber overnight for cell progression to at least the 2-cell stage. Our results show that our methodology was successful in producing fertilized cells. However we were able to note that the following morning after overnight incubation cells were already atrophying. This means that our methods are sound but the media they are cultured in might not be the most suitable for Peromyscus oocytes as compared to their Mus counterpart.

Formulation of a Vascular Tissue Sealant Based on Aldehyde-Amine Chemistry

Myra Robinson, Biomedical Engineering - Senior
Eva Juarez-Perez, Biomedical Engineering - Senior
Mentors: Dr. Tarek Shazly, Mechanical Engineering Dr. Richard Goodwin, Cell Biology and Anatomy Ms. Stefanie Biechler, Biomedical Engineering
Vascular anastomoses are formed in the course of many surgical procedures including cardiac bypass graft implantation or organ transplantation. However
Engineering scaffolds. The acidic macromolecules such as glutamic acid based peptide sequences are present in the extracellular matrix of bone and play a key role in the mineralization of the collagen fibers. The purpose of this research is to understand the effect of mineralization of glutamic acid template peptide conjugated poly(lactide co-glycolide) NF (GLU-cNF) on osteogenic differentiation of bone marrow stromal (BMS) cells. Electrospinning is a technique that employs an electrical field to synthesize NF from various biocompatible and biodegradable polymers. For this work GLU-cNF was fabricated by collecting the NF on a high-speed rotating wheel along with the electrospinning technique. The GLU-cNF were mineralized by incubating them in modified 10 fold simulated body fluid (m10SBF). The effect of the mineralization of GLU-cNF on osteogenic differentiation of BMS cells was determined by measuring the DNA content alkaline phosphatase (ALPase) activity calcium (Ca) content and mRNA expression levels of osteogenic markers such as osteopontin (OP) osteocalcin (OC) ALPase and collagen type I (Col-I) as a function of incubation time. Preliminary results indicated that the mineralized GLU-cNF had significantly higher ALPase activity calcium content and mRNA expression levels of osteogenic markers compared to non-mineralized GLU-cNF. It was observed that mineralization of GLU-cNF greatly enhanced osteogenic differentiation of BMS cells which can be used in the future to create safer and readily available bone grafts.

Nanoparticle Assembly with Anti-CD3 IgG and Resveratrol for Drug Delivery to Treat Alzheimer’s

Brandi Bailey, Chemistry - Senior
Mentor: Dr. Qian Wang, Chemistry and Biochemistry
Alzheimer’s disease is characterized by a loss of brain function which continues to worsen over time. Resveratrol, RES, is a chemical that can be used to treat patients with Alzheimer’s disease. It needs to be administered directly to the brain, however due to its poor bioavailability, researchers have utilized nanotechnology to enhance its delivery. The nanoparticle allows us this specificity. The nanoparticle described herein, comprises of modified pHEMA (pHEMA/Py) and protein outer layer. The polymer is modified with hydrophobic groups to force the hydrophilic protein to the outside of the particle, an assembly phenomenon well-established in our group. In this particular experiment, we are using anti-CD3 immunoglobulin G (IgG) as our protein because it can target the brain. When we assemble the particle with resveratrol, the resveratrol will be encapsulated in the hydrophobic core. Upon the IgG binding the proper antigen, the particle will open up and release the drug. We are in the process of determining the optimum mass ratio range of IgG to pHEMA/Py that will give us our desired particle size (150 nm). Also, we are trying out different polymers to see the effect that this could have on the particle size. The data obtained thus far is reported here.

Localization of AIM1 in yeast cells

Michael Crooks, Biological Sciences - Senior
Mentor: Dr. Caryn Outten, Chemistry and Biochemistry
Proteins can serve as mediators and regulators of metabolic processes involved in a cell. In order to assess and determine the roles of a protein in these metabolic reactions, it is vital to know where exactly in the cell this protein resides. Such knowledge is useful in the practical application of any protein used in the medical field. The sub-cellular location of one yeast (S. cerevisiae) protein, AIM1 has not been determined yet. While it is suspected to be located in the mitochondria, there is little evidence as to the location and molecular function of this protein. The goal here is to successfully attach a hemagglutinin (HA) tag to both of these proteins by using a DNA primer sequence to replicate (via PCR) a section of DNA that will code for AIM1. This section of DNA is inserted into the yeast plasmid pAA3X, which contains a section of DNA that encodes its own HA tag via a ligation reaction. AIM1 was successfully cloned by inserting it into the pAA3X yeast plasmid, and transforming it into E.coli cells, and was able to be extracted and purified. Next, these plasmids were transformed into wild type (WT) and yal046cΔ deletion yeast strains, which are to be used in the process of fractionating the cell extracts into different sub cellular compartments, and tested for the presence of the HA tagged proteins using anti-HA antibodies in a western blot. This will confirm the location of this mysterious protein.
Oligoaniline-Containing Block Copolymers as Nanodielectrics Materials
Dionisio Gonzalez-Delozier, Chemistry - Junior
Mentor: Dr. Chuanbing Tang, Chemistry and Biochemistry
High performance dielectric materials have attracted tremendous attention due to their various applications throughout such industries as telecommunications computing defense and aerospace. Particularly there is much demand for the development of pulse power which requires accumulating much energy over a long period of time and releasing it quickly thus increasing the instantaneous power. High energy density dielectric capacitors would help to reduce the volume weight and cost of the electric power system. Conjugated materials including polyaniline and oligoaniline have been used in charge-injection layers in organic light emitting diodes plastic circuitry and biosensors due to their high conductivity low density low cost and ease in processing. Oligoaniline has also been shown to enhance dielectric constants of polymers upon anchoring the oligoaniline unit to the polymer chain end. However morphological control was not possible as control over composition was limited. The focus of this work is to obtain both control over nano-scale morphology and the enhanced dielectric properties associated with oligoaniline by combining the conjugated aniline macromolecule onto the side-chain of one segment of a block copolymer. Upon successful attachment of the oligoaniline thermally-induced microphase separation produced well-defined nanodomains. Compared with undoped neat block copolymers oligoaniline-doped block copolymers exhibited higher permittivity and much lower dielectric loss. This poster focuses on the synthesis self-assembly and dielectric properties of oligoaniline-containing block copolymers.

Infrared Spectroscopy for Non-destructive Remote Detection of Latent Fingerprints
Alexis Keller, Chemistry - Senior
Emma Spencer, Chemistry - Sophomore
Mentor: Dr. Stephen Morgan, Chemistry and Biochemistry
Methods for visualizing fingerprints at crime scenes whether visible or invisible latent prints are messy at best and potentially contaminate areas of a crime scene with fingerprint powders or chemical residues. This project was designed to test the research hypothesis that infrared (IR) spectroscopy can be used for rapid non-destructive detection of fingerprints. Fingerprints are of forensic interest not just for fingerprint pattern matching but also for recovery of DNA by low copy number DNA techniques which only require trace amounts of DNA. By eliminating contamination of a fingerprint scene the likelihood of recovering intact DNA from fingerprints is enhanced. Infrared spectroscopy can interrogate the chemical composition of a chemical coating on a surface non-destructively by acquisition of a spectrum showing frequencies at which molecular vibrations cause absorption of energy. Because fingerprints are comprised of biological organic secretions which are transferred to surfaces through sweat the IR spectrum exhibits a variety of characteristic peaks including fatty acids and lipids. We have performed attenuated total reflectance Fourier transform infrared spectroscopy (ATR-IR) on sweat from anonymous individuals to create a collection of representative sweat spectra on a variety of background substrates. By comparing sweat spectra on diverse fabrics such as acrylic cotton nylon and polyester as well as other household materials we have established that neat and sweat-contaminated substrates can be readily discriminated. Further experiments with samples of dried sweat and diluted sweat were performed to estimate limits of detection. This research may lead to improved non-invasive approaches for forensic fingerprint detection.

Forensic Characterization and Identification of Dyes Extracted from Millimeter-length Fibers using Ultra-Performance Liquid Chromatography/Mass Spectrometry
Andrei Kovaltshuk, Chemistry - Senior
Nicholas M. Riley, Chemistry - Senior
Mentor: Dr. Stephen Morgan, Chemistry and Biochemistry
Forensic fiber examinations involve comparison of trace evidence fibers with one or more known fibers to determine possible associations between victims suspects and crime scenes. Microscopy (for morphology) and polarized light microscopy (for birefringence sign of elongation and refractive index) are initially used to compare fibers. Fast nondestructive methods such as fluorescence UV/visible spectrophotometry and infrared spectroscopy are preferred but do not identify dyes. Our working hypothesis is that microextraction followed by liquid chromatographic separation and detection of individual dye components by mass spectrometry (LC/MS) provides a qualitative and semi-quantitative fiber dye ‘fingerprint’ that enhances discrimination of known and questioned casework fibers. We have developed extraction methods for acid dyes (nylon) disperse and reactive dyes (cotton) basic dyes (acrylic) and disperse dyes (polyester). Determining the number and relative amounts of dyes on fibers and characterizing dyes by MS offers specific detail not otherwise available. Such information may also enable tracing dye formulations to manufacturers. Target sizes for forensically relevant fibers are often 2 mm or less in length. Because extraction of dyes from a fiber is destructive the ability to extract and identify dyes from extremely small fibers is critical. Ultra-performance liquid chromatography (UPLC) uses high pressures (10000 psi) smaller particles (2 μm) and short columns (~5 cm) for high speed resolution and sensitivity. Combining UPLC with tandem mass spectrometry (MS/MS) and multiple reaction monitoring (MRM) we have achieved rapid identification and quantitation at exquisitely low detection limits (e.g. 0.1 ng or less).

Study of the nature of the intramolecular arene-arene interaction
Michael Kozik, Biological Sciences - Junior
Mentor: Dr. Ken Shimizu, Chemistry and Biochemistry
In this work a unique molecular balance was designed to measure the influence of dispersion forces on arene-arene interactions. The balances are constructed from two modular components – an arene arm and shelf – that give rise to two possible conformations: folded and unfolded. In the folded conformation the arene surfaces of the arm and the shelf can form either an attractive or a repulsive intramolecular interaction which can be measured via 1H NMR. In the unfolded conformation the arm and the shelf do not form any interaction. To study the effects of dispersion forces on the arene-arene interactions we modified the sizes
of the arene surfaces of the arm and the shelf. This investigation revealed that size of the arene surface has a direct correlation with the dispersion component of the pi-stacking interaction. Specifically the larger arene surfaces in the folded conformation the larger the dispersion component.

Surface Modification to Optimally Display Viral Particles for Biotechnology Applications
Sevan Muhammad, Biological Sciences - Senior
Mentor: Dr. Qian Wang, Chemistry and Biochemistry
The size and molecular structure of viruses has been evolutionarily optimized to interact with host cells and tissues. Therefore we rationalize the virus can be used as a molecular probe to study how nanometer scales can affect macro scale events. The goal of the research project was to attain optimal coating of viral particles on two-dimensional substrates. We approached this idea by coating 2D substrates through layer-by-layer assemblies with polyelectrolytes followed by virus coatings. Further adjustments including pH ionic strength virus concentrations were finely tuned to maximize surface coatings. The results indicate that weakly charged polyelectrolytes effectively immobilized Tobacco Mosaic Virus to the surface without causing toxicity to the cells. The research utilizes viruses as nano-sized building blocks to display a variety of functional groups for applications in cell culture tissue engineering or vaccine developments.

Reprogramming of the Plant Virus as Extracellular Matrix Mimetic
Quyen Nguyen, Chemistry - Senior
Mentor: Dr. Qian Wang, Chemistry and Biochemistry
Tobacco Mosaic Virus (TMV) has been well characterized since its initial discovery in the late 19th century. Recent studies with viruses as nanoscale scaffolds have renewed interests in manipulating the surface properties of TMV without disrupting the integrity and morphology for a wide range of applications. In our previous studies the virus coated substrates have been reported to enhance the differentiation of mesenchymal stem cell towards osteoblasts. Here we report the insertion of a variety of peptides near the carboxy terminus of TMV capsid to mimic the extracellular matrix. These inserts based on the sequences from natural extracellular matrix proteins are displayed on the viral particles at high copies (2000 peptides in a 300 nm x 18 nm space) with high regularity. Among the mutants six variants showed systemic infection in the tobacco plant host and the mutants can be continuously produced in a laboratory setting with minimal upkeep with yields reaching up to 1-2 g per kg of wet leaves. The genetic and protein stabilities of these mutants were followed for several generations (or passage to passage) with distinct observance of proteolytic degradation of mutants during prolonged storage without alterations in the genetic code. Lastly an adhesion screening assay was employed to screen the accessibility and functionality of the mutants against mammalian cell lines. Several ongoing studies regarding the mutants’ ability to affect cell differentiation motility or proliferation will also be reported.

A molecular balance to measure halogen-pi interactions
Amanda Rickher, Chemistry - Senior
Mentor: Dr. Ken Shimizu, Chemistry and Biochemistry
Presented is a calibration of a molecular balance system that was designed to measure weak non-covalent interactions specifically looking at halogen-pi interactions. Currently the balances have been employed to measure weak non-covalent interactions such as the offset face-to-face pi-pi stacking CH-pi and halogen-pi interactions. The balances made came from two modular components an arene shelf and arm. The constructed balance exhibited two conformations a folded and unfolded state. In the balance's folded conformation the arm can form either an attractive or repulsive intramolecular interaction with the arene shelf. In the unfolded conformation no intramolecular interaction can be formed between the arm and arene shelf. The equilibrium ratio of the conformations can be measured via 1H NMR. In particular we are investigating the interactions formed between halogens and the pi-system of the balance arene shelf. Examination of these substituents verified that the weak attractive halogen-pi interactions in these molecular balances could still be accurately measured despite the presence of opposing repulsive steric and electronic interactions.
Engineering, Computing, and Math I

Bridging the Gap Between Earth Science Modeling Systems
Robert Boykin, Civil Engineering - Sophomore
Mentor: Dr. Jon Goodall, Civil and Environmental Engineering
Many researchers create computer programs which model real environmental processes. Several programs and tools used to combine individual models exist however most of these tools have their own unique methodology and requirements for the models which they run limiting the scope of a model created to running only with other models created for that coupling system. The goal of this project is to create a wrapper program which will allow any model created for the Community Surface Dynamics Modeling System (CSDMS) an NSF-funded earth science modeling platform to work in the OpenMI environment which is used internationally in the water resources modeling community. The wrapper will work by interpreting the CSDMS model given to it and supplying to the OpenMI environment all of the variables and requirements it demands. These two systems take different logistical approaches to interpreting and running models cohesively which requires an extensive knowledge of the inner-workings of each system. If the wrapper is successful it will allow researchers to take models they have written for CSDMS and expose them to the breadth of OpenMI’s resources exponentially increasing the possible combinations they may use and data they may acquire.

2012 Solar Splash Competition Project
Michael Griffith, Mechanical Engineering - Senior
Taylor Lacey, Mechanical Engineering - Senior
Hudson White, Mechanical Engineering - Senior
Sami Al-Kindi, Mechanical Engineering - Senior
Tyler Piehl, Mechanical Engineering - Senior
Mentor: Dr. Jamil Khan, Mechanical Engineering
The University of South Carolina solar boat team is participating in the 2012 Solar Splash competition located in Cedar Falls Iowa during June 13th – 17th 2012. The competition consists of three main events including sprint endurance and slalom races. Through the funding provided by the Magellan Scholar Grant the solar boat team will be able to adequately provide modifications towards the improvement of key components of the current boat for competition purposes. The significant improvements involved extensive background research contacting boating experts and vendors to create optimal solutions for competition purposes. The endurance configuration for the boat assembly was the primary focus for modifications towards the competition. Primary components such as the solar panels rudders and drive train were optimized for this leg of the race. The sprint configuration incorporates the drive train improvement and the application of an epoxy finish to reduce drag within the water. Finally the slalom configuration uses a combination of the previously mentioned improvements to benefit the boat’s performance in this aspect of the competition. Throughout these modifications each team member has been able to apply their engineering knowledge and skills towards the fabrication of these components. Additionally the project involves the combination of multiple ideas from various individuals to develop the best possible solution. Through the exchange of ideas each team member has sufficiently been able to work in a group atmosphere and develop interpersonal skills that can be applied towards future work experience.

Biodiesel Purification
Abby Horn, Chemistry - Senior
Mentor: Mr. Joe Renwick, Midlands Biofuels
Biodiesel is produced through a transesterification reaction of methanol vegetable oil and catalyst. A side product of this reaction is glycerin. Glycerin must be separated from the biodiesel to obtain ASTM standard grade B100 fuel. This research seeks to establish a method of purification for biodiesel by wood chip filtration. Moisture and soap level testing were conducted before and after the filtration to determine the effectiveness of this filtration. Two types of wood oak and aspen were used to conduct this research.

Fabrication and characterization of SPELA hydrogels
George Plasko, Biomedical Engineering - Sophomore
Mentor: Dr. Esmaiel Jabbari, Chemical Engineering
Hydrogels are hydrophilic, crosslinked polymer structures that hold large amounts of water when swollen without dissolving, making an ideal environment for biomedical applications. One of these water soluble and biodegradable macromers is Poly-ethylene glycol co-lactide (PELA), In this paper, ring opening polymerization was used to make star Poly-ethylene glycol co-lactide (SPELA) with variable lactide to star PEG molar ratios (r). Different ratios produced hydrogels with a range of mechanical properties and degradation rates, which were accordingly quantified through different experiments. This study compared the hydrogels fabricated from four SPELA macromers with “r” equal to 0:1, 10:1, 15:1, and 20:1. The results showed that the shear modulus and gelation time of the hydrogels decreased with increasing “r.” Furthermore, it was shown that the SPELA 15:1 hydrogel had the fastest degradation rate while SPELA 0:1 had the highest shear modulus. Moreover, shear modulus was increased with increasing concentration of the macromers in the precursor solution for all “r” values. According to the results, star PEG based degradable hydrogels with desired characteristics can be fabricated with variation of the molar ratio of lactide to PEG. The display at the 2012 discovery day will be a poster encompassing an introduction to hydrogels, the synthesis of SPELA, the fabrication of the hydrogel network, the material characterization data, and the next steps for the research. I will be present to explain the poster and answer any question asked of me on April 20th. I look forward to this incredible opportunity.

Modular Nano-Enabled Sorption Cartridge Design for Water Treatment
Sam Rollings, Civil Engineering - Senior
Mentor: Dr. Navid Saleh, Civil and Environmental Engineering
The goal of this research is to develop a cost-effective design strategy that can incorporate nanomaterials practically in water treatment processes. Carbonaceous nanomaterials e.g. carbon nanotubes have recently been

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studied as an effective material class in removing trace amounts of dissolved organic contaminants from water. However, a feasible strategy for proper and safe utilization of these advanced materials has not yet been demonstrated in literature or practice. If successful, the research work will be the first step in developing techniques for incorporating such novel materials within commercialized filter systems. The impact of such a technology has enormous practical significance since advanced nanomaterials can remove emerging contaminants e.g., pharmaceuticals, endocrine disrupting compounds and industrial byproducts that are being released in trace amounts to the natural environment with severe ecological and human health concerns. The technical approach for nanomaterial immobilization in this study essentially involves principles of liquid-liquid extraction and physisorption of a highly hydrophobic material multi-walled carbon nanotubes (MWNTs) to a hydrophobized porous surface that is pretreated with hydrophobic solvents. Controlled suspension (using ultrasonication) and detailed characterization of the MWNTs and MWNT-enabled filter cartridges are performed using dynamic light scattering (DLS) transmission and scanning electron microscopy techniques. The ultimate goal is to use such nano-enabled cartridges to effectively remove dissolved organic and metallic contaminants. So far this study has already developed detailed MWNT suspension and cartridge protocols and has characterized the modified cartridges to test for effective MWNT immobilization. Furthermore, the study is concentrating on addressing challenges in ensuring robustness of this immobilization technique.

Development of an Integrated Protein Database Containing Experimental and Derived Data
Mark Williams, Computer Science - Senior
Mentor: Dr. Homayoun Valafar, Computer Science and Engineering
Proteins are macromolecular structures found in all organisms and are involved in a variety of essential functions from muscle contraction to digestion. The amount of information we have about proteins is constantly expanding allowing for more research into their function. Unfortunately, our knowledge is growing at a rate which makes categorizing and accessing this information difficult. Many databases exist which contain data regarding a specific aspect of proteins such as structure or functional activity. This research created a database containing several types of protein data and develop methods for easy querying analysis and download of the data. By providing an integrated source for data about many different aspects of proteins we can help to promote more efficient and complete research in proteins and drug design.

Measurement of Mica Content in Soil Deposits using Loss on Ignition
Christopher Brown, Civil Engineering - Senior
Mentor: Dr. Charles Pierce, Civil and Environmental Engineering
Mica is a shiny, silicate mineral with a layered structure found in residual soil deposits weathered from granite and other rocks. Due to its flat shape and smooth particle texture, mica can impact the engineering characteristics of soil, especially its compaction and strength properties. However, there are no universal standard methods for measuring mica content in soils. A Particle Counting Method was developed to approximate how much mica is present in 141 soil samples collected from different parts of South Carolina. Based on mica particle counts, two soil samples were selected (from Greenville and Abbeville) to evaluate Loss on Ignition (LOI). In this procedure, the water of crystallization contained within the mica is driven off by ignition at 1000 °C ± 10 °C. The mass loss is an index of the amount of mica present. Following South Carolina Department of Transportation procedures, changes in two of the procedural steps were evaluated for their impacts on the tests results. Soil samples were soaked in sodium hexametaphosphate solution for short (one hour) and long (almost 24 hours) time periods. Samples were left in the ignition oven for different times (15, 45 and 75 minutes). There were no measurable differences in LOI with soaking time, but there were slight increases in LOI with ignition time. When samples were soaked for one hour and left in the oven for 45 minutes, the LOI values were 3.93% (Greenville) and 0.20% (Abbeville). The LOI values were consistent with the mica particle counts of 115-130 and 7-11, respectively.

Development of a Gradient Heating Unit for Thin-Film Transparent Conducting Oxide Processing
Jonathan Bunn, Chemical Engineering - Senior
Mentor: Dr. Jason Hattrick-Simpers, Chemical Engineering
Transparent Conducting Oxides (TCOs) have been a major area of research in recent years due to their applications in solar power technologies. The processing conditions of TCOs are very important because they directly affect important physical properties that define the TCO’s performance. In this work a gradient heating unit was fabricated to facilitate a combinatorial optimization of TCO processing conditions. Comsol software initially was used to model the temperature gradient which could be established across a 3” glass substrate. The models showed that the system equilibrates within fifteen minutes of startup and that the temperature gradient across the TCO coated substrate would exhibit a S-shaped transition before becoming approximately linear. The gradient heater was then designed in Pro-Engineer and the unit was fabricated. Preliminary experimental results show that the heat profile reaches equilibrium more slowly than predicted. Time dependent temperature measurements indicate that the S-shaped temperature gradient may be steady state so the near linear temperature gradient may not be reached. The conflicting results could be due to issues with modeling assumptions regarding heat transfer in moving fluids.
discrepancies in heat transfer coefficients that neither convective cooling nor contact resistances would affect the heat profile. Further testing needs to be done before a definitive conclusion can be made. Despite differences between modeling and the experimental results the desired temperature gradient range can be achieved and maintained during TCO optimization experiments.

**Development of Multi-Organization Credentialing Using Veiled Certificates to Ensure Privacy Protection**

*Will Goss*, Computer Science - Senior  
Mentor: Dr. Chih-Tser Huang, Computer Science and Engineering  
To develop a new type of digital certificate which allows individuals to legitimately perform transactions with organizations while not giving away their unique identifier thus preventing the aforementioned risk of crosslinking between independently managed databases.

**Developing a sustainable Waste Management Strategy for the University of South Carolina**

*Christopher Guth*, Civil Engineering - Senior  
Mentor: Dr. Nicole Berge, Civil and Environmental Engineering  
The University of South Carolina is trying to establish itself as a sustainable campus and has taken considerable steps in becoming a green campus. One area in which the University may be able to further minimize greenhouse gas emissions is solid waste management. Having a sustainable management plan for solid waste can result in a significant decrease in emissions and can also become a source of renewable energy. Waste management plans are used to determine how much waste should be sent to different waste processing facilities while taking into account among other factors environmental impact energy input/ output and economic benefits. For example the university may be sending all waste deposited in trash cans and dumpsters to the nearest landfill. However there may in fact be other options that have not been considered such as incineration gasification hydrothermal carbonization (HTC) and/or composting of the waste. These alternatives could prove to be more economically and environmentally friendly than landfilling alone. Determining the most effective waste management plan for the University of South Carolina requires that the waste composition of the University be found. This can be done by conducting multiple waste sorts throughout campus. With the composition along with the moisture content of the waste a more precise waste management plan can be formulated and compared to the present system in order to determine the environmental benefit it may have. By formulating a new plan the University will be able to further itself and become a more environmentally friendly campus.

**Uniquely Completable Graph Colorings**

*Anna Kirkpatrick*, Mathematics - Sophomore  
Mentor: Dr. Joshua Cooper, Mathematics  
A recent result of McGuire et al has shown that every fair Sudoku puzzle has at least 17 clues. The proof involves a massive computation (a) whose rigor extends only as far as the accuracy of all the hardware and software employed and (b) that sheds little light on the reason that 17 is the truth. Therefore we generalize the question to a purely graph-theoretic setting: When is a partial (vertex) coloring of a graph uniquely completable? A proper (possibly partial) vertex-coloring of G is an assignment of colors to (some of) the vertices of G so that no two adjacent vertices receive the same color. A partial coloring of G is said to be uniquely completable if there is exactly one proper coloring of all of G which agrees with the partial coloring. A determining set S of vertices for a given coloring is a set so that the coloring restricted to S is uniquely completable and a determining set is critical if all of its proper subsets are not determining. The primary goal is to understand what the sizes of critical sets are over all colorings of a given graph G. We study this question for several classes of graphs and graph operations obtaining bounds on the size of the smallest and largest critical sets as well as addressing questions of computational complexity.

**Modeling of Product Compositions of Methane Combustion by Gibbs Free Energy Minimization**

*David Sims*, Chemical Engineering - Senior  
Mentor: Dr. Vincent Van Brunt, Chemical Engineering  
My research used a mathematical model to characterize the hazards of a methane combustion plant. The flammability of methane is based on the relationship between fuel rich and oxygen rich mixtures. The goals of this project were to discover why: running a combustion process fuel rich causes an explosion what byproducts are produced in the process and how the byproducts influence the combustion. ASPEN+ simulator was used to model the combustion reactions and data were gathered by changing the fuel to oxygen ratio of the feed. This produced one slice in the ternary diagram. The rest of the diagram was generated by varying the oxygen to nitrogen ratio. The simulator was run successively for different fuel to oxygen ratios. Once a large number of composition slices have been gathered the ternary flammability diagram will be completed and the flammability region will be identified. This work provides a theoretical way to identify the impact that incomplete combustion has on the flammability of the process which translates to whether or not there is an explosion hazard. With this theoretical model created it is hoped that similar modeling can be conducted for other processes and the results can be used to prevent explosions.

**Sudoku and Critical Sets**

*Nicholas Jaamin Smith*, Actuarial Mathematics and Statistics - Sophomore  
Mentor: Dr. Joshua Cooper, Mathematics  
A valid Sudoku board is a 9X9 matrix filled with the numbers 1-9 so that each row column and the nine 3X3 nonoverlapping submatrices contain each number exactly once; a puzzle is a partially filled-in Sudoku board; a puzzle is said to be fair if it can be completed to a valid Sudoku board in exactly one way. An order-n Latin square is an nXn matrix consisting of the numbers 1-n so that each row and column contains each number exactly once; thus a valid Sudoku board is a special kind of order-9 Latin square. We generalize and unify several topics of research in the mathematics of Sudoku boards and Latin squares by defining four graph invariants (and parametrized generalizations of them) which measure the size of fair puzzles on a general graph i.e. partial vertex colorings which can be completed to a proper graph coloring in precisely one way. This leads to a number of natural questions about so-called critical sets which we have proven several
results about including bounds relating their size to the total number of colorings of the graph. Unanswered questions abound and we discuss directions for future research.

Detrital thermochronology of the Larson Basin Antarctica
Erin Adams, Geological Sciences - Junior
Mentor: Dr. David Barbeau, Earth and Ocean Sciences
The composition and architecture of sedimentary rocks record the source units from which their constituent sediments come, as well as the depositional environment and the conditions under which they are deposited. The study of the former is known as provenance analysis, which our laboratory conducts using three radiometric dating techniques—(U-Th-Sm)/He, U-Pb, and fission-track geochronology—via the analysis of sedimentary grains of the minerals zircon and apatite to determine the crystallization and cooling history of their sedimentary sources. I am analyzing the aforementioned geochronology of 10 sedimentary samples previously acquired from the Larsen basin of the Antarctic Peninsula in order to determine their provenance. From each sample, I will produce single-grain U-Pb data for 100 randomly selected detrital zircons; (U-Th-Sm)/He for at least 3 zircons from each of 10 samples; and fission-track data for selected appropriate samples. I will interpret and compare this data to data we have collected previously from the Larsen basin and from age-equivalent strata in South America to determine when South America separated from Antarctica, and thus the opening of Drake Passage that instigated the Antarctic Circumpolar Current (ACC). The ACC regulates the climate of much of the southern hemisphere. The timing of Drake Passage opening is widely debated, but can be further constrained by determining the provenance of sediments through geologic time.

Gut Content Analysis Among Morone saxatilis and Morone americana
Donna Agan, Biological Sciences - Junior
Mentor: Mr. Jason Bettinger; South Carolina Department of Natural Resources
Two key species Morone saxatilis and Morone americana were dissected using a dissecting microscope and the stomachs were removed for gut content analysis. The purpose of the study is to evaluate the diet of the key species record any overlap in diet and record the changes in diet as growth occurs. Both species are found in the same areas therefore competition among food resources may be occurring. It was found that both species consumed the same prey items with the exception of a few consumed by Morone saxatilis. Hexapoda proved to be an important subphylum in each fish’s diet.

Phytoplankton Communities in an Impaired Watershed in Aiken County SC
Kaitlyn Edgington, Biology - Junior; USC Aiken
Mentor: Dr. Michele Harmon, Biology/Geology; USC Aiken
Non-point source runoff of sediments and chemicals from malfunctioning septic systems leaching sewers fertilizers and animal waste can create water pollution and excess amounts of nutrients. Nutrients such as nitrogen and phosphorus are the most common pollutants affecting the water quality in ponds and reservoirs. If excess nutrients are flowing into a body of water then algal biomass may
Modeling in the waves: Significance of wave splash to the survival of Mytilus californianus

Shadow Fockler, Biological Sciences - Senior
Mentor: Dr. Brian Helmuth, Biological Sciences

Understanding the impacts of changes in both aerial and submerged body temperature are important considerations for predicting the likely impacts of climate change on intertidal communities. While body temperature under water is set by water temperature during low tide it is determined by many factors including wind sun and air temperature. Exploring the role of wave splash (a function of wave height and shoreline topography) is thus important because it can ameliorate extreme aerial body temperatures. While wave heights are expected to increase with climate change physical structures such as breakwaters and wave energy farms can cause decreases in wave height and thus wave splash. Biophysical models have been created to estimate body temperature during low tide using weather data. However the amount of data from weather stations is limited. This study examines the effectiveness of a heat budget model to predict aerial body temperature of the mussel Mytilus californianus using coarse (32km) weather data. Results of the model verified using in situ measurements were compared using environmental data from either a local weather station (i.e. high resolution but available only for select coastal sites) or from reanalyzed large scale data (National Center for Environmental Prediction Climate Forecast System Reanalysis CFSR; i.e. coarse resolution but available worldwide). Results indicate that the model successfully predicts aerial body temperatures to within approximately 2.8°C (local weather station) to 3.3°C (CFSR) and that at least at the site tested (Bodega Bay CA) mussel temperatures are surprisingly insensitive to changes in the nearshore wave climate.

The Effect of Radiation in Fukushima Japan on Pollen Abortion and Viability of Plant Populations

Humna Fayyaz, Chemistry - Sophomore
Mentor: Dr. Andrea Bonisoli Alquati, Biological Sciences

As a result of the Tohoku earthquake an explosion at the Fukushima Daiichi nuclear power plant on 11 March 2011 in Okuma Japan released a great magnitude of radioactive material possibly affecting living organisms in the surrounding environment. We explored the question of whether radioactive contamination following the nuclear accident increased the rate of pollen abortion in flower samples collected in July 2011. Flower samples of different species that were collected across levels of radioactive contamination were stained using a dye that colors aborted and viable pollen grains differently. We then measured the proportion of aborted pollen grains in all specimens. A regression was run relating exposure to radiation and abortion rate of individual plants which were then combined with the other individuals of the same species. This allowed us to estimate a dose-response relationship between radiation and frequency of pollen abortion thus determining the species-specific radiation sensitivity. Lastly we related certain ecological traits of species to their sensitivity to radiation quantified by their abortion rate. The growing number of nations turning to nuclear energy as an alternate to their current supply leads to the necessity of a more refined understanding of this type of disaster and its consequences. Assessing the effects of the Fukushima disaster serves as a platform to understand the risks related to nuclear energy production as well as aiding in creating a database of species response to radiation.

Stimulated Ammonia Oxidizing Activity in Marine Subsurface Sediment through Bioirrigation

Michael Gabriel, Biological Sciences - Sophomore
Mentor: Dr. Charles Lovell, Biological Sciences

Ammonia oxidizing Bacteria (AOB) and Archaea (AOA) are important to the geochemical cycling of nitrogen in marine systems. They conduct the first step in the transformation of ammonia to nitrate; transforming ammonia to nitrite which is then transformed by nitrite oxidizers to the more usable form nitrate. Infauna organisms that live in sediments greatly impact marine sedimentary ecosystems. They modify sediments and affect geochemistry through the addition of oxygenated water into the anoxic subsurface sediment. A mechanical mimic of infaunal activity Rabloug consisting of a programmable peristaltic pump that pumps water into the subsurface has been used to examine the effect of infaunal irrigation on microbial communities. Using the Rabloug I have conducted an experiment examining the impact of infaunal irrigation on the activity of ammonia oxidizing microbes. Two treatments (a seawater only irrigation and a seawater amended with 100 μM ammonium chloride) and a negative control (lacking any irrigation) were each replicated three times in this experiment. Nucleic acids were extracted from sediment samples and cDNA was constructed from mRNA PCR amplification of a key gene for ammonia oxidation amoA from DNA in all samples confirmed the presence of these organisms in all samples.
Evidence of enhanced bioactivity in isolated nanoparticle-bound antibiotics from marine bacteria

**Steven Glenn**, Biochemistry and Molecular Biology - Senior

Mentors: Dr. Alan Decho, Environmental Health Sciences
Dr. Yung Pin Chen, Environmental Health Sciences

The emergence in hospitals of antibiotic resistant infections is rising at alarming rates worldwide. There has been a concerted effort to discover new compounds that inhibit the growth, and/or kill human pathogenic bacteria. Here, Nanoparticles are bound to a novel antibiotic R1 via dehydrogenase to produce a nano-antibiotic complex. Results demonstrate enhanced (antibiotic) bioactivity as well as an altered biological mechanism. We suggest that ineffective penicillin treatments can become active through the nano-biosynthesis approaches, and that novel nano-antibiotic can be used to enhance weapons for combating antibiotic-resistant pathogens and cancer.

The Application of Geometric Morphometrics in Individual Fin Identification of the Great White Shark Carcharodon carcharias

**Sarah Grasty**, Environmental Science - Senior

Mentor: Dr. Joe Quattro, Biological Sciences

With many shark populations now severely depleted as culmination of several anthropogenic pressures, many studies on sharks now focus on population dynamics in order to better determine appropriate conservation measures. This requires accurate counts of individuals in a population, thus it is necessary to identify individuals over time in the same area(s). For great whites, this is often done using written and photographic logs of distinctive scars/markings and pigmentation; an arduous process which leaves room for human error. In an attempt to eliminate some user bias, I investigated the utility of employing geometric morphometrics to identify individual great whites within Mosselbaai, South Africa. Geometric morphometrics is a method of shape analysis which uses landmarks placed along figures which are then compared via various statistical tests to determine the statistical similarities/differences between datasets (each dataset is the set of landmarks for an individual fin). In testing this method, it was determined that it may be too impractical for researchers to attempt to take a photograph at an appropriate, consistent angle while in the field (90° between the path of the lens and the fin) needed for accurate differentiation between individuals or matching of fins from the same individual. This significant obstacle thereby makes many of the photographs taken unusable for this method of individual identification. If photographs were able to be easily taken at the appropriate angles to the fin, geometric morphometrics has the potential to be a useful, supplementary tool to current identification methods.

Is radioactive contamination from the Fukushima accident increasing genetic damage in animals?

**Leila Heidari**, Biological Sciences - Sophomore

Mentor: Dr. Tim Mousseau, Biological Sciences

The Tohoku earthquake and consequent tsunami that hit Japan last year caused an accident at the Fukushima Daiichi Nuclear Power Plant. The effects of the release of radionuclides in the environment are almost completely unexplored so far. My project focuses on the impacts of the radioactive contamination on wildlife in the area of the accident. I am exploring the effects of exposure to radioactive contamination on DNA integrity in an insect species the grasshopper Chorthippus albomarginatus. My work has focused on testing the hypothesis that radioactive contamination in Fukushima would increase genetic damage in exposed organisms. I have had the opportunity to work with samples of grasshopper hemolymph that Dr. Mousseau’s research team collected in the field. These samples were processed through the comet assay an electrophoresis-based test that quantifies genetic damage at the level of single cells. I then captured and scored images of these cells and I am currently working on processing the results. Further developments of this study will assess variation in genetic damage across species.
Combat-Related Post Traumatic Stress Disorder: A Review of Psychotherapeutic Treatment Therapies

Hayley Elia, Public Health - Junior
Mentor: Dr. Shawn Youngstedt, Exercise Science
Post Traumatic Stress Disorder (PTSD) is a psychiatric disorder that some individuals develop subsequent to traumatic experiences. In recent years PTSD has become an increasingly recognized and diagnosed disorder among veterans of the United States Armed Forces who are often exposed to traumatic combat events during their military service. Veterans that develop PTSD often experience a range of symptoms that adversely impact both the quality of life and overall health of affected veterans. While researchers have proposed numerous psychotherapeutic pharmacotherapy and alternative treatments for PTSD the overall effectiveness of these treatments is unclear. In this endeavor an exhaustive literature review of one category of PTSD treatments psychotherapy was carried out. Over 70 open or randomized controlled trials were examined and relevant information about those trials was synthesized in order to gain a clearer understanding of the effectiveness of psychotherapeutic treatment therapies. Integrating this information with similar information gathered about pharmacotherapy treatments and alternative treatments a meta-analysis is being carried out to statistically determine effect sizes of various PTSD treatment types.

Mental Toughness Adaptations of Male and Female Soldiers During Basic Combat Training

Amanda Hawkins, Athletic Training - Senior
Mentor: Dr. Thomas Dompier, Physical Education
Basic combat training (BCT) in the United States serves to teach basic combat skills along with the warrior ethos. Few studies have demonstrated a change in the warrior ethos which could be described as mental toughness, or the ability to cope with challenging situations. The MeBToughTM questionnaire measures mental, emotional, and physical toughness. The purpose of this cross-sectional study was to determine if changes in mental toughness occur during BCT in both male and female soldiers, and was part of a larger prospective study. We hypothesized that mental toughness would improve during BCT. The MeBToughTM questionnaire was administered on four separate occasions in single Army Training Center located in the southeast United. Baseline (T1) was collected within the first week of battalion assignment while the remaining were collected approximately every three weeks thereafter (T2, T3, T4). Time and gender were the independent variables. The dependent variable was the mean MeBToughTM score. Differences between male and female scores at T1 were determined as well as score changes over time. Females' scores were significantly lower than males at T1, and improved significantly over time, with the majority of change occurring during the first three weeks of BCT, but the change was not significant after T1-T2. Males' scores also significantly improved over time from T1-T2 and T2-T3, but not from T3-T4. The results support our hypothesis that mental toughness improved during BCT, supporting the concept of the warrior ethos. Future studies should determine if mental toughness is predictive of BCT completion.

Research for the Development of a Meta-Analysis of Combat PTSD Treatments: An Undergraduate’s Perspective on the Academic Paper Writing Process

Molly Higgins, Public Health - Junior
Mentor: Dr. Shawn Youngstedt, Exercise Science
Post-traumatic Stress Disorder (PTSD) is an anxiety disorder that can develop after experiencing a traumatic event. The prevalence of PTSD is approximately 15-20% among combat veterans. The purpose of this research was to investigate and compile data on the current treatments available for combat PTSD in order to write a meta-analysis. Presently combat PTSD can be treated with several different methods including various forms of pharmacotherapy and psychotherapy. However the efficacy of each of these treatments is not clear and there is an obvious need for treatment that is consistently effective and easy to administer. The synthesis of the current research into a meta-analysis serves to show the shortcomings of each treatment in order to illuminate the need for a more effective treatment. There is potential for exercise to serve as this alternative treatment but the use of exercise has not yet been investigated. The first phase of this study consisted of investigating the symptoms characteristics and prevalence of combat PTSD. The second phase of this study was comprised of searches to gather journal articles pertaining to combat PTSD treatments specifically the anti-psychotic anti-anxiety and antidepressants available. In the third phase of the study the articles were sorted and organized into a document conducive to writing a meta-analysis. The preliminary results of this search and compilation show that there is a need for an alternative treatment and that exercise may be a suitable option.

Effects of Music and Brain Stimulation On Mental Fatigue

Kayleigh Kemmy, Exercise Science - Senior
Mentor: Dr. Roger Newman-Norlund, Exercise Science
Previous studies have shown that task performance can be affected by both brain stimulation and exposure to music. I tested over 20 subjects to test my hypothesis of whether or not major or minor music can have any negative or positive effect on mental vigilance and the same subjects participated in a second trial of the same task with (or with a placebo) brain stimulation. I investigated whether these two interventions could have an effect on people’s ability to stay alert. Specifically participants performed a psychomotor vigilance task before listening to either major or minor classical music pieces and then with or without brain stimulation over the anterior ventral premotor cortex. The methods were fairly simple: after recruiting subjects I played either major or minor music while they filled out consent forms. Then they did the control trial on the computer. The second trial was with or without stimulation which was placed over their anterior ventral premotor cortex. They performed the task again and the data of their reaction times were recorded. So far we have found some interesting results. The most robust finding thus far has involved the data from subjects who listened to
major music. The results could potentially have a big impact on the community especially those people who work in a high-stress environment or who’s jobs require a lot of immediate attention. In fact it could even have a big impact on students when they are studying.

Does Resveratrol work through the Nfê-â Pathway to Reduce Inflammation?  
Emily Learner, Exercise Science - Sophomore  
Mentor: Dr. Matthew Kostek, Exercise Science

Duchenne muscular dystrophy (DMD) is an X-linked genetic disease caused by the loss of the protein dystrophin leading to muscle wasting and premature death in boys with the disease. Work done in our lab has studied the effects of treating a DMD mouse model (mdx) with a naturally occurring antioxidant compound resveratrol. These studies have found a decrease in inflammation (~50%) after 10 days of treatment and improved muscle function after 8 weeks. In order to identify the mechanism by which resveratrol decreases inflammation and if it affects specific skeletal muscles our current study examines 16 5-week old mdx mice treated with resveratrol or placebo for 10 days. The mice were sacrificed and muscles removed and frozen. There were no differences between treatment groups in muscle weight (p 0.05 for all comparisons). Histological measures of muscle damage are being analyzed to compare differences between muscles. Research has also shown that the Nfê-â pathway is likely to be a target for the decrease in inflammation in DMD. We are currently quantifying Nfê-â activity at this 10 day time point to see if this is one of the pathways resveratrol is working through to reduce overall inflammation. Completion of this study will help clarify the effectiveness of resveratrol as a therapeutic drug for DMD.

The Effect of Bright Light Therapy on Combat-Related Post-Traumatic Stress Disorder: Experience Working with OEF/OIF Veterans Diagnosed with PTSD  
Lauren Miyares, Biological Sciences - Senior  
Mentors: Dr. Shawn Youngstedt, Exercise Science  
Ms. Shannon Crowley, Exercise Science

For the past calendar year I have worked with Dr. Shawn Youngstedt and Ms. Shannon Crowley Chronobiology Lab Department of Exercise Science on a research study investigating the effect of bright light therapy on combat-related post-traumatic stress disorder (PTSD). I chose to work on this study because PTSD is a serious problem that many veterans face yet only half of the affected veterans are receiving treatment.(1) Current treatments appear to be ineffective possibly due to many factors including: shortage of appropriately trained clinicians(2) limitations of medications to treat the heterogeneity of symptoms of PTSD (3) and other barriers to care (4). The aim of this study was to determine whether a novel treatment bright light therapy was an efficacious treatment for combat-related PTSD symptoms. Sixty male and female veterans who had combat exposure during Operation Enduring Freedom (OEF) and Operation Iraqi Freedom (OIF) were randomized to either bright light therapy or a placebo (sham negative ion generator) for five weeks. Self-reported measures of sleep quality, anxiety, and depression were assessed weekly; in conjunction with sleep disturbance and light intake data retrieved from an Actigraphy watch. Clinical assessments of depression, cognition, and PTSD were assessed pre- and post-intervention. Since depression is such a devastating manifestation of PTSD, the study implemented the Beck Depression Inventory (BDI), which assesses the severity of depression [2]. After examining the scores on the BDI questionnaire pre- and post-intervention of both the control and experimental group, the results suggest that bright light treatment has a significant positive effect on the subjective assessment of depression, which may lead to a decrease in severity of PTSD symptoms.
**Psychology and Neuroscience I**

**Parental and Peer Support and Home Barriers to Healthy Diet in Underserved Minority Adolescents**  
**Katherine Boland**, Biological Sciences - Senior  
Mentor: Dr. Dawn Wilson, Psychology

Minority and low socioeconomic status youth have been disproportionately affected by increasing obesity rates, which puts this group at an increased risk for developing chronic diseases. The biocological model suggests that individual, social, and environmental factors are important factors to consider for health behavior interventions aimed at reducing the incidence of chronic preventable illnesses. While social support and environmental barriers have been shown to relate to diet and health behaviors in the general population, very little research has been done to measure their effects in underserved, overweight minority adolescents. In the current study, parental and peer social support are hypothesized to be positively related to fruit and vegetable intake, while the presence of home barriers to healthy dietary choices is predicted to have a negative effect on fruit and vegetable consumption in overweight minority adolescents. Adolescent and parent self-reported peer and social support measures, as well as home barrier reports were obtained using established scales. Fruit and vegetable intake measures were obtained from three random 24-hour dietary recalls. Three regression analyses predicting fruit, vegetable, and fat intake indicated that barriers to healthy eating, but not peer and parent social support, significantly predicted healthy eating among overweight adolescent participants. These results suggest that environment factors, particularly the availability of healthy foods in the home, are extremely important in determining healthy dietary outcomes. Intervention efforts should target accessibility of healthy foods in the home in order to improve health and decrease the incidence of chronic illnesses among low income, minority youth.

**How do you mean? The effect of item size and frequency on set representation**  
**Krystin Bourdua**, Exercise Science - Junior  
Mentor: Dr. Melanie Palomares, Psychology

We live in a diverse environment that is full of redundant sets or groups of similar objects. It has been shown that we are able to accurately find the mean of a set of objects yet picking an individual item or member of a set is much harder (Ariely 2001). In our experiment we evaluated whether changing the skew or number of small items compared to large items of sizes in a set can bias our statistical representation of the set. Participants were shown a set of 9 randomly sized squares for 133 ms and 2 choice squares were presented afterward. Participants had to choose which square was a previously shown member in the display or choose which square represented the mean size of the set. Our results indicate that participants were significantly better at identifying the mean size than a member of a set. Performance accuracy was modulated by the frequency distribution of the set. Surprisingly we also found that the representation of the set is biased such that we give more weight to items that are physically bigger.

**Greek Affiliation Risky Behaviors and Negative Outcomes among College Students**  
**Joyce Hones**, Psychology - Senior  
Mentor: Dr. Kate Flory, Psychology

Greek-letter organizations are a social force and unique culture on campuses. Existing research shows Greek students are more likely to engage in some risky behaviors. The literature has suggested possible negative outcomes (e.g. compromised academic performance legal trouble) of these behaviors yet patterns of these outcomes have not been adequately examined. The present study compares Greek and non-Greek students on risky behaviors and negative outcomes. Recruited by multiple methods 478 collegians completed an anonymous survey that assessed demographics alcohol/drug use mental health and various negative outcomes. 43% of the sample was Greek-affiliated; of these 205 Greeks 45% were in NPC sororities 13.9% in NPHC (historically African American) organizations 13.9% in multicultural or service organizations and 5.4% in NIC fraternities. Relating Greek affiliation to substance use showed that GLO members were significantly more likely to binge drink (F=12.82 p.01) and misuse prescription stimulants (F=6.83 p.01). There was no difference on cigarette smoking marijuana use cocaine use or the frequency of alcohol-related problems reported by the CAPS-r. Greeks were significantly more likely to report "blackouts" (F=1.94 p.01) and alcohol-related negative effects on academic performance (&#967;2=4.03 p= .05) but also had a marginally significantly higher GPA(F=3.41 p.10). Further analyses examine risky behaviors as mediators of the relation between Greek status and negative outcomes. Results will elucidate the risks and benefits of GLO affiliation with implications for college administrators and prevention/intervention programming. This work was supported in part by a South Carolina Honors College Senior Thesis/Project Grant JOH.

**The Effect of Electronic Time Use on Well-Being in Adolescents**  
**Sarah Lada**, Psychology - Senior  
Mentor: Dr. Kimberly Hills, Psychology

Adolescents in the United States spend a majority of their time in the structured environment of an American classroom. When the final school bell rings some students rush to a sports team practice or an academic club while others are left to their own devices and spend unsupervised time alone or with their friends. Research to date suggests that how adolescents spend their time outside of the classroom can significantly influence their overall outcomes in life. Many of these studies concluded that structured extracurricular activities are beneficial for adolescents while unstructured activities can have detrimental effects. Research investigating the effects of unstructured activities involving the use of electronic devices (e.g. computer phone) and the internet are few given the only recent development and wide usage of electronic devices and media. Given the recent increase in adolescents’ use of electronic devices and the internet understanding the effects of such use on overall well-being and outcomes is important. The present study investigates the relationship between adolescents’ time use and their subjective well-being focusing specifically on effects of time spent using electronic devices/internet. Archival survey data using a sample of 9th and 10th graders will be used to examine the relationship among these factors. It is
hypothesized that time spent on the computer or electronic devices will have an even greater negative effect on students’ well-being than other unstructured activities. The results of this study will add to the current literature and inform prevention and health promotion efforts with adolescents.

**Social Fear in Infants with Fragile X Syndrome**
*Elizabeth Messman, Psychology - Junior*
*Bryan Wehrenberg, Biological Sciences - Junior*
*Carly Joseph, Psychology - Junior*

Mentor: Dr. Jane Roberts, Psychology

Fragile-X Syndrome (FXS) is the leading single gene cause of intellectual disability and autism (Tranfaglia 2011). Children with FXS display elevated fear and escape behaviors during socially demanding situations (Hall et al. 2006) and exhibit poor eye contact with an unfamiliar adult (Hessl et al. 2006). Because the FXS phenotype is difficult to detect in the first years of life (Roberts et al. 2008) characterizing social fear facets specific to FXS in early childhood may foster early detection. Participants included 39 males with FXS and 33 age-matched typically developing (TD) controls. Both groups were divided into young (11 to 33 months) and old (34 to 50 months) cohorts. As part of a longitudinal study participants were assessed using the Stranger Approach episode of the Laboratory Temperament Assessment Battery (Lab-TAB) which is intended to elicit features of shyness and person fear (Gagne et al. 2011). Preliminary mean levels of facial fear for children with FXS were M=4.4 M=5.0 for younger and older children respectively and for TD controls M=5.2 M=4.6 suggesting different patterns with FXS increasing in fear while TD decreased by age. For escape behaviors for infants with FXS M=4.4 M=5.3 for younger and older infants respectively and for TD controls M=4.6 M=4.9 indicating that both groups increased in escape with the FXS showing a greater magnitude of increase by age. Additional analyses will be conducted to determine effect size and significance of group differences. The implications of the study will be discussed in the context of early detection.

**Exploring the Nature of jealousy in Romantic Relationships as Moderated by Hurt Disposition**
*Abigail Mojica, Psychology - Senior; USC Aiken*

Mentor: Dr. Laura May, Psychology; USC Aiken

The current study examined whether hurt disposition paired with one’s level of dispositional jealousy differentially predicts emotional cognitive and behavioral outcomes of jealousy experiences. Specifically it was hypothesized that hurt disposition would interact with interpersonal jealousy to yield significant differences in both intrapersonal and interpersonal experiential outcomes such that those high in both introjective hurt disposition and dispositional jealousy would report greater levels of sadness/depression self-blame and incident-specific jealousy whereas those high in both retaliatory hurt and dispositional jealousy would report higher levels of anger resentment seeking retaliation and blaming the other. The results of the study indicated that high levels of dispositional jealousy were associated with high levels of both introjective and retaliatory hurt. Specifically regression analyses revealed that one’s level of dispositional jealousy and introjective hurt disposition were significant predictors of incident-specific jealousy and feelings of sadness/depression; whereas dispositional jealousy and retaliatory hurt significantly predicted seeking retaliation blaming the other and feeling anger and resentment toward the other. Furthermore MANOVA results revealed those high in introjective hurt disposition reported higher levels of sadness and depression while those high in both introjective hurt disposition and dispositional jealousy reported higher levels of incident-specific jealousy. In contrast those with a retaliatory hurt disposition reported higher levels of anger resentment and retaliation. Thus this study provides a significant contribution to our understanding of the nature of jealousy and how its adverse intrapersonal and interpersonal effects are moderated by the presence of other dispositional attributes such as hurt disposition.

**An Application of the Capacity Model to Left Hemisphere Functional Cerebral Systems: Changes in Verbal Fluency Performance as a Function of Diabetes Classification in Older Adults**
*Sara Newton, Psychology - Sophomore; USC Lancaster*

Mentor: Dr. Kate Holland, Psychology; USC Lancaster

Objective: The left hemisphere has been demonstrated to regulate the parasympathetic nervous system (Wittling 1995) including regulation of diastolic blood pressure and digestive functions. Functional cerebral systems in the left hemisphere may be compromised in individuals with Type II diabetes. For the current research the process of food ingestion absorption and pre-digestion was conceptualized as a left hemisphere stressor. It was predicted that diabetic individuals would evidence a diminished capacity to complete a verbal fluency task after undergoing pre-digestive stress. Data Selection: Individuals diagnosed with Type II diabetes (N=8) and individuals without Type II diabetes (N=10) completed the Controlled Oral Word Association Task (COWAT) before and after eating a sandwich containing between 44-48 grams of carbohydrates. Blood pressure measures were taken after both administrations of the COWAT and 5 minutes after eating. Data Synthesis: A main effect for diastolic blood pressure (DBP) was found (F(4 64)=3.63 p=.01) indicating that DBP was elevated during absorption and after both administrations of the COWAT. Moreover a Diabetes x Condition x Trial interaction was found for unique words produced (F(2 30)=3.62 p.05) indicating that diabetic individuals failed maintain consistent levels of verbal fluency in the post stress condition compared to non diabetic individuals. Conclusions: The current results indicate that functional cerebral systems in the left hemisphere may be compromised in individuals with Type II diabetes. Diabetic individuals demonstrated a reduced capacity to complete a task requiring relative activation of cerebral systems in the left hemisphere after food ingestion.

**Promoter Specific Gene Expression and Antinociception in a Neuropathic Pain Model**
*Candler Paige, Biological Sciences - Senior*

Mentor: Dr. Sarah Sweitzer, Pharmacology Physiology and Neuroscience

Neuropathic pain is a serious health issue that is often times difficult to treat with standard pain medications. Gene therapy is currently being explored in human and animal models of neuropathic pain as a treatment option. The herpes
simplex virus type 1 (HSV-1) is particularly useful in virally-mediated gene transfer within the peripheral nervous system because of its natural propensity for afferent neurons. HSV-1 also remains in a latent state indefinitely and thus the promoter used to drive gene expression is particularly important. Our lab has previously shown that HSV-1 viral vectors can be used to over-express the mu opioid receptor (MOR) within primary afferent neurons using the human cytomegalovirus promoter (HSV-CMV). In the search for an injury specific promoter we showed increased expression of galanin in afferent neurons following peripheral nerve injury. We then developed a virus that would over-express MOR expression using a galanin promoter (HSV-GAL) with the goal of maximizing antinociception. We found increased antinociception in animals infected with HSV-GAL compared to HSV-CMV. Within the dorsal horns of injured animals we found a decrease in percent positive MOR area. Compared with the CMV promoter which showed a partial recovery of the MOR area the HSV-GAL showed complete recovery. These results suggest that using different promoters to drive gene expression in primary afferent neurons can cause changes that influence nociceptive behaviors. Based on our observations it can be concluded that promoter selection is an important component in successful gene expression in an injury and population specific manner.

**Comparison of manipulable vs. non-manipulable nouns and verbs**

**Arjamand Sami**, Biological Sciences - Junior  
Mentor: Dr. Svetlana Shinkareva, Psychology

Nouns and verbs are basic components of language that help us communicate and are processed differently in the brain (Bird 2003). Nouns are easier to learn during child development or learning a new language (Gentner & Boroditsky 2001). It has been suggested that manipulability whether or not the functioning of an object requires hand movement (pen vs. house) or whether the action refers to a hand motion (to grasp vs. to run) may account for differences in noun-verb processing as processing speed is affected by recruiting brain areas that represent hand action (Saccuman 2006). This study investigated whether manipulability influenced the processing speed of manipulable and non-manipulable nouns and verbs in a grammatical task. Experiment 1 was used to generate a list of stimuli. Sixty one participants rated nouns and verbs on manipulability in an online survey. Four groups (NN MN NV MV) consisting of 40 words each were formed by selecting words with extreme ratings and equated on word lengths (p.05). Experiment 2 examined whether the grammatical class and manipulability of a word had an effect on processing speed. Words generated from Experiment 1 were used in phrase completion task using nouns or verbs for example “He… jumps or jump Many…apples or apple”. Participants were asked to select the correct match and reaction times were measured for comparison. Preliminary results from 8 participants showed no differences in reaction times for manipulable vs. non-manipulable and nouns vs. verbs processing suggesting the effect of manipulability on processing speed was insignificant in grammatical task.
Enkephalin is an opioid peptide which research suggests has a role in anxiety regulation in the amygdala. NPY is a neuropeptide which has been shown to reduce fear-conditioned responses in rat models after exogenous administration raising the question of NPY’s role is in fear responses. c-fos is an immediate-early transcription factor known to be expressed during neuronal activation. Tissue samples were examined for the expression of each protein and especially for cells that were labeled for both c-fos and enkephalin or NPY which would suggest the cells containing these endogenous neuropeptides were activated by expression of fear conditioning. Results have shown no differences in numbers of dual-labeled c-fos and enkephalin neurons of the central amygdala between different anxiety groups. Examination of NPY and c-fos stained tissues are currently in progress.

Examing What is Noted from a Brief Glance
Liana Krajnak, Psychology - Senior
Mentor: Dr. Melanie Palomares, Psychology
With even only a brief glance an observer can fully grasp the contents of a natural scene but he or she will notice some aspects of the scene more than others. What will the observer notice first? What aspects does he think are most important? Although a scene’s aspects are best noted after view them for more than one full second information about the scene is perceived in observations of much shorter time intervals. It has been shown that observers are able to comprehend and report semantic information about scenes after viewing them for less than 50ms. In order to further investigate what an observer sees in a scene over varying time intervals subjects were asked to observe and describe natural scenes. In Experiment 1 adult subjects viewed scenes for 500ms then answered with a great degree of accuracy questions designed to probe their comprehension of the gist and the details in a scene. We found that gist information is more accurately recalled than detail information. In Experiment 2 participants will view scenes for shorter amounts of time and asked to describe the scene they observed in free recall. The experiments will provide insight into the perception of and memory for natural scenes.

The Effect of Mental Representation on Reaching in 3D Environments
Emily McAlhany, Psychology - Senior; USC Salkehatchie
Mentor: Dr. Carmela Gottesman, Psychology; USC Salkehatchie
Reaching for things is very common people reach for things numerous times a day. The understanding of spatial layout i.e. the location and orientation of surfaces and objects around the person is obviously important for successful reaching and grasping. Much research has shown that when viewing the world people construct mental representation of the spatial layout they see. However the effect of such mental representation on actual behaviors such as reaching in real 3D environments has not been explored. The present study is testing the effect of mental representation on the speed of reaching for objects in 3D models. 3D models have been constructed of Lego bricks over keyboards that record reaction time. On Each trial participants view a picture of a scene and are then asked to reach for an object either in the real 3D version of the scene they had just viewed or a different real 3d scene. The actual objects that need to be touched (pink Lego bricks) are never presented in the pictures. The models are encased in wooden
boxes so participants cannot see the model before each trial begins. If the mental representation of the scene’s layout constructed based on the picture aids the reaching behavior faster responses are expected when the picture and the real 3D environment are the same then when they are different. Results are forthcoming.

**Understanding How Emotional Response to a Disney Film Impacts Older Adolescents’ Ability to Identify Social and Moral Themes**  
*Sara Rapp*, Spanish - Senior  
Mentor: Dr. Kate Flory, Psychology  
Twenty males and 68 females at the University of South Carolina came into our laboratory to view Beauty and the Beast a Disney film selected for its popularity and historical significance (Cannon 2009). Participants reported their biographical information and how often they watched Disney films as children how much they watch them now and how many times they had seen each Disney film. Most importantly to our research aims participants completed an emotion “thermometer” measure assessing anxiety, happiness, relaxation level, interest and comfortability before and after viewing the movie and they answered open-ended questions regarding themes present in the movie following the viewing. For the poster presentation we will present results examining participants’ change in emotions from before to after viewing the movie as well as statistics reflecting which themes from the film were most often identified by the viewers. We also plan to relate these two outcomes to some of the demographic and background information collected. The results will help us to better understand how Disney affects specific populations on an emotional level with implications to the benefit or the disadvantage of having a Disney enriched culture.

**Discovery of G-Protein Coupled Inward Rectifying K+ (GIRK) Channel Inhibitors and Activators**  
*David Shipp*, Pharmacy - Senior  
Mentor: Dr. Kenneth Walsh, Pharmacology Physiology and Neuroscience  
G-protein coupled inward rectifying K+ (GIRK) channels are found throughout the central nervous system where they act to regulate the neuronal cell resting membrane potential. GIRK channels become activated following the binding of neurotransmitters and hormones to their plasma membrane-bound G protein-coupled receptors (GPCRs). Recent studies suggest that GIRK channels represent targets for the development of new pain medications. However there are no drugs available that directly act on the channel. Currently greater than 50 million people in the United States suffer from some form of chronic disabling pain. Pain medications such as nonsteroidal anti-inflammatory agents (aspirin, ibuprofen etc.) and narcotics (oxycodeone, codeine etc.) are widely prescribed for the treatment of these patients. However these drugs produce many unwanted side effects. Therefore we hope to find a therapeutic use for GIRK channel modulators. The goal of this project is to identify new inhibitors or activators of the GIRK channel using a cell-based fluorescent screening assay. We have done initial testing of the assay using the K+ channel modulators glipizide, glybenclamide and PNU-37883A. Glipizide and glybenclamide showed no inhibitory actions on the GIRK channel. However PNU-37883A inhibited the GIRK channel in a dose-dependent manner with as Kd = 2.21M. In the future a compound library of 5000 ion channel modulators will be tested using this assay. Once identified the specificity of the compounds will be determined using a secondary cell-based assay.
conducted research on the organizations that are taking action to eradicate FGC in particular the WHO Tostan UNFPA FORWARD Amnesty International The FGC Education and Networking Project and UNICEF. After reviewing their strategies I found that work starting at the village level that then expands to the city and regional levels has been key in addressing FGC. Respecting the value of long-held traditions while at the same time demonstrating how FGC is not a religious requirement and how it can have devastating consequences on the mental and physical health of women are effective strategies that have been used within communities. The most effective methods of FGC eradication involve villagers educating other villagers international response through fundraising and support of innovative strategies group commitments to abandon the practice and local laws that forbid FGC. With these strategies combined this multi-pronged plan can be put into action and FGC can be revealed as a violation of human rights and a practice that needs to be stopped.

An Alternative Spring Break: Medical Mission to Belize 2012
Brewer Eberly, Biological Sciences - Sophomore
Mentors: Dr. Patrick Hickey, Nursing and Capstone Scholars Ms. Eileen Korpita, Pre-Professional Advising
Over Spring Break of 2012 twenty-one pre-healthcare students of various majors and backgrounds traveled to Orange Walk Belize representing USC and International Service Learning (ISL) as medical student volunteers. With previous training regarding triage vital signs and basic medical Spanish two teams of students made rudimentary free clinics available for the local populations in four rural villages. This process included one-on-one home interactions to determine health needs of prospective patients who then received appointments based on greatest need due to a limited supply of medical resources. Community centers and preschools were converted into makeshift primary healthcare centers which served as both clinics for the patients and a hands-on teaching arena for the students. Along with experience gained in a rural healthcare setting students were able to observe the functions and methodologies within a hospital of a developing country. In addition to our enthusiasm for the practical medical knowledge and skills gained through this experience we are even more passionate about expressing what we believe to be our growing realization that the art of medicine is fundamentally based upon a life of dedicated service.

Effects of monthly dental care coaching on improving dental health in elementary students compared to usual care
Sukhi Guram, Biological Sciences - Senior
Mentors: Dr. Brad Smith, Psychology Dr. Kevin Elliott, Philosophy and Leadership Initiative
The primary goal of this research is to examine the effects of monthly dental care coaching on improving dental health in elementary students compared to usual care. The surgeon general’s report on oral health showed that dental carries is the most common childhood disease. 100 elementary school students will be randomly assigned to a control or intervention group. To assess dental care skills be given dental care items and examiners will assign points on a 1-5 scale based
on each aspect of care (brushing flossing mouthwash). The control group receives no feedback on performance while the intervention group receives feedback once a month. Results will be assessed using repeated measures Analysis of Variance looking for a group by time interaction. We hypothesize that after six months the final screening will indicate improved oral health in the intervention group. This research project focuses on a preventative chronic disease that can be lessened with effective education.

_Notes:

**Forgotten Carolina: Race and its Effects on Education in the Rural Lowcountry of South Carolina**

*Ami Pulaski, History - Senior*

Mentor: Dr. Bobby Donaldson, History

The documentary “The Corridor of Shame” exposed the terrible conditions faced by poor rural school districts along I-95 in South Carolina. During the 2008 Presidential campaign the national media widely discussed these Lowcountry communities and their infrastructure and funding. While the documentary and news reports brought attention to the region this project looks more closely at Hampton and Beaufort counties as case studies that explore the racial social and historic forces that gave rise to profound educational inequity. These two particular counties are very different in nature since Beaufort is a popular coastal tourist destination while Hampton is a fairly remote county further inland with few businesses and industrial centers. Employing archival research government reports and oral interviews with school administrators and veteran teachers this study aims to confront the educational inequalities that have developed through social and racial segregation in both Hampton and Beaufort Counties.

_Educating the Populace: Reaching Out to the Underserved of Columbia through Diabetes Education Programs_

*Lauren Talley, Biological Sciences - Senior*

Mentors: Dr. David Simmons, Anthropology and Health Promotion, Education and Behavior

Dr. Kevin Elliott, Philosophy and Leadership Initiative

In South Carolina 8.5% of high school students drop out between the ages of 16 and 19. This is incredible in comparison to the fact that 37.9% of high school students will not graduate with a high school diploma as a result of mixed factors. With such unsurprising statistics (South Carolina is currently 47th in the nation in terms of quality public education) it makes sense that there are similar trends in terms of low and underfunded health education. It has been demonstrated throughout numerous articles that education is inextricably linked to both social and economic mobility as well as an indicator for quality of health. My project focuses on one educational program that is targeted towards patients suffering from Diabetes Types I & II. The program involves residents attending an informational class about the disease on a weekly basis. The class informs the patients of the proper diets foot wear and other care procedures for their bodies that will encourage a healthy lifestyle. Once patients have attended two classes they will be given free glucose meters and testing strips. The goal of my project was to ultimately see if the blood glucose levels fall after undergoing the course regimen.

**The Role of Traditional Medicine in Taiwan**

*Beth Tilley, Anthropology - Senior*

Mentor: Dr. Doyle Stevick, Educational Leadership and Policies

At a time when the U.S. is embroiled in a battle over the cost of healthcare new ideas and methods for reducing costs without compromising the health outcomes would be welcome. While examining other health care systems can inform then policy debate so can examining from various cultural perspectives. In this era of biomedicine many consider western scientific or “empirical knowledge” the only way to address illness; others view it as mechanical and impersonal. This research project examines how traditional eastern medicine is combined with modern western biomedicine to fit the needs of the growing Taiwanese population. It also describes the large percentage of Taiwanese who because of the importance of tradition choose medical care with no biomedical techniques. More flexibility in healthcare options could be achieved with a greater understanding of the benefits of traditional healing. In addition to preliminary readings I conducted my research by visiting hospitals in both Taipei and Taichung Taiwan visiting local markets and observing common health remedies. This observational approach helped me grasp the importance of cultural diversity and understand my own ethnocentric view of biomedicine. My epiphany occurred when I realized that the incorporation of new (or old) medical techniques was not as essential as understanding differing definitions (or conceptions) of health. In Taiwan and especially for Buddhists it is vital to take life at face value. It is essential to consider what is best for the individual instead of the idea of generic medical practices with the idea that “one size fits all.”

**Barriers to Women’s Participation in Russian Politics**

*Jasmine Whelan, International Studies - Senior*

Mentor: Dr. Judith Kalb, Languages Literatures and Cultures

With just 14 percent of the Duma made up of female representatives and less than 5 percent of the Federation Council gender inequality plays a large role in Russian society—both in everyday life and in politics. A significant body of English-language research examining the problems of gender inequality in Russian society exists but the overwhelming majority of such material focuses on the 1990s. The astronomical rate of change during that turbulent decade renders research that focuses on the 1990s inadequate for forming a complete picture of the contemporary situation however. Thus this project seeks to fill in some of the gaps in knowledge with a more contemporary analysis of the factors contributing to a lack of women’s participation in Russian politics. Specifically the project will identify historical trends contributing to the current societal norms that discourage women from participating in politics examine the kinds of political roles that are typically available to women and their implications for the average Russian woman and outline the contemporary debate on women’s involvement in politics by highlighting the common arguments for and against their participation. The project will also incorporate insight from original interviews conducted with local-level Russian politicians from several cities.
Customer Attitudes and Personal Selling

Carley Davis, Retailing - Senior
Mentor: Dr. Jung-Hwan Kim, Retailing
The purpose of the research is to investigate how personal selling affects consumer attitudes and purchase intentions in luxury retail shopping environments. As a senior Retailing major in the school of HRSM I have found a personal interest in personal selling and as I am pursuing a career in the field of personal shopping. Consumers of luxury goods are characteristically different than other consumers. To identify what produces satisfaction and positive emotion within this niche could help me personally in my career and potentially become a guide for others such as co-workers and future students to better understand how to drive a personal selling business or better thrive in a competitive selling environment. Personal interviews with field experts and reviews of articles on consumer attitudes towards luxury goods and personal selling/shopping will be utilized. This will assist me in forming a conclusion and a "picture" of the luxury consumer and what their needs are.

Columbia’s Sustainable Promise

Courtney Good, Tourism Management - Senior
Phillip Parrillo, Tourism Management - Senior
Joe Fortune, Tourism Management - Senior
Mentor: Dr. David Harrison, Management; USC Aiken
During the Fall semester of 2010 we studied abroad at the IESEG School of Management in Lille, France. The benefits in studying abroad at the IESEG School of Management included: learning a foreign language, meeting and interacting with different cultures, and traveling throughout Europe. The IESEG School of Management is ranked among the top ten business schools in France and is known as their unabbreviated French name the Institut d’ Économie Scientifique Et de Gestion. Prior to studying in France we both had little knowledge and experience in understanding the French language and culture. However, throughout our semester long experience we eventually were able to learn small amounts of the French culture and adapt it to our daily practices. While studying at the IESEG School of Management we were able to choose if we wanted our courses to be one week long or one day a week. For the most part we chose to have one course a week with the final examination on the last day of the course. In having courses once a week, every course had students from all across the globe with their own international perspective on class topics. In our off time allotted to us by the university we individually travelled to over seven different countries using trains, cars, and planes. Ultimately, looking back on the experience we can both say studying abroad was one of the best experiences we ever had and was one of the best investments for our future.

Advancing Information Technology and Sustainable Economic Growth - One Event at a Time

Taylor Harrison, Hotel Restaurant and Tourism Management - Senior
With unemployment at record levels the Southeast is badly in need of high-paying jobs to boost local economies. I worked with a start-up company to support the development of information technology (IT) skills and technology-related businesses throughout the Southeast. IT-o-Logy formed in 2011 by a consortium led by USC BlueCross BlueShield and IBM is a non-profit firm that works to “Promote IT Grow IT and Teach IT.” As the event coordinator for IT-
Hong Kong: One Country Two Economies?

Justin Jensen, International Business - Junior
Mentor: Dr. David Hudgens, International Business
Our study researches whether the Closer Economic Partnership Arrangement is truly beneficial to the financial industry in Hong Kong and to what extent. The study includes interviews from 10 Hong Kong businessmen throughout the financial industry drawing from the four main sectors: banking services, foreign exchange services, investment services, and insurance. Questions were geared towards how conducting financial matters between Mainland and Hong Kong SAR has changed due to the Closer Economic Partnership Arrangement (CEPA). Conclusions are drawn on the effectiveness of the CEPA specifically considering if and to what extent it actually benefits the financial industry in Hong Kong. The goal of the study is to write an analysis of my findings and submit it in article form to numerous business journals such as: the State GSA Business and Hang Seng Economic Monthly.

Issue Evolution and the Development of the U.S. Congress

Bryan McDonald, Political Science - Senior
Mentor: Dr. Charles Finocchiaro, Political Science
This research further refined a dataset on congressional bills from the late 19th and early 20th century in order to better understand what types of bills were being introduced and passed during a time of transition from an “amateur” legislature to one more characterized by a “careerist” view. The transition took place over a 25-year period in which Congressmen started to view their legislative role in a professionalized light motivated by an interest in building resources that would help with their electoral prospects. By analyzing information gathered on the bills that were passed during this time, light is shed on the historical development of Congress and we are also able to address the implications of agenda change for the contemporary Congress. The project involved reading descriptions of thousands of bills and classifying them by issue area. We then calculated descriptive statistics showing the rise in “service” and “advertising” legislation as opposed to more substantively policy-oriented legislation as members of Congress sought longer careers. The types of legislation that increased tended to involve things like pensions for war veterans naming public buildings and so forth. The findings help to clarify our understanding of this important period of American political history. They also demonstrate the roots of modern behavior like pork barrel spending and the passage of “commemorative” legislation.

Lasting Effects of the First Time Homebuyer Tax Credit
Joseph Nave, Economics - Senior
Mentor: Dr. Stephen Finger, Economics
The decline in the United States housing market beginning in 2006 was a major cause of the late 2000’s recession. The Housing and Economic Recovery Act of 2008 was passed in an effort to start recovery in US housing. This paper focuses on determining the effectiveness of the First Time Homebuyer Tax Credit part of that bill. The purpose of this project was to determine whether or not the subsidy significantly altered the housing market and whether those effects were lasting. The research was done by obtaining demographic housing and economic data for every metropolitan statistical area in the United States from 1996 to 2010. The demographic data consisted of data known to have an effect on home purchases such as the number of marriages, fertility rate, racial statistics, migration, and population. The economic data used standard economic indicators such as per capita income, gross domestic product, and stock index averages. The economic and demographic data where then compared to housing statistics such as number of homes sold, average price per square foot. Then fixed effect regressions were used to test the housing data against several economic and demographic variables to isolate the effect of the tax credit. The predictions from the models were then compared to trend lines from the housing data over time. This paper is important because policy analysis is an essential part of macroeconomics. How can we know what works if we don’t test it?

Examining Opportunities to Strengthen the Tanzania MOHSW Integrated Logistics System

Elizabeth Wilson, International Business - Senior
Mentor: Anad Nair, Management Science
This research examines how the healthcare delivery model developed by the social enterprise VillageReach can be successfully integrated with Tanzania Ministry of Health and Social Welfare’s (MOHSW) Integrated Logistics System (ILS) to improve ILS’s ability to address the cold chain needs within remote and underserved communities in Tanzania. Each year despite the availability of vaccines more than 2.4 million children perish from vaccine-preventable diseases with a disproportionate number of those deaths accounted for in Sub-Saharan Africa. Immunization services in developing countries such as Tanzania have been hindered by weak logistics practices and inadequate information access. The VillageReach Dedicated Logistics System in Mozambique has set an excellent example of how social enterprise can work hand-in-hand with government institutions (i.e. the Ministry of Health) to improve immunization coverage. Great opportunities appear for creating synergies between the business
model of the Dedicated Logistics System and objectives and practices followed by ILS. Literature was analyzed regarding supply chain best practices and contextual factors such as the economic social and environmental issues that play an important role in operational decision making in Tanzania. Through that analysis research questions were refined and questionnaires were developed to conduct fieldwork and interviews in Tanzania. Following travels to Tanzania I will complete the project analysis and formulate actionable recommendations for aligning VillageReach’s healthcare delivery model with ILS.
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