Discovery Day

A forum for student ingenuity

2014
Discovery Day 2014
A forum for student ingenuity

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

Our sponsors who made this event possible:

Office of the Vice President for Research
South Carolina Honors College
College of Arts and Sciences
Moore School of Business
College of Education
College of Engineering and Computing
College of Pharmacy
USC Connect
Carolina Leadership Initiative

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

all for supporting student success
Schedule of Events

All events take place in the Russell House-Columbia

8:15 am  Registration  Lobby (2nd floor)
9:00 am-11:00 am  Poster Presentations  Ballroom
9:00 am-11:30 am  Oral & Creative Presentations
Arts and Humanities  Theatre
Social Sciences and Public Health  304
Social Sciences I  205
Social Sciences II  302
Social Sciences III  303
Science, Technology, Engineering, and Mathematics I  305
Science, Technology, Engineering, and Mathematics II  315
USC Connect Showcase I  201
USC Connect Showcase II  203
12:30 pm-3:00 pm  Oral & Creative Presentations
Arts and Humanities  Theatre
Social Sciences and Public Health  303
Social Sciences I  205
Social Sciences II  302
Science, Technology, Engineering, and Mathematics I  304
Science, Technology, Engineering, and Mathematics II  305
Science, Technology, Engineering, and Mathematics III  315
USC Connect Showcase  203
1:00 pm-3:00 pm  Poster Presentations  Ballroom
3:00 pm-3:30 pm  Reception  Ballroom
3:30 pm-4:30 pm  Awards Ceremony  Theatre

For questions, please visit the Registration table (2nd floor lobby) or Information Point (Ballroom)
Table of Contents

— Oral and Creative Presentations —

Morning Session
Arts and Humanities ................................................................. page 12
Social Sciences and Public Health ............................................. page 16
Social Sciences I ....................................................................... page 20
Social Sciences II .................................................................... page 23
Social Sciences III ................................................................. page 26
Science, Technology, Engineering, and Mathematics I ............ page 29
Science, Technology, Engineering, and Mathematics II ........... page 32
USC Connect Showcase I ......................................................... page 36
USC Connect Showcase II ......................................................... page 39

Afternoon Session
Arts and Humanities ............................................................... page 44
Social Sciences and Public Health ............................................. page 47
Social Sciences I ..................................................................... page 50
Social Sciences II .................................................................... page 53
Science, Technology, Engineering, and Mathematics I ............ page 56
Science, Technology, Engineering, and Mathematics II ........... page 59
Science, Technology, Engineering, and Mathematics III .......... page 63
USC Connect Showcase ............................................................ page 66

— Poster Presentations —

Morning Session
Arts and Humanities ................................................................. page 70
Biology and Biomedical Sciences I .......................................... page 73
Biology and Biomedical Sciences II ....................................... page 79
Chemistry and Physics ............................................................ page 84
Computing ............................................................................ page 88
Engineering and Math ............................................................. page 92
Environmental Sciences ........................................................... page 95
Exercise Science and Physical Education ............................... page 99
Psychology and Communication Sciences ............................ page 104
Psychology and Neuroscience I ............................................ page 108
Psychology and Neuroscience II ........................................... page 113
Public Health ....................................................................... page 117
Social Sciences I ..................................................................... page 123
Social Sciences II .................................................................... page 128
USC Connect Showcase I ......................................................... page 132
USC Connect Showcase II ......................................................... page 136

Afternoon Session
Arts and Humanities ............................................................... page 142
Biology and Biomedical Sciences I .......................................... page 145
Biology and Biomedical Sciences II ....................................... page 150
Chemistry and Physics ............................................................ page 155
Computing ............................................................................ page 159
Engineering and Math ............................................................. page 164
Environmental Sciences ........................................................... page 168
Exercise Science and Physical Education ............................... page 172
Psychology and Communication Sciences ............................ page 177
Psychology and Neuroscience I ............................................ page 182
Psychology and Neuroscience II ........................................... page 186
Public Health ....................................................................... page 191
Social Sciences I ..................................................................... page 197
Social Sciences II .................................................................... page 202
USC Connect Showcase I ......................................................... page 207
USC Connect Showcase II ......................................................... page 211
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, peer 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. 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?

Ready to get started?

Come by Information Point (Russell House Ballroom) to pick up a scavenger hunt form.

USC Connect Showcase

USC Connect is a long term initiative at USC Columbia and the Regional Campuses (Lancaster, Salkehatchie, Sumter, Union) to support all students in making the most of their education. Students are encouraged to connect or integrate their learning from within and beyond the classroom activities, such as those highlighted at Discovery Day. The ultimate goal of USC Connect is for students to be thoroughly and deeply prepared with core knowledge, developed skills, and the dispositions to contribute and lead in home, community, and work settings.

Please visit our USC Connect Showcases throughout the day. While all students presenting at Discovery Day participate in USC Connect, the presentations in the Showcase have been specifically brought together to highlight the variety of activities available to students that contribute to integrative learning.

Look for these designations on each poster to see how our students are involved in USC Connect:

- Community Service
- Global Learning
- Professional and Civic Engagement
- Research

USC Connect

USC Connect is a long term initiative at USC Columbia and the Regional Campuses (Lancaster, Salkehatchie, Sumter, Union) to support all students in making the most of their education. Students are encouraged to connect or integrate their learning from within and beyond the classroom activities, such as those highlighted at Discovery Day. The ultimate goal of USC Connect is for students to be thoroughly and deeply prepared with core knowledge, developed skills, and the dispositions to contribute and lead in home, community, and work settings.

Please visit our USC Connect Showcases throughout the day. While all students presenting at Discovery Day participate in USC Connect, the presentations in the Showcase have been specifically brought together to highlight the variety of activities available to students that contribute to integrative learning.

Look for these designations on each poster to see how our students are involved in USC Connect:

- Community Service
- Global Learning
- Professional and Civic Engagement
- Research
Arts and Humanities

Sustaining the Land of Fire and Ice

**Chandler Green**, Environmental Science - Sophomore

Mentor: Prof. Laura Kissel, Art

The mainstream media frequently promotes sensational stories about controversial environmental topics such as clean energy and global warming. But it is difficult to learn about these issues and find ways to solve these environmental problems without experiencing their complexity firsthand. This was the motivation to research Iceland, because it is a living laboratory for the most prominent environmental issues of our time. Iceland is known for being one of the "greenest" countries in the world, with eighty percent of their energy derived from clean energy sources; however, it is also under threat from global warming, as its glaciers are rapidly melting. During an Iceland Maymester in 2013, the effects of climate change on Iceland's environment and the country's efforts in clean energy were documented on film. The driving purpose behind the documentary was to better understand Iceland's relationship with their environment, and how climate change threatens this relationship. The medium of film was used to illustrate the investigation in order to personally share the learning experience. Using filmed interviews with University of Iceland students, representatives from the United Nations University Geothermal and Land Restoration Training Programs, and tour guides, firsthand knowledge was captured and communicated from the residents of Iceland themselves. Ultimately, the documentary educates viewers on relevant environmental issues in Iceland from the role of geothermal energy in the country to Iceland's rapidly melting glaciers. Such visual environmental education is essential because these issues currently modeled by Iceland will soon be the responsibility of our generation.

Dear Burns: Robert Burns in Dialogue with his Contemporaries

**Joseph DuRant**, English - Junior

Mentor: Dr. Patrick Scott, Rare Books & Special Collections

While the Scottish poet Robert Burns (1759-1796) has been long studied, there has been no collected scholarly edition of the letters people wrote to him. My Magellan research project with Dr. Patrick Scott, based in USC Libraries’ G. Ross Roy Collection, has created the first-ever edition of these letters, for print and on-line publication. After a synopsis of the project work in creating text, comparing variant sources, resolving discrepant dates, and researching literary and contextual annotations, this paper discusses examples of several major letter-groups, and the different issues they raise: Burns’s exchanges with Agnes M’Clehose (“Clarinda”) and Frances Dunlop, which both raise significant textual and dating issues; letters from friends or on business, often single items or known only from early biographies; letters recorded with extracts in an early 19th century manuscript inventory; and correspondence where only Burns’s side has survived (e.g. George Thomson, the song-publisher). Often the annotation and research on letters to Burns explains problems or modifies interpretation of the letters Burns himself wrote. The cumulative effect of the new research is to present a Burns in dialogue with his contemporaries.

"They'll hold their manhoods cheap..." – Examining the intersections of economy, masculinity and honor in the Henriad

**Harvey Jessup**, English - Senior

Mentor: Dr. Ed Gieskes, English Language and Literature

Like many of Shakespeare’s plays, the plays of the Henriad centers around what many scholars have described as a crisis of authority. After deposing Richard II, Henry IV is faced with the problem of how to unify England and assert authority over it on rather shaky grounds of authority. Having not inherited his title from Richard, he has to find some way to legitimate his authority, and make sure that his son, Prince Hal, is honorable enough to carry on his fledgling dynasty. However, this crisis of authority is represented by Shakespeare as not being merely dynastic: it is constituted by problems with money, honor, and masculinity. While, as needed, providing a historical and theoretical overview from which I draw my assumptions, I am presenting a reading of 1 Henry IV, 2 Henry IV and Henry V that focuses on how these new kinds of social relations are enacted and what sorts of masculinities the characters engender, navigate and challenge through the lens of performance theory. Tracing these developments throughout the three plays, it will be demonstrated that much of the economic anxiety in the play goes hand in hand with anxieties permeating much of the relationships between men (and women). This is not merely coincidence. In the Henriad, masculinity and honor – which go hand in hand – are constantly being commodified and subject to economic logics in relationships between men and women. It makes possible King Henry V’s suggestion that because fewer are at the battle of Agincourt, the “greater share of honor” will be had by those present, and those far away will “hold their manhoods cheap”.

The Euphradian Society: An Intellectual Heritage

**Steven Vanderlip**, Political Science - Senior

Mentor: Dr. Jill Frank, Political Science

In an 1892 address before an assembly of collegiate literary societies, a University of South Carolina professor observed that these literary societies, “mediate between the school and the world.” Indeed such societies, of which virtually all students partook at the time, were forges for students who sought to hammer out what was learnt in their studies with the world around them. The Euphradian Society at the University of South Carolina offers a case study of this dynamic. Compiling an original and comprehensive collection of Euphradian Society debate topics that span over four decades of antebellum life, I have sought to begin a discussion on the question of what this dynamic necessarily meant and what it looked like. Using the debate resolutions and, when available, the recorded outcomes of those debates, my research has lent itself to studying the Euphradian Society as an intellectual and philosophical entity of its own accord, as well as an entity that is drawing on particular currents in Southern intellectual thought. Debate topics such as “Whether heroes or statesmen have been most useful to the United States” and “Should justice yield to policy” all speak of the dynamic between the Euphradian Society and its relation with the antebellum southern society that existed around it and supported it. While collegiate literary societies have largely gone extinct, the Euphradian Society remains today, though with a severely curtailed sense of itself. Recovering a forgotten intellectual heritage and an identity for the Society has thus been my impetus for research.
Mozart’s Impact on the Bassoon

Madelyn LaPrade, Music Performance - Junior
Mentor: Dr. Michael Harley, Music

Musicians today often make significant stylistic changes in the music of legendary composers in order to make the music sound impressive and virtuosic. They play the music faster than the composer intended, make changes in articulation, or add trills and flashy technical passages that were not originally written in the music. Mozart’s music, specifically his Bassoon Concerto in B flat Major, K.191 already showcases the unique qualities of the instrument and therefore does not need to be changed in order to sound virtuosic. This piece demands virtuosic playing from the performer unlike any bassoon concerto written before it.

The two purposes for my research in Salzburg, Austria were to prove Mozart’s significance to the bassoon literature, and to learn to play his music just as he had intended it to be played in the 18th century. My research shows that composers before Mozart did not realize the capabilities of the instrument. Mozart’s bassoon concerto is significantly more advanced than any music previously written for the bassoon because of its three-octave range, many large leaps across octaves, and difficult technical passages. By studying original Mozart manuscripts and through my private lessons with Austrian bassoonist Dr. Edward Bartlett, I believe that I improved as a performer and enhanced my knowledge in music history. Therefore, I am now able to perform the Mozart Bassoon Concerto as Mozart would have wanted it to be played.

Theatre Arts affecting Children’s Self-Perception

Kathryn Atkinson, Business Administration - Senior
Mentor: Dr. Karen Heid, Art

An education in the arts is an important supplement to children’s traditional math and science courses. I studied specifically how children are affected by theatre education. I worked with Dr. Karen Heid, music teacher Mary Ann Tillman, and her 4th graders at AC Moore Elementary to produce Seussical the Musical Jr. My research asks how exposure to the performing arts can affect a child’s perception of themselves, the child’s individual progress, how the child compares themselves with others, how the child measures social feedback, and the physiological state of the student. The students completed Self-Perception surveys early in the rehearsal process, and took these surveys again after performing and completing follow up classes. My research also includes interviewing students and taking observational notes. Through actor training and performance classes the student’s confidence levels increased, resulting in improved scores on the Self-Perception survey. This project inspired me to redirect my career goals. I was overwhelmed by the response from my students as they grew to love and appreciate acting. Now I have decided to focus on creating more accessible arts education options for children. I want the community at USC to recognize the significance that a theatre education can have on a child’s personal development.

The Stella Adler Approach to Training a Young, Professional Actor

Andrea Wurzburger, English - Junior
Kathryn Atkinson, Marketing - Senior
Mentor: Prof. David Britt, Theatre and Dance

From the start of our project, our ultimate goal was to learn and utilize the Stella Adler acting techniques by working alongside instructors and contemporaries within the Stella Adler conservatory. We wanted to return to the University of South Carolina with new methods that would allow us to improve our personal work in the theatre department. Our process began with attending The Stella Adler Conservatory of New York City. We both studied at the 10 week conservatory, which required approximately 20 hours a week, not including individual rehearsals and research. The program is the equivalent to a full term at the NYU Tisch School of the Arts program. We both took classes such as Voice and Speech, Script Interpretation, Scene Study, The Stella Adler Technique, Movement, Shakespeare, and Acting for Film and Television. We spent time communicating with our mentor, David Britt, discussing the new material that we were learning and gained insight as to how we could apply it upon returning to the university. Our research culminated in our theatre workshop, “Putting It Together”, for students at the University of South Carolina. We wanted to offer this workshop to not only our peers in the theatre community, but to the USC community as a whole. Our presentation is a product of that workshop.
Identifying and Overcoming the Stigma of School Mental Health Services

Alyssa Huggins, Biological Sciences - Senior
Mentors: Dr. Mark Weist, Psychology  Dr. Mike McCall, Psychology

Mental health services are widely underutilized: of adolescents affected by mental health problems, very few make the decision to seek treatment. Since adolescents spend the majority of their time at school, faculty/staff members serve as a chief source of assistance for students who do make the decision to seek treatment for symptoms of mental illness. However, in a school setting, a student undergoing emotional stress has more to face than simply seeking out counseling sessions—they have to face their peers. The purpose of this project is to investigate the role of stigma as a contributing factor to students’ underutilization of school mental health (SMH) services. In order to account for the population and resources available to various students, research on this topic was conducted via a series of interviews at a rural, urban, and private school. From each school, interviewees consisted of an administrator, teacher, school counselor, and two students, totaling fifteen interviews. Interviews were analyzed using QSR International’s NVivo10 (2012) Software. Data indicate that students have a poor perception of SMH services; students believe they could be stereotyped or could face embarrassing consequences as a result of receiving school counseling. In addition, it appears that there is a lack of consistent understanding of SMH services among interviewees of a particular school. Ideally, this research will identify gaps in the understanding of mental health and treatment provided by SMH services. Data from this research could define areas for the development and improvement of strategies for overcoming the stigma of SMH services.

Transforming Care through Disruptive Design: Incorporating a Midwifery Model of Care into Obstetric Practices

Lauren Marsh, Psychology - Senior
Mentor: Dr. Deborah Billings, Health Promotion Education and Behavior

Maternal and child health outcomes in the United States are far poorer than in other industrialized nations. To improve women’s experiences with the maternity care system, nurse-midwife Sharon Schindler-Rising developed the CenteringPregnancy (CP) group model of prenatal care (PNC). Research comparing CP with traditional one-on-one PNC has found that implementing CP results in decreased rates of preterm birth and low birth weight, increased rates of breastfeeding, and improved outcomes for women who typically experience health disparities, including African Americans. Documented success of the model in the Greenville Health System convinced the SC Department of Health and Human Services of the importance of supporting CP expansion throughout the state. In 2013, five obstetric practices initiated CP as an option for all eligible women; two additional practices were added in 2014. My research focuses on the first phase of expansion and examines the facilitating factors and barriers associated with incorporating a midwifery-aligned model of care into obstetric practices, which are staffed primarily by physicians and nurses. Data were collected by members of the research team through semi-structured interviews, field notes, and participation in various workshop and conference venues. Through qualitative analysis several major themes emerged, including physical space, time, support and collaboration, sustainability, and the nature of the Centering model itself; these themes emerged as facilitators and/or barriers depending on the practice site. Sites that wish to implement CP in the future will need to consider their position in these areas in order to determine their readiness for successful and sustainable implementation.

Oral Hygiene Education

Amanda Hartman, Biochemistry and Molecular Biology - Junior
Mentor: Dr. DeAnne Messias, Nursing

A holistic approach to oral health includes prevention and treatment of both mouth and body. The presence of bacteria in the mouth, when left untreated, can lead to tooth and gum disease and other conditions, including heart disease and osteoporosis. Proper oral hygiene and professional dental care are preventive measures, but lack of access to services and limited English proficiency are common barriers among the local Hispanic population. According to research conducted by the American Dental Association, the self-assessed level of awareness about dental hygiene among Hispanics is much lower than among other groups, likely due to the lack of culturally and linguistically appropriate
more holistic care to sex workers and their families. Through empowerment, community forums, and education, organizations labor to promote an environment in hospitals, neighborhoods, and cities where sex workers have access to the resources they need to live healthy lives. I plan to share these findings through a research article and a Spanish-language report that I will share with organizations, with the goal of fostering a more collaborative environment amongst non-profit and governmental agencies in the Dominican Republic and the clients they serve.

SC Health Atlas
Jacob LeGrone, Public Health - Senior
Mentor: Dr. Jan Eberth, Epidemiology and Biostatistics
The goal of the SC Health Atlas is to aggregate data on the South Carolina health services landscape, and to provide access to this data through online geospatial visualization and a standardized application programmable interface (API). This landscape is a complex and dynamic system. While there is a great deal of information on health resources available to the public, it comes in a variety of disparate sources and formats; the SC Health Atlas will provide a means by which individuals, researchers, community organizations, and other institutions may query the most up to date information concerning a variety of health resources. Furthermore, interactive geospatial visualizations of this data provided by the SC Health Atlas may reduce barriers to access and utilization by improving the discovery of health resources.

Barriers and Facilitators to Health and Health Care Access Amongst Dominican Sex Workers
Carrie Wolf, Nursing - Senior
Mentors: Dr. DeAnne Messias, Nursing
Dr. David Simmons, Anthropology and Health Promotion, Education and Behavior
In recent years, the Dominican Republic has been the most visited country in the Caribbean. Increasingly, sex work has become one of the largest sectors in the tourism industry. Roughly 2% of the female population in the Dominican Republic work in the sex industry. The aim of this qualitative, descriptive research was to explore the barriers and facilitators to health and health care access among Dominican sex workers, from the perspectives of individuals associated with non-profit and governmental agencies. During the summer of 2013, I conducted eight interviews with organizational staff members and current and former sex workers. In analyzing the interview data, I identified both cultural and structural barriers which prevent sex workers from receiving care. These ranged from discrimination by medical professionals to governmental policies to disparity between sex workers’ ability to access services due to their work schedules. Conversely, some organizations seek to deconstruct these barriers and facilitate
Social Sciences I

Washington Media Scholars: Case Competition
Melissa Davis, Journalism and Mass Communications, Advertising and Public Relations - Sophomore
Erin Brunelle, Public Relations - Freshman
Mentor: Dr. Glenda Alverado, Advertising and Public Relations
As participants in the 2014 Washington Media Scholars Foundation: Media Planning Case Competition, we were challenged to allocate funds across mediums for two separate hypothetical media cases. In the qualifying round, we allocated a $1,350,000 budget across nine media vehicles for a campaign on behalf of the Central Coast Seabird's new stadium the impetus for the Central Coast Waterfront Renewal Coalition. The goal was to increase awareness of the project, stimulate civic engagement, and gain support from city council representatives. Upon completion of the qualifying round, we placed among the top 20% of entries and were invited to move forward. We were presented with the second case requiring us to allocate $7 million dollars in the five months prior to elections in November, to ensure necessary public support for passage of referendum I-3. This round necessitated an in-depth analysis of target demographics, media impressions, and gross rating points to reach both the politically active, as well as those with a vested interest in NASCAR. The case competition provided us the opportunity for real world and practical application of skills studied in the classroom. It was an invaluable experience that gave us insight into our futures as media professionals. Our oral presentation will reflect the process and analysis through which we were able to create a comprehensive media plan.

Mapping Crime on the USC Campus: An Environmental Perspective
Alysson Gatens, Criminal Justice - Senior
Mentor: Dr. Robert Kaminski, Criminology and Criminal Justice
Crime can be construed as a product of an interaction between a person and a setting. Environmental Criminology shifts the unit of analysis from person, as it is in most criminological theories, to analysis of place or location. This project aims to definitively identify clusters, or “hot spots”, of crime on and around the University of South Carolina campus. This is done through statistical analysis of crime data and visually represented through maps created with ArcGIS. I chose to specifically examine robberies because they are a type of offense that is highly dependent on the characteristics of the immediate environment, as well as being a violent, personal crime that threatens feelings of overall public safety. The findings are analyzed to determine what characteristics of the locations with clusters of robberies make them conducive to criminal opportunities. By employing a micro-perspective in mapping the crimes of a relatively small area, environmental characteristics related to the commission of a crime can be readily identified; whereas, a community-level approach may be too broad to produce a clear picture of the proximate spatial characteristics surrounding criminal events. Socio-demographic measures of geographic areas around the USC campus are likely to be much more similar than those of an entire city. Examining generally homogeneous areas allows the focus to shift away from individual traits to the influence of environmental characteristics on crime. Repairing the criminogenic characteristics of specific places can produce longer lasting reductions of crime than attempting to change individuals and their motives.

Contextual Priming: Race, Church Polling Places, and Georgia’s Constitutional Amendment 1: An Exploratory Analysis of the City of Atlanta
Steven Moore, Political Science - Senior
Mentor: Dr. Todd Shaw, Political Science
We will examine whether voting in a church polling place heightens any voter support for same sex marriage/civil union bans. Political contexts often may “socially prime” or provide political clues to voters (Bargh, 2006; Berger, Meredith, & Wheeler, 2008; Berger, Meredith, & Wheeler, 2006; Blumenthal & Turnipseed, 2011; Pryor, Mendez, & Herrick, 2011). African Americans, due to their high religiosity and strong attachments to churches, are frequently susceptible to church-based political cues (McDaniels 2008). In turn, the religious objections many black churches have to homosexuality might only reinforce any black voter opposition to same sex marriage (T. Shaw & McDaniel, 2007). However, a countervailing contextual cue is whether a precinct is located in a neighborhood with higher percentages of same sex households. We examine the 2004 general election results of Atlanta, Georgia when Georgia’s Constitutional Amendment 1, which banned same-sex marriage, was on the ballot. We will examine if there is any significant differences in the results from church polling places versus non-church polling places.

A New South: Hispanic Political Participation in the Carolinas
Steven Moore, Political Science - Senior
Mentor: Dr. Todd Shaw, Political Science
Rapid growth within the Hispanic population in the American Southeast has irrevocably changed the region. However, because of immigration status and a myriad of socioeconomic factors Latinos do not participate politically in numbers that would match their significant population. I examined electoral results in South and North Carolina from the 2008 and 2012 elections to see if Hispanic political participation caused any significant changes in outcome. Though some results were inconclusive I was able to demonstrate possible electoral outcome shifts in both South and North Carolina.

Increasing Environmental Consciousness Through Motivational Factors
Haley Rabic, Public Relations - Junior
Mentor: Dr. Kevin Elliott, Philosophy
Contemporary environmental problems like climate change, biodiversity loss, and depletion of fresh water pose huge social challenges. In order to help address these problems, this project examines the factors that motivate individuals to exhibit pro-environmental behavior. The goal is to identify strategies that will help strengthen the grassroots movement of sustainability and ultimately lead to systemic and long-lasting changes in people’s perceptions of the environment. This research synthesizes work by environmental psychologists, ethicists, and anthropologists to draw conclusions about the most important causal factors that lead to pro-environment behaviors or lack thereof. This scholarship indicates
that it is fruitful to divide people into four stages of environmental consciousness: unconscious incompetence, conscious incompetence, conscious competence, and unconscious competence. We present intervention techniques appropriate to each of these stages, and we focus especially on motivational interventions that can help move individuals from conscious incompetence to conscious competence, thereby encouraging behavior change. These motivational factors include: beliefs and values, removal of ideal and infrastructure barriers, financial incentives, and arguments related to public health and economic stimulation. These efforts to reach people at an individual level are important not only for changing the behavior of individuals, but also because of the ways individuals can push for important institutional changes that have the power to transform society.

The Influence and Relationship of Music on Modern Politics

Colleen Welch, Communications - Junior; USC Aiken
Mentor: Dr. Spring-Serenity Duvall, Communications; USC Aiken

I wrote a research paper entitled The Influence and Relationship of Music on Modern Politics in the fall of 2013 for a COMM352: Media & Culture, a communications course offered at USC Aiken. In this research component, I focused on how musicians can affect politicians. I looked at the reasons why politicians associate themselves with certain artists. Through my research, I used the specific example of the controversy between 2012 vice president candidate Paul Ryan and the rap-metal band Rage Against the Machine. Conservative Ryan created a media whirlwind when he publicly announced the anarchist Rage Against the Machine as one of his favorite bands. Throughout my paper I discuss the band members’ reactions to Ryan’s statements and how that affected Ryan’s political campaign. With several sources used, I analyzed how the music world correlates with the political realm. I ascertained that politicians attach themselves to musicians to increase their relatability and popularity. I also discovered that having a pop culture element like music involved in politics encourages younger generations to vote. Conducting this research project motivated me to become more politically savvy.

Assessing Attitudes Toward Homelessness in Residents of Richland County, SC Through Telephone Survey

Travis Byrd, History - Senior
Mentor: Dr. Bret Kloos, Psychology

This survey developed out of the Attitudes Towards Homelessness Inventory (ATHI), developed to assess the attitudes of health care professionals towards homeless individuals. A modified survey was created by staff at the University of South Carolina, adding in questions about the respondent’s experiences with homelessness and questions asking the respondent to the estimate the demographics of the homeless population. This modified survey was used in 2010 and 2011 to collect data on attitudes towards homelessness in Richland County. The 2010 and 2011 surveys were done through a random-digit dialing phone survey. This study focused on modifying the survey using the data from the 2010 and 2011 surveys, eliminating questions with little correlation to other questions or respondent demographics and adding questions concerning efficacy and opinion towards specific policies addressing homelessness. This modified survey was then administered through a random-digit dialing phone survey. The data was then cleaned to remove non-useful responses (answering 100% for every demographic question) and “scale scores” of attitudes were calculated in four areas using questions from the opinion section of the survey: attribution of homelessness to personal and social causes, efficacy of interventions, and willingness to affiliate with homeless people. This newly
collected data was analyzed to find correlations between attitudes, experiences, and demographics. Further, the newly collected data was compared to the data from the previous surveys in order to track changes in opinion over time.

**The Development of Empathy, Leadership and Pro-Social Dispositions in Middle-School and High School Age Children: A Case Study of Peer Education and the Anne Frank Story in Brazil**

*Pedro De Abreu*, Business Economics - Senior  
Mentor: Dr. Doyle Stevick, Educational Leadership and Policies  

Traditional teaching methods can be effective at transmitting knowledge and even developing skills. Teaching in ways that shape positive dispositions like empathy and qualities like leadership is much more difficult. Stories like the story of Anne Frank have the potential to develop empathy, understanding and other important inclinations in students. This project aims at understanding the changes in dispositions, leadership and patterns of thought that students in the Amazon undergo when becoming trained and performing as peer educators for the traveling Anne Frank House exhibitions.

**Historic Site Improvement and Preservation: Bedon-Lucas House**

*Jennifer Haman*, History - Senior; USC Salkehatchie  
Mentor: Dr. Sarah Miller; History; USC Salkehatchie  

I had the honor of receiving a Magellan Research Grant this semester; working with Dr. Sarah Miller as my mentor; and the Colleton County Historical and Preservation Society to conserve and present the Bedon-Lucas House, a historic high-house, to the public. Built circa 1820, the Bedon-Lucas House was used as a summer home by Richard Bedon, a plantation owner from Jacksonboro who would retreat to Walterboro to escape disease in the heat of summer on the lowlands of the rice plantation. It is one of only five high houses still remaining in Walterboro, South Carolina. The house was occupied until the 1960s, and then left to disrepair. The Colleton County Historical and Preservation Society purchased the property in 1996, beginning restoration and preservation. The goal and objective of this research is to understand the importance of a private home as a reflection of society and convey this message through the proper placement, identification and conservation of artifacts, with necessary preservation and repair within the Bedon-Lucas House. Production of a docent manual is an integral part of opening the house to the public, which is the aim of my endeavors. I would like to share this docent manual along with my report for the executive boards of the Colleton County Historical and Preservation Society regarding preservation of the house and artifacts.

**Domestic Violence: Where Privacy is a Silent Killer**

*Sharita Moultrie*, Social Work - Senior  
Mentor: Dr. Susan Parlier, Social Work  

Every 15 - 18 seconds a woman is physically or sexually abused by her intimate partner. In every 4 women will experience domestic violence in her lifetime. As of 2013, South Carolina ranks number 1 in the nation of women killed by men. For far too long, domestic violence has been viewed as a private family matter. Because of its affect on those involved, many have chosen to sweep it under the rug or hide it in an attempt to minimize its damage. In more recent years, domestic violence is now viewed as a public health and human rights issue. It is an issue that begs its community's response to addressing it and advocating on behalf of victims of domestic violence and their children. So I conducted a survey of my fellow Carolina social work cohort to see how many of them are actively involved in the community. I found that of those surveyed only 40% are active in their community. As potential social workers, it is not enough to advocate or just connect our clients to resources; we have to have a bigger commitment to civic engagement. We as professionals, students, community leaders, educators, or legislators must be willing to have these table talks with our sisters, friends, mothers, aunts, coworkers, sons and daughters. We cannot be silent anymore about this, because it is killing us softly.

**Gay USA: The Portrayal of Gay Relationships in American LGBT-related Media Since 1970**

*Doyle Tate*, Psychology - Senior  
Mentor: Dr. Kendra Ogletree-Cusac, Psychology  

In modern society, the media has a profound influence on thought, behavior, opinion, and even individual expression. This power gives media the ability to distort or create relationship ideals that are not necessarily based on reality, but instead upon what broadcasts have presented. This study sets out to interpret the portrayals of gay male relationships in American LGBT-related films across time with respect to race, body type, infidelity, relationship type, and domestic abuse. Utilizing content analysis, coding with measures of interpersonal violence and stereotypic information was done through observations of interactions between couples in the selected films. Results showed a drastic change in portrayals in media over time for all categories. These changes impact current gay male relationships and views of said relationships.

**Measuring the Accuracy of “Gaydar” Based Solely on the Response to Visual Images**

*Doyle Tate*, Psychology - Senior  
Mentor: Dr. Suzanne Swan, Psychology  

The process of selecting a mate is essential for human progression and procreation, and the main method of mate-selection examined in this work was the evolutionary approach which predicts that women and men are attracted to one another based on the process of creating genetic offspring. One of the main shortcomings of this approach is that it excludes gay men and other sexuality minorities from selecting one another. The purpose of this project was to create and administer a test to judge the accuracy of “gaydar”, the ability to distinguish gay men from straight men, among different gender and sexual minorities in order to highlight the internal ability of mate selection within these groups. Based on previous research, the prediction was that straight women and people of sexuality minorities would have “gaydar”, meaning that the average score for the sample would be greater than chance, whereas straight men would not. The test consisted of thirty questions with each question having two pictures, one gay male and one straight male, from which participants had to choose which one they thought was gay. The findings of the experiment showed that straight women ($n = 62, p \ 0.05$) and gay men ($n = 269, p \ 0.05$) had a statistically significant accuracy at determining sexuality based on images alone, and gay men were more accurate than women in determining sexuality using these images. These findings correspond with past research and show that evolutionary theory in psychology needs to be reevaluated for sexuality minorities.
#FestivalFans: The use of social media at music festivals and its influence on brand relationship quality

**Rupert Hudson**, International Business - Senior

Mentor: Dr. Thomas Madden, Marketing

The purpose of this study was to examine how social media interactions with brands affect how consumers think and feel about those brands, and consequently how those interactions affect desired marketing outcomes. Music festivals were chosen as the focus of analysis. Initially, the researchers studied three major music festivals (Bonnaroo, Lollapalooza and Latitude) finding a relatively high degree of sophistication in the implementation of social media. A conceptual model (see Figure 1) was then developed, one that proposes a relationship between social media use, emotions, brand relationship quality (BRQ) and positive word of mouth. A survey instrument, administered online, was created based on the literature (Thomson et al., 2005; Fournier, 1998; Ekinci et al., 2005) to measure the variables in the model. 423 responses were collected, and of those, 215 had interacted with their favorite music festival via social media, and 208 had not.

Structural equations modeling was performed to empirically test the relationships between the variables in the model. The model (Figure 1) provided an acceptable fit to the data [$CMIN/df = 4.0$, $CFI = .996$] and indicated a direct effect of social media usage on emotional attachment to the festival, and a direct effect of emotional attachment on brand relationship quality, with emotional attachment being a mediator between social media usage and brand relationship quality. So the study shows that social media does have a significant affect on emotions and attachments to brands, and that social media-based relationships lead to desired outcomes such as positive word of mouth.

The Prison Tragedy: The Failure of Narcotics Criminalization in New York City’s War on Drugs

**Henry Capps**, History - Senior

Mentor: Dr. Samuel Roberts, Columbia University, History; USC

Like most politicians of his time, New York City Mayor Edward Koch (in office 1978-1989) believed the primary solution to the drug problem in the United States was deterrence through harsh penalties and the aggressive arrests of both users and dealers. In fact, at the end of his final term, even after the New York State prison population had more than doubled as a result of increased criminalization of narcotics, Koch expressed regret that everyone believed was a criminal was not in prison, calling it a “prison tragedy.” My project analyzes the ways in which Koch’s policies and rhetoric about the War on Drugs, found in his administration’s departmental correspondence and newspaper sources, framed the issues surrounding America’s drug problem, causing emphasis to be placed on criminalization-oriented solutions while excluding other potential solutions. I argue that by attempting to resolve what he called the “prison tragedy” through increased arrests and punishment, and by framing the War on Drugs as an actual war against enemy combatants, Koch not only failed to reduce drug use in New York City, he also created real tragedies for the community he was attempting to improve, including mass incarceration and threats to civil liberties, among others.

Comparing Social Ties Within Assisted Housing

**Michael Englehart**, Sociology - Senior

Mentor: Dr. Shelley Smith, Sociology

Public housing was established in the United States to provide for the housing needs of low-income individuals and families. While this program has been successful in reducing homelessness, other issues have arisen (i.e., housing segregation, concentration of poverty, stigmatization, etc.) More recently, Section 8, or the Housing Choice Voucher program, has become the preferred method of assisted housing. Since participants are able to use their voucher on the private market, they are potentially able to spread out, thus reducing the concentration of poverty – a problem that has adversely affected education, health, and crime. The purpose of this study is to explore if individuals living in traditional government-subsidized public housing (high-rises, housing projects, etc.) in Columbia, South Carolina, have fewer social ties to external communities than individuals living in Housing Choice Voucher housing. The importance of a broad, diverse social network has been shown to have positive effects on socioeconomic mobility. Through survey research, a comparison of the two groups will be available to determine whether there are significant differences in social network ties.

The Effects of Government Policies on the Stock Market

**Samruddhi Somani**, Political Science - Senior

Mentor: Dr. Holger Kern, Political Science

What is the most effective government policy to boost stock returns and, subsequently, to foster economic growth, especially during an economic crisis? This paper examines the effects of various government actions on stock market performance during the global financial crisis of 2007. As expected from rational investors, nearly all of the variation in index levels is explained by the variation in index futures levels, which reflect market expectations. Index and future levels were collected for June 2007-December 2009 using Bloomberg, which tracks data for various financial instruments. The financial crisis timeline furnished by the New York Federal Reserve Board on its website was used to determine important policies, which were then categorized into eight groups. Dummy variables were created for each of these categories corresponding to the date on which the event in question occurred. VIX futures are used to model market expectations of volatility; federal funds futures, of the federal funds rate. Regressions using the ordinary least squares measure and correcting for autocorrelation were performed with market expectations of index levels as the dependent variable. Significant predictors of index futures were volatility futures, federal funds rate futures, and the creation or adjustment of swaps. The most effective way to change stock market returns is to change expectations, and the most practical way to change expectations is to decrease the federal funds rate.
Relationships between News Language and Content
Samruddhi Somani, Political Science - Senior
Mentor: Dr. Tobias Heinrich, Political Science

Language is an integral part of being human, and the languages in which one chooses to communicate speaks volumes about his or her beliefs. Media websites select headlines based on their beliefs about readers' interests. My honors political science senior thesis, I am studying the examined BBC headlines for Hindi, Urdu, and English language news online for similarities and differences among headlines selected for each of these languages. Headlines were collected using the Wayback Machine; data from every twenty days was used to fulfill time constraints and to avoid time effects due to using the same day of the week or the same day or week of the month repeatedly. I analyzed the data using R statistical software. BBC was selected because it has online news in all three languages, so differences in languages due to newspaper idiosyncrasies are minimized. The data was then categorized by content and geography, both on a country basis and region basis using the United Nations Statistics Division's classifications. The results of this project will shed light on the relationship between a newspaper's language and the stories it publishes; this kind of information will inform researchers and readers literate in multiple languages what kinds of stories are more likely to appear in each of these languages. While this particular project only considers Hindi, Urdu, and English, similar analyses could however be conducted for other languages.

Identification of audio tape degradation using infrared spectroscopy with mass spectrometric validation
Eric Bringley, Chemical Engineering - Sophomore
Mentors: Dr. Stephen Morgan, Chemistry and Biochemistry; Ms. Brianda Cassidy, Chemistry and Biochemistry

Polyester urethane (PEU) magnetic tape has been used since the 1970s and is known to become unplayable as degradation occurs. Cultural heritage institutions in the United States hold more than 46 million tapes, of which more than 40% are in unknown condition. Variations in dispersant, lubricants, and other additives, which exist between different brands and models of tape, make degradation difficult to identify. Visual inspection of tapes—the method used by most libraries—often incorrectly assesses tape status, and attempting to play degraded tapes can lead to permanent data loss. Some researchers have used destructive methods to predict tape degradation that involve removing material from the tape surface, but these approaches are also inappropriate on valuable collection materials. We have used a portable infrared (IR) instrument to rapidly and non-destructively detect tape degradation with high accuracy. This technique will impact the ability of libraries and museums to care for and manage their audio tape collections and to sustain access to these materials. This presentation will address two issues: (1) whether IR spectroscopy coupled with multivariate statistics predict the degradation state of ¼" audio magnetic tapes of different composition/brand; and, (2) whether mass spectrometry (MS) can identify chemical markers that distinguish between non-degraded and degraded tapes? The first question concerns the generality of our approach for tapes of different chemistry; the second concerns scientific validity of the discrimination achieved using statistical analysis.

Re-Evaluation of the EMU Maastricht Convergence Criteria
Patrick Stiebinger, Business Administration - Senior; USC Aiken
Mentor: Dr. Sanela Porca, Business Administration; USC Aiken

The goal of our research was to examine the validity of the European Monetary Union Maastricht Convergence criteria under the current economic and monetary conditions of the European Union. By using the case study of the four European Monetary Union member economies which are currently experiencing severe monetary struggles – Greece, Italy, Spain, and Portugal – the Maastricht Convergence Admission criteria to the EMU were re-evaluated. Would Greece, Italy, Spain, and Portugal be accepted to the European Monetary Union under their current economic conditions? Are there weaknesses to the European Monetary Union Admission criteria that need to be revisited and revised? Based on the findings of the current research, policy recommendations were derived.

Re-Evaluation of the EMU Maastricht Convergence Criteria
Patrick Stiebinger, Business Administration - Senior; USC Aiken
Mentor: Dr. Sanela Porca, Business Administration; USC Aiken

The goal of our research was to examine the validity of the European Monetary Union Maastricht Convergence criteria under the current economic and monetary conditions of the European Union. By using the case study of the four European Monetary Union member economies which are currently experiencing severe monetary struggles – Greece, Italy, Spain, and Portugal – the Maastricht Convergence Admission criteria to the EMU were re-evaluated. Would Greece, Italy, Spain, and Portugal be accepted to the European Monetary Union under their current economic conditions? Are there weaknesses to the European Monetary Union Admission criteria that need to be revisited and revised? Based on the findings of the current research, policy recommendations were derived.

Computer Vision Using the Microsoft Xbox 360 Kinect to Play an Interactive Invisible Drum Set
Leonardo Merza, Electrical Engineering - Senior
Mentor: Dr. MVS Chandrashekhar, Electrical Engineering

The field of computer vision and machine learning has advanced rapidly over the last decade as a result of powerful compact computers able to handle the large processing required for such technology. The mass production of the Microsoft Xbox 360 Kinect has allowed for cheap 3D spatial vision through cameras and light sensors. This project uses this technology in order to create an interactive drum set that can be played by the user using computer vision user tracking. Detection and tracking of various joints in the body allow for the user to play a fully functional drum set without the costs or noise associated with physical drum sets. This project demonstrates the ease of basic computer vision programming in order to encourage more research into this important field. The project works by recording the 3D Cartesian coordinates of a user's joints in order to compare it with preset Cartesian values that correspond with the various parts of the drum set. The Processing application used for this project is designed for
visual arts hobbyists and is used in conjunction with SimpleOpenNI which is a Java based application wrapper to access the Microsoft Kinect’s user tracking features without a large learning curve. This allows for many nontechnical users unfamiliar with complex computer vision algorithms to be introduced to how computer vision works and focus on projects outside of the realm of robotics and engineering in general. These nontechnical users can contribute their own proof of concepts to further drive this research field.

Assessing Toxicity of Amyloid-Beta Aggregates in an in vitro Neuronal Model

John Clegg, Biomedical Engineering - Senior
Mentor: Dr. Melissa Moss, Chemical Engineering

The accumulation of insoluble plaques comprised of aggregated amyloid-beta (AB) protein is a hallmark of Alzheimer’s disease. It is widely accepted that AB soluble aggregates are highly toxic and responsible for neurodegeneration. This toxicity is achieved through pathways that elevate cellular reactive oxygen species, trigger neuroinflammation, and induce apoptosis signaling. Downstream, these pathways increase cell death and diminish the remaining viable cell population. This study compares various methods for assessing AB induced toxicity through each of the three previously stated mechanisms, as well as methods for quantifying in vitro cell viability. In each experiment, SHSY-5Y neuroblastoma cells treated with AB oligomeric aggregates were utilized as an Alzheimer’s disease neuronal cell model. Neuroinflammation, reactive oxygen species, and apoptosis were assessed using respective fluorescence-probe assays coupled with imaging. Additionally, polyphenol inhibitors were investigated for their potential to attenuate each toxicity pathway. Through the analysis of each compound’s attenuation of selected pathways, in conversation with in vitro results and epidemiological studies, one can infer ways in which each compound, in isolation or in tandem, can intervene in Alzheimer’s disease pathology.

Molecular Modeling of ssDNA-salt Interactions

Katherine Driscoll, Biochemistry and Molecular Biology - Sophomore
Mentor: Dr. Mark Uline, Chemical Engineering

DNA biosensors have been predicted to become an important new feature of medical diagnostics as they allow investigators to assess how DNA sequences interact with surrounding molecules. These devices immobilize one end of DNA aptamers (short strands of naturally occurring nucleotides with the capability to bind to target molecules) to a surface and allow the rest of the strand to interact with target molecules immersed in ionic solutions. The ions in solution impact the structure of the single-stranded DNA, and this impact must be studied to determine the exact interactions between ssDNA and target molecules, which will aid in the design of functional biosensors. Using a Mean Field Theory (MFT) calculation, the ssDNA structure in a magnesium versus a sodium salt solution has been shown to vary greatly. This calculation, however, does not fully account for the charge correlation effects of the divalent ions. Therefore, sample MFT calculations must be compared to Molecular Dynamics (MD) simulations to obtain an appropriate correction term to incorporate into the MFT calculations. MD simulations also have their own drawbacks—namely, long computational times and inability to capture pH accurately—that present the need for a unique computational method to be derived. Upon determination of the appropriate spatially dependent correction term, the incorporation of this term into MFT calculations will result in the most accurate, reliable method to determine ssDNA behavior with target molecules in salt solutions. This method can then be applied to the design of optimally functional biosensors and further medical advances.

Bulls and Cows, A Code Cracking Game

Anton Khristyuk, Undeclared - Freshman; USC Salkehatchie
Mentor: Dr. Wei-Kai Lai, Mathematics; USC Salkehatchie

The game Bulls and Cows is said to be a paper-and-pencil version of the game Mastermind. It requires lots of logical reasoning, and yes, a little bit of luck. In this talk we will introduce several variations of this paper-and-pencil game. Using examples, we will also discuss the mathematical techniques that we used to analyze the game. Some winning strategies of simple cases will be mentioned as well.

Fabrication and Testing of Gallium Selenide (GaSe) Semiconductor Devices for Nuclear Radiation Detection

Michael Myers, Electrical Engineering - Senior
Mentor: Dr. Krishna Mandal, Electrical Engineering

Currently there is a great need for ‘direct read-out’ hand-held semiconductor detectors which can identify and monitor special nuclear materials (SNMs) used for illicit nuclear weapons. For this purpose, in recent years, CdZnTe (CZT) has been developed as nuclear detectors for room temperature (RT) operations. However, poor yields from crystal growth and prohibitive cost have impeded the widespread deployment of these devices. Therefore, there is a strong need for RT nuclear detectors that can be grown and fabricated in large areas at high yield and at a relatively lower cost. Layered gallium selenide (GaSe), a wide bandgap (2.0 eV at 300K) semiconductor is an ideal candidate to satisfy these requirements. In my Magellan program, I have grown GaSe single crystals using a vertical Bridgman method. The grown crystals have been characterized thoroughly for structural, optical, electrical, and electronic charge transport properties. X-ray diffraction analysis (XRD) revealed the hexagonal structure and determined the lattice parameters of the grown GaSe crystals. Optical absorption measurements confirmed the bandgap of 2.01 eV at 300K. Current-voltage (I-V) measurements determined the resistivity of the grown crystals to be ≥10$^{-10}$ Ω-cm and revealed low leakage currents which contribute to low detector noise. Planar single-element detectors were fabricated and nuclear detection characteristics were measured using Am-241 nuclear radiation source. The results clearly show that GaSe based nuclear detectors could operate with low electronic noise and could be used for wide range of applications including Homeland security, nuclear non-proliferation, medical imaging, and nuclear power plans.
factor alpha (TGFα) promotes the formation of cochlear stem cells derived from the sensory epithelium of postnatal rodent cochleae. We hypothesized that both TGFα and hypoxia increase the number of neurospheres formed from cells from the auditory nerve of adult mice. Using the neurosphere assay, we tested the effect of both hypoxia and TGFα on cells isolated from the auditory nerves of adult CBA/CaJ mice. Neurosphere formation increased in hypoxic environments, whereas TGFα decreased the number of neurospheres formed. Hypoxic conditions could be a signal of the NSC niche, while TGFα could block the action of other growth factors, decreasing growth. Unfortunately, this does seem to make the use of TGFα to induce sensory hair cell regeneration a less viable option as it could also inhibit auditory nerve regrowth.

Effects of Haematoloechus Infection on the Functional Response of Libellulid Odonate Naiads

James Leaphart, Biology - Senior; USC Aiken
Mentor: Dr. Derek Zelmer, Biology/Geology; USC Aiken

The ubiquity of host-parasite interactions and the significant representation of parasites in host biomass implies that parasites have the potential to influence energy flow through an ecosystem. The functional response of 10 Tetragnonuria dragonfly naiads was determined by exposure to 10 abundances of Daphnia magna. Each exposure lasted for one hour, and odonates were fasted for 48-72 hour intervals between prey exposures. Following the initial determination of the functional response, five randomly selected naiads were each exposed to 200 Haematoloechus floedae cercariae. Ten days post-exposure, a second set of feeding trials was conducted to determine the functional response. A second experiment using a 30-day period between parasite exposure and the second set of feeding trials produced similar results and those results were pooled with the original data. The change in the functional responses of exposed and uninfected naiads was analyzed using indicator variables within a nonlinear regression fit of Holling’s disk equation integrated over time. All exposed nymphs were infected with H. floedae metacercariae and spent a greater amount of time consuming prey after infection, while the functional response of uninfected nymphs did not change over the course of two trials.

Exploring Competition Among Epitope-Specific CD8 T Cell Responses Induced by Viral Vaccination

Courtney Malo, Biological Sciences - Senior
Mentor: Dr. Aaron Johnson, Mayo Clinic Immunology; USC

The current standard of treatment for cancer patients is insufficient at eliminating tumors. Therefore, it is essential to develop novel therapeutic models. Enhancing the cytotoxic T lymphocyte (CTL) response against a tumor presents one such strategy. Vaccination approaches using viruses engineered to express tumor antigens have been developed to enhance the CTL response. However, these approaches are limited in their ability to elicit a response against the tumor antigen; rather, the response is directed toward the immunodominant epitope of the virus. Theiler's Murine Encephalomyelitis Virus (TMEV) is known to elicit a strong CTL response. Our research group has previously demonstrated the ability to engineer TMEV to promote anti-tumor immunity in the B16-OVA melanoma
South Carolina’s State Flower: Flower Scent Variation in Gelsemium sempervirens

Nigel Wolfram, Biological Sciences - Sophomore; USC Lancaster

Mentors: Dr. Annette Golonka, Biology; USC Lancaster  
Dr. Bettie Obi Johnson, Chemistry; USC Lancaster

Gelsemium sempervirens (Carolina Jessamine), is a perennial, distylous, climbing shrub with sweet smelling bright yellow flowers. Gelsemium sempervirens is insect-pollinated by various species, which are typically attracted by the color and scent of its flowers. There has been very little research done on the floral scent composition of this flower. Previous research from our group involved developing a solid phase micro-extraction and gas chromatography-mass spectrometry (SPME-GC-MS) method to detect and identify the volatile organic compounds (VOCs) present in the flower. Those tests revealed significant differences in the scent profiles of cultivated versus wild flowers found on USCL's campus and more than 30 volatile organic compounds (VOCs) present in the flower. Those tests revealed significant differences in the scent profiles of cultivated versus wild flowers found on USCL's campus and more than 30 volatile organic compounds emanating from the flowers. However, of these 30 VOCs, eight benzenoid compounds (benzaldehyde, benzyl benzoate, p-anisaldehyde, benzyl alcohol, and acetophenone) comprised greater than 75% of the overall scent profile whereas the remainder of the scent was comprised of terpenes (alpha-farnesene) and aliphatic ketones (alpha and beta ionone, dihydro beta and gamma ionone, neryl acetone). The current study confirms the identity of some of the VOCs and expands the number of plant populations to six to gain a better understanding of the floral scent variations within this species and the overall differences between these population types. Additionally, the nectar is being evaluated for the presence of nectar inhabiting microorganisms (NIMs) and their potential impact on the flower’s scent. The results of this project will provide information on the scent compounds that contribute to the specific aroma of G. sempervirens, and ultimately contribute to understanding pollination dynamics.
A Global Education: The Benefits of Studying Abroad

**Kristina Drake**, Biomedical Engineering - Senior

During my undergraduate career, I have participated in two study abroad experiences, the first as a global classroom program to Belize and the second as a semester study abroad at the Universidad de Salamanca in Spain. While my initial objective in participating in these adventures was in large part a desire to improve my skills in speaking the Spanish language, I left each country considerably wiser than I entered. These travels facilitated an enormous level of personal growth, as I gained insight into the workings of the world outside of my home country. From these global experiences, I learned a great deal about open-mindedness, respect and cultural awareness, and the importance of adaptability and preparation. I believe that study abroad has been a vital and irreplaceable part of my education, and in the hope of encouraging other students to participate in and learn from the wonderful institution of study abroad, I intend to outline in video-journalism format its many benefits.

**Internship**

**Dana Jennings**, Public Relations - Senior

As a public relations major, it is important to get internships to gain experience in the field and I wanted to intern at a variety of different companies so I can as much experience as possible. I have had three internships during my time at USC. At the USC Division of Communications, I was a media relations intern, where I wrote press releases and feature stories for USC news publications. Because I had a lot of opportunities to write, I honed my writing skills and learned how to write according to Associated Press Style guidelines. When I interned for Flock and Rally, I learned how to become flexible because of the vast clientele and services the company offered. I would always be working on more than one thing at a time and no day was ever the same. Currently, I am interning with Chernoff Newman, where I am applying everything I have learned at my previous internships. I found that across the board, writing is the most important skill to have in public relations. Additionally, being flexible while remaining professional is key to gain the respect of your supervisors. My internships reinforced my decision to pursue public relations and I look forward to beginning my career.

**At the Heels of History: A Perspective of Progress & Equality from the Field**

**Randy Moore**, Social Work - Senior

Mentors: Dr. Susan Parlier, Social Work  
Mr. Ryan Wilson, South Carolina Equality; USC

As an undergraduate social work student, completing a field practicum internship is an essential component in connecting the knowledge, values, and skills learned in the classroom with the real world experiences of working to enhance the economic and social well-being of society’s most vulnerable. While on one hand this experience aims to develop a student’s ability to create meaningful and lasting change within various client systems, sometimes, and equally profound, is the change experienced by the student. As an intern with a state-based LGBT civil rights organization at the onset of a historic year for LGBT rights, I had the opportunity to develop as a professional social worker during one of the most historic years for the equality movement. However, 2013 was not only about the seeds of progress and hope I helped plant in a community, but also the same seeds a community helped planted in me.

**Take the Lead**

**Anthony Nguyen**, Public Health - Senior

During my freshman year of spring 2011, I established the dance student organization Swype at the University of South Carolina. Swype’s purpose is to recruit members, regardless of level of experience, to share and develop our interest in dance together. Swype practices various genres of dance, but it primarily focuses on hip hop choreography and break-dancing. One of Swype’s main purposes is to provide performance opportunities for its members. We have performed at on-campus events like Spurs and Struts during homecoming week, and we have hosted our own showcase Swype This Way. We also help members and peers prepare for these performances through teaching, practicing, and rehearsing choreography. Since its foundation, I have served as the president of Swype. My roles and responsibilities have included creating, teaching, and performing choreography with my peers. Through this experience, I have developed communication skills through instructing peers and networking with university coordinators and officials. I have seen the importance of clarity in communication through firsthand experience and improved my ability to articulate my ideas across to my audience. Swype is my legacy at the University of South Carolina. I want others to learn how to dance and gain the knowledge and experience of what it takes to continue towards progression and self-development. My successors for Swype will continue to grow this organization and hopefully expand and connect with other collegiate campuses. As I graduate USC, I know I take with me a special skill set that I may contribute to my community.

**A Year of Unprecedented Self Discovery**

**Holland Stocker**, German - Senior

Mentor: Dr. Kurt Goblirsch, Languages, Literatures, and Cultures

For the 2012-2013 academic year I studied abroad in Bamberg, Germany at the Otto-Friedrich-Universität Bamberg, where I took fifteen credit hours per semester in courses with German students. I also instructed two weekly English Conversation courses for German Grundkurs 1 students per semester. While I was not there to conduct any research in particular, over the course of the year I learned more about myself and why studying abroad is such a life-changing experience than I ever could have expected. Unlike many other study abroad participants, who seem to spend as much time traveling as they do in their host city, I decided to spend the vast majority of my time in Bamberg so as to integrate myself fully into the community and to truly make that magnificent city my new home. It is a decision I will never regret, and words will never be able to accurately describe how I feel about both the city, in which I lived, and the people.
I met there. My experience abroad meant me coming into my own and reaching whole new levels of independence. It meant learning concretely what I truly value and what direction I want my life to take. It meant coming back and wanting to get more involved in the USC community. Finally, it meant wanting to take this new-found passion and to share it with others, so that hopefully they too will want to go abroad and seek out new adventures.

**Leadership with a Purpose: the Sorority Experience**  
*Brady Newell, Exercise Science - Sophomore*  
*Mentor: Mrs. Katie Hambrick, Student Affairs*

The sorority community at the University of South Carolina offers a unique place for more than 3,000 young women to connect over shared values and grow as individuals. As the current Vice President of Conduct for Sorority Council, I will examine how sororities and their interactions with the Office of Fraternity and Sorority Life foster the development of young female leaders. Additionally, I will share my personal experiences as a rising leader and the factors I believe have been most influential in perpetuating the cycle of leadership.

**USC Connect Showcase II**

**Developing Sustainable Leaders through the Green Leadership Program: Hosting a Green Networking Breakfast**  
*Connor Bain, Computer Science - Junior*  
*Mentor: Ms. Hayley Efland, Office of Sustainability*

The Green Leadership Team at Sustainable Carolina works to infuse green leadership principles in sustainability organizations on campus, including Sustainable Carolina, and train future leaders through leadership workshops, experience on project teams, and participation in regional and national conferences. In addition to holding monthly workshops on sustainability and leadership, we also hold special events that encourage students to become sustainable leaders. This presentation will focus on the Green Networking Breakfast we held at the Learning Center for Sustainable Futures which gave students the chance to connect to professionals, faculty, and volunteers involved with sustainability in and around the Columbia area. From internships to national fellowship competitions, the students in attendance learned about all kinds of opportunities that sustainability has. In addition, the Green Leadership Team will host a Green Career Fair; a Green Leadership Retreat, and is now coordinating the Green Office Certification Program and in partnership with USC Connect, the Green Leadership Program on campus. The Green Leadership program is meant to develop the next generation of leaders by encouraging sustainable thinking and helping students incorporate sustainability into their future career plans.

**Engaging in Self-Discovery: The Barry M. Goldwater and Udall Scholarship Competitions**  
*Connor Bain, Computer Science - Junior*  

Often times, students are discouraged from applying for national fellowships because the process seems labyrinthine. While the application process isn’t easy, it is completely worth it. As a student with interests in teaching, the environment, and research, the Barry M. Goldwater Scholarship and Udall Scholarship competitions were two great matches for me. The Goldwater Scholarship focuses on students with a dedication to a career in research while the Udall looks for students with a commitment to the environment. Together, the two competitions fit my career plan of becoming a professor of computer science but also staying involved in sustaining the environment. Working with USC’s Office of Fellowships and Scholar Program has been critical to furthering my understanding of my academic, leadership, and service work. The applications that I developed and revised many times through the assistance of OFSP aided in focusing my career goals and led to me being more prepared for applying to graduate school. The process of applying for a national fellowship is one of self-discovery that helps you realize how your passions define your life.
Profiles in Leadership: My Life in College and the Leaders I Met Along the Way

Coy Gibson, Political Science - Senior

In this project, I will share my college experience—yes, the whole four years. I believe that from freshman move-in day to graduation, every college student has a unique story to tell. As a result, my presentation is about what I experienced in college and who I met along the way. Throughout the work, I analyze leadership, highlight traits I recognized in others (friends, mentors, professors, activists), and complete ‘profiles’ of these remarkable individuals—from USC and across the world, student and professional, from the fields of law, business, international human rights, and, of course, college. Their stories and insights are collected within this presentation, as well. Overall, the past four years have been quite the adventure. I trekked across three continents and eight countries, ran and was elected to student body office twice, studied abroad in Brazil, volunteered in local communities, served as a resident mentor, crowd-surfed four times, joined the honors college, learned a new language, and many more. In the end, degrees and exams are important, but what ultimately counted the most were the incredibly diverse and humbling people I met along the way, the journeys we shared together, and what we learned from one another.

Graduation with Leadership Distinction: Professional and Civic Engagement

Sheimaliz Glover, International Business - Senior

I am planning to graduate in May 2014 with Leadership Distinction in Professional and Civic Engagement. Over the course of four years at the University of South Carolina, I have been afforded the opportunity to experience a variety of internship and work experiences that aided both my professional and personal development in the classroom and the community. Some of my most rewarding experiences have been interning with the City of Columbia’s Office as a Mayor’s Fellow Intern and in working with a bio-technology startup company as both a business development intern and now as a Market Research Analyst. Through these experiences especially, I gained a deeper understanding of preparation, flexibility and adaptability, interpersonal relationships, problem-solving that I feel strengthened my ability to work in teams, create and manage long term projects, and communicate effectively in a variety of situations. It is these skills that I hope will aid me in my pursuit of a career in the foreign service and allow me in continuing to give back to the community and foster its development.

A Personal Reflection on Myth, Memory, and Manifestation

Calvin Koon-Stack, English - Senior

During my time in college, I have embarkd on three important journeys. In 2011, my roommate and I went on a month-long backpacking trip in California. In 2012, I worked at an English immersion summer camp in Croatia. And in 2013, I studied abroad in Bilbao, Spain. Any one of these experiences would provide ample fodder for an aspiring writer—such as myself—let alone all three. In an attempt to bring all of these extraordinary experiences together, I undertook this multifaceted project, which explores different modes of writing by incorporating elements of memoir, reflection, and fantasy. Combining these elements has allowed me to reexamine my story, both the fact and the fiction, to ponder how each experience has shaped me, and to create new models of symbolism which I hope to explore throughout my career.

Studying Abroad in South Carolina: An Appalachian Adventure in Writing

Evelyn Robinson, History - Junior

Mentor: Dr. Marjorie Spruill, History

I’m an international student from the University of Leeds, England and have been studying abroad at USC since August 2013. This exchange has afforded me the opportunity for immense personal growth and independence while being able to travel, meet new people and foster an understanding of other cultures. As a budding journalist, I’ve always been told to seize opportunities that will help me to stand out from the crowd, so I jumped at the chance to enhance my employability in a competitive and globalised job market. During my time at USC I have written for a variety of publications, with special focus upon cross-cultural differences between England and America. I manage my own blog, ‘Puravidastudent’, which has developed significantly since moving to the US, gaining 50 followers, over 12,000 views and it has been featured on USC’s study abroad website. I also write as a guest blogger for ‘Garnet and Black’, ‘A World Apart’, and Leeds University Union English Society. Since October I have been writing Viewpoints columns for The Daily Gamecock, and in November I accepted the position of Viewpoints Columnist. Additional achievements include setting up an international intra-mural volleyball team, and becoming a Thinking Globally Ambassador, which requires me to deliver 15-20 minute presentations about England to classes at USC and in local elementary schools. My year abroad has provided me with a platform for enormous personal development while teaching me invaluable lessons as both a writer and a journalist.

The Importance of Guest Service in the Hospitality Industry

Haley Smith, Hospitality Management - Senior

In the spring of 2012, I began my journey with The Walt Disney Company. I started as an Intern working in one of the Four Diamond properties, The Yacht and Beach Club Resorts. The Walt Disney Company’s objective is to be one of the world’s leading producers and providers of entertainment and information. They convey to their cast members that the four keys to success are Safety, Courtesy, Show and Efficiency. As a Hospitality Major at the University of South Carolina, my internship gave me hands-on experience in hospitality, and specifically guest service with one of the industry’s leaders. I had the opportunity to do research on guest service while I was interning for one of our professor’s recently published books. Since that internship, so many opportunities have opened up for me including working for the Master’s Golf Tournament and at the Marriott here in Columbia. Through my internship, and it reaffirmed exactly what bring me to the hospitality field, and that is the guest service interactions that occur daily. After graduation, I will be returning to the Walt Disney Company to continue a career with them.
Oral and Creative Presentations

Afternoon Session

Discovery Day 2014
A forum for student ingenuity
Rolling With Cocky’s Reading Express
James Armstrong, Political Science - Senior
Mentor: Dean Charles Bierbauer, Mass Communications and Information Studies
“Rolling with Cocky’s Reading Express” is a short documentary that showcases the biggest literacy outreach program at the University of South Carolina, Cocky’s Reading ExpressTM, and discusses how it was founded, how it has grown, and most importantly where it is today and what it can become. Cocky’s Reading Express takes student volunteers and USC’s mascot Cocky to Title one schools throughout the state and provides elementary school children with free books to build their very own at home library as long as the make a promise to Cocky that they will practice reading every day. The documentary also delves into the program’s grant focusing in Calhoun County. The grant, “Get Ready to Read with Cocky!”, is funded by the Central Carolina Community Foundation and supported the efforts of Cocky’s Reading Express as well as students and professionals from the Arnold School of Public Health. The ASPH monitors children who are at-risk for reading difficulties based on hearing and sight tests, and also provides information to the parents through CRE’s Family Literacy Nights focusing on life literacies, including fitness, health, environment, finance and nutrition. Calhoun County was great grant opportunity because both of its elementary schools, St. Matthews K-B School and Sandy Run Elementary, are Title one schools in within an hour drive of Columbia. The documentary will be a tool that showcases the importance of the program to our community, not only through the presence of Cocky and coordinators, but through the volunteer efforts of passionate USC students dedicated to service. “Rolling with CRE” highlights what being a Carolinian is all about, and the viewers will learn for themselves that at the University of South Carolina, our dedication to eliminating illiteracy has no limits.

Hip-Hop as a Postmodernist Expression of the Blues
Sean Wills, History - Senior; USC Aiken
Mentor: Dr. Willie Strong, Fine Arts; USC Aiken
Both Hip Hop and the Blues are organically-grown African-American art forms that grew from the internal need of a disenfranchised segment of American society to find its own social and political voice. As such, common threads, elements, and tropes may be found in the origins of both, linking the two forms across time. This study sought to engender a dialogue regarding commonality between these seemingly disparate musical genres. Having found a broad array of similar features through the study of selected recordings and existing literature on the subject matter, I have selected a few of the elements I feel are best representative of the overlap: similar tendencies in phrasing and lyrical structure; tropes that represent African literary heritage, such as the Trickster; and the creation of an external persona, as in the mythical legend of Robert Johnson. I have begun posting my findings in a blog format, in the hopes of engaging the internet community in an open, intellectual discussion that may dispel some of the old myths and mysteries behind the art—while exploring new and exciting ones.

Baroque and Popular Music: Linking the Styles
Clara Logue, Music Performance - Senior
Mentor: Dr. Constance Gee, Music
Historical performance is a movement in which musicians attempt to play a piece ‘authentically’ by researching and mimicking the musical practice in place when the composition was written. Baroque historical performance, in particular, focuses on a time in music history in which the majority of popular music today has its roots. In the course of my research, I have attempted to tie together present-day music and Baroque music in a way that makes this connection evident and relevant to modern audiences. For my Magellan project, I am rearranging several current popular tunes in a Baroque style and am pairing these arrangements with harmonically and stylistically similar Baroque music. I am collaborating with a historical harmony professor at the Conservatory of Amsterdam for this arrangement portion. With my Magellan grant, I received basic training in historical performance at the Oberlin Baroque Performance Institute in summer 2013; this has helped in my stylistic study of the music in my presentation. This project will help address the relatively little knowledge of historical performance in the Columbia area and will show audiences why this is such a powerful and relevant art form.

The Second Hurricane: Bringing Research to Life
Kathleen McKinney, Music Performance - Senior
Mentor: Prof. Ellen Schlaefer, Music
In the summer of 2013 I traveled to New York City to study Aaron Copland and his little-known children’s opera, The Second Hurricane. While there, I was able to conduct interviews with Michael Barrett, associate artistic director of New York Festival of Song and musical director of a 2000 production of The Second Hurricane, Michael Boriskin, Artistic and Executive Director of Copland House, and Stephanie Heriger, author of “Tis a Gift to be Simple?: The Second Hurricane and Copland’s first steps toward American Opera.” Through these interviews as supplemented by research of primary and secondary sources, I was able to understand more about the opera’s original conception: its music, themes, and symbolism; and its reception: criticism and praise for the work. I was then inspired to direct a production of the opera. While back in Columbia, I used my knowledge of Copland’s original intentions to recreate an authentic version of The Second Hurricane. I wanted to provide a learning experience for both myself and my peers; using funding from the Magellan Scholars Program, I hired a team including a Stage Manager, Assistant Director, Musical Director, and accompanist, all of whom are students at USC. Together, we auditioned about 30 Columbia-area children, cast the show, conducted musical and staging rehearsals, and collaborated to produce The Second Hurricane in the spring of 2014. I took time during rehearsals to disseminate my research and incorporate my knowledge of the opera’s history in my correspondence with the children and my artistic team.
Parks in Peril: A visual journey into how climate change is affecting U.S. national parks

**Monica Munoz**, Public Relations - Senior

Mentor: Prof. David Weintraub, Visual Communications

This project offers audiences a look into how catastrophic events, such as fires, floods, invasive species and drought, are affecting US national parks, and how these problems may affect overall visitor experience. The possible correlation between these events and climate change will also be studied. Research methods include: original video interviews with park officials and visitors; original park photography; and secondary-source research on climate change and the parks. This research will focus on five regionally and ecologically diverse parks: Great Smoky Mountains National Park, Cape Hatteras National Seashore, Rocky Mountain National Park, Yosemite National Park and Glacier National Park. All information will be synthesized onto one user-friendly, educational website. The visual aspect of this website and its emphasis on user-friendliness will appeal to people with little to no scientific background who are interested in learning about problems facing US national parks.

Social Sciences and Public Health

**Leila Heidari**, Baccalaureus Artium et Scientiae - Senior

Mentor: Dr. Christine Blake, Health Promotion Education and Behavior

The Junior Gardener's sustainable gardening program emphasizes relationships between human and environmental health. The goal of this program was to increase students' knowledge of environmental and nutrition science, encourage development of positive attitudes toward eating plant foods, and increase fruit and vegetable consumption. A total of 15 3rd-5th-grade students from a Title 1 elementary school participated in the Junior Gardeners program and completed pre- and post-surveys that included assessment of environmental science and nutrition knowledge, attitudes towards eating fruits and vegetables, and fruit and vegetable consumption behaviors. Chi-square and T-tests were used to assess changes from pre- to post- tests using SPSS statistical software package. Students' knowledge of the nutrition and environmental science topics including nutrients in vegetables, ecosystems, plant parts, soil, compost, and water significantly increased ($p < 0.05$). They demonstrated a significant increase in preferences for greater number of vegetables ($p < 0.05$). Students rated the impacts of the environment and the food we eat on our health higher after participating in the program. A garden education program successfully increased environmental and nutrition science knowledge, attitudes, and fruit and vegetable consumption behaviors of elementary aged students. Establishing sustainability of this program will be sought with the support of the school's teachers and administrators and USC and Columbia-area sustainability programs.

Tensions Between Subjectivity and Objectivity in Film Adaptations of Women's Memoirs

**Kayla Pruitte**, Communications - Senior; USC Aiken

Mentor: Dr. Jill Hampton, English; USC Aiken

The adaptations of memoirs into film have given audiences a glimpse into the lives of real people; however, questions arise concerning the relationship of these films to their literary sources, especially in terms of interpretation and cultural contextualization. In order to appeal to the audience, film memoirs often use contemporary, rather than historically correct, popular music, costuming, and gender roles. Gender roles are especially relevant in women's memoirs when interpreted and transformed for commercial movie audiences. My main goal of this project was to learn more about adaptation theory and its current influence on film studies, specifically to understand how and why film makers made certain changes in their adaptation of women's memoirs and how these changes reflect ideological, especially patriarchal, concerns. This study focused on six films produced by our highly commercialized Western culture where celebrities, particularly women, are objectified by films and fans. Examining the film adaptations of women's memoirs gives a better understanding of the ways in which movies continue to influence women's perceptions of themselves in accordance with other people and their ideas, even within the supposedly "real" world of memoir. I compared and contrasted how the memoirs and films focused on each woman's career and life. I then determined whether or not the film adaptations maintained the selective focus the women placed on their experiences in their writings and how much the ideology and social practices diverted the film's attention from their own stories.

Fitness and Diet Program Designed for the College Student

**Brooks Briel**, Exercise Science - Senior

Mentors: Dr. Teresa Moore, Exercise Science Dr. Stephen Chen, Exercise Science

Oftentimes college students can be seen going to the gym with simply no direction in exercise or nutrition. They go through the motions of exercising, but have no real understanding of what they are doing. These students may see some progress, but plateau early and find it discouraging to continue to workout. The goal of this project was to create a personal diet and exercise program that could be used by the average college student to improve their physical fitness levels. The exercise program includes cardiovascular fitness, muscular strength and endurance, and flexibility training. The dietary program followed the recommended proportions of carbohydrates, proteins, and fats. Baseline testing was performed to determine current levels of fitness. A daily food diary, exercise logs and a daily journal were meticulously recorded throughout the 12-week program. Post-program testing will provide the effectiveness of the program. Once completed, the diet and exercise program will be presented in an easy to follow format.
Project Vida: After-School Health Education and Promotion for Underserved Youth

Fides Elamparo, Biochemistry and Molecular Biology - Senior

Salem Carriker, Anthropology - Senior

Project Vida is a service organization created by students who wanted to combine their interest in medicine and health with their passion for serving the local community. Our main goal is to emphasize crucial concepts of healthy living to local youth. Since its inception in 2010, Project Vida has expanded in the local partners it serves, young people it works with, and impact it has had on student members, USC advisors, and the community as a whole. For the past four years, we have provided healthy living presentations such as nutrition, hygiene, exercise, and many more to Columbia youth either on a bimonthly basis or at special events. The recurring nature of these programs allows us to build a relationship with the children and sites we work with, tailor the program to their needs, and reinforce concepts through a longer period of time. Through Project Vida, students hope to teach the children in the community how to maintain a healthy lifestyle in an informative and fun way that will hopefully create a lasting impression overall. This is especially important for most of the children we work with, whose circumstances are, at present, less than ideal, that they have the potential to improve the lives of not only themselves but of those around them. This organization enables students to give back through the promotion of responsible, healthy behavior in order to make a better future for the children of Columbia.

Implementing an electronic medical records system in a pediatric physician’s office to increase efficiency within all aspects of the practice

Neal Price, Public Health - Senior

Mentor: Dr. Sara Corwin, Health Promotion Education and Behavior

During the spring semester of 2014, I worked with Sandhills Pediatrics shadowing the director of the practice. Sandhills Pediatrics is made up of one main office and four satellite offices throughout the midlands in SC. As a public health major at the University of South Carolina, my internship allowed me to relate my curriculum to the field of public health/healthcare management. This semester, I have had the opportunity to help implement a new electronic medical records system (a computer based health records system) from start to finish. Sandhills Pediatrics decided to replace their current method of storing medical records, a non-efficient and paper printing technique with a new system known as PCC EHR. This new system is expected to cut costs by simply saving paper; less employees will be needed to focus on healthcare coding/billing and will reduce physician/nurse liability as everything important and necessary will be documented without fail. Since January 2014, the new system has been finely tuned to suit the practice. Each week the director, the head doctor/nurse and myself have had conference calls with the software developer to ensure the transition of their system will be smooth into our practice. There were over four million documents that needed to be converted and placed into the new electronic medical records for each patient, which took weeks. Training for each part of the practice ranging from physicians to front desk receptionists has been and will continue to be provided until March 31, 2014, which is the "go live" date with the new PCC EHR system. A more efficient way of keeping medical records will provide the practice with real time data in one place to cut down on costs and employee’s time.

Carbon Monoxide Poisoning Prevention Education and Awareness

Chelsea Schaefer, Nursing - Senior

Mentor: Dr. Amber Williams, Nursing; USC Lancaster

Carbon monoxide (CO) is called “the silent killer” because it is a colorless, odorless, and tasteless gas. CO poisoning is responsible for more than 400 deaths in the United States each year and is a leading cause of unintentional poisoning deaths in the US. The health belief model says that a person’s health-related behavior depends on their perception of four critical areas: the severity of a potential illness, the person’s susceptibility to that illness, the benefits of taking a preventive action, and the barriers to taking that action. According to this model, individuals will take action to prevent adverse health conditions if they believe they are susceptible to them. Therefore, education and awareness, as it pertains to the need for the installation of carbon monoxide detectors in all public buildings and private homes alike, is one of the best ways to eliminate death due to carbon monoxide poisoning. The purpose of this research is to increase awareness of the danger this silent killer poses and simple measures to prevent future exposures. This was accomplished by disseminating findings through educational class presentations and poster presentations, and also by providing a framework for creating a foundation as an interventional strategy to increase awareness.

Mental Health America

Caitlin Cribbin, Social Work - Senior

Mentor: Dr. Susan Parlier, Social Work

This video is intended to focus on the issue of mental health in America. Specifically, the video will explore the difficulties encountered in obtaining funding for research and providing effective treatment for those with mental illnesses. There is a lack of acknowledgement regarding mental health because mental illness doesn’t appear as a tangible, physical quality that can be observed. The lack of acknowledgement exacerbates the difficulties for the mentally ill person when trying to obtain help. American society tends to punish the mentally ill rather than effectively treat them. Many violent crimes have been committed as a result of mental illness. The criminal justice system has proven to be unequipped to tackle the issue of mental illness and many of those who are sent to prison wind up being repeat offenders. Mental illnesses can range from things like simple anxiety and depression to schizophrenic behavior. As a society, we have swept mental illness under the rug for years, and consequently, we are now at a point where it is necessary to raise awareness and increase education. With the proper funding, research, and treatment plans, mental health issues can be minimized which will in turn lead to a healthier, safer society.
Effects of NASA’s STEM Program on Middle School Student’s Academic Performance

Kelsey Rudeck, Business Administration - Senior
Mentor: Dr. Bradley Smith, Psychology

In recent years, NASA has published a set of lesson plans focusing on the areas of Science, Technology, Engineering, and Mathematics (STEM) with the aim to help children grow academically. This study aims to implement the STEM program in the context of a randomized study in order to decipher if the program improves test scores and a willingness to learn. Up to 90 students attending the Challenging Horizons summer program were randomly separated into two groups, one of which under went STEM lesson plans and one of which participated in a writing group. The MAP scores of the students participating in STEM lesson plans were compared from the Spring to the Fall in order to see if there was a significant increase in test scores. Additionally, surveys were conducted regarding the participants’ willingness to learn and liking of STEM subjects relative to other school subjects. The results show that preference for STEM subjects increased, particularly in Science, and that the majority of participants increased their MAP scores from Spring to Fall. The STEM program successfully gave the students a willingness to learn and to expand their education with hands on, interactive lesson plans.

High-Risk Sexual Activity in Student Athletes: A Proposal for Holistic Sexual Health based in Self-Determination Theory

Stephanie Saunders, Psychology - Junior
Mentor: Dr. Kendra Ogletree-Cusaac, Psychology

Sexual risk behaviors remain a public health issue in the U.S. and are especially prevalent among college students. The purpose of this study is to review current literature to determine the need for a change in the approach to sexual risk behaviors at the university level, and then propose holistic sexual health programming based in self-determination theory (SDT). The first phase observes the current state of high-risk sexual activity in college students with a focus on student athletes. We look to college students’ sexual health behaviors, interpersonal developmental needs, and campus sexual health resources. We will then look to student-athletes, a subgroup of college students with a strong sense of identity, elevated social status, and wide access to health resources. Next, we study sexual risk behaviors and factors, particularly in the context of the current approach to sexual education, the effects of social norms theory, and the integral role of communication. Then we will do an overview of SDT, applying it to interpersonal development, sexual risk behaviors and factors, and university sexual health resources. The second phase is a proposal for sexual health programming applying the tenets of SDT: autonomy, competence, and relatedness. Given its emphasis on intrinsic motivation for health behaviors and goal achievement, SDT is the best model for university sexual health programming. This holistic approach to sexual health should encourage a healthy lifestyle based on personal value systems.

The Influence of Study Abroad in South Africa on American Students’ Identity

Madeline Willett, Spanish - Sophomore
Mentors: Dr. Andrea Tanner, Journalism and Mass Communications, Dr. Jennifer Engel, Study Abroad Office

With a 170% increase in study abroad by U.S. students from 2000 to 2012, it is widely recognized that study abroad not only allows students to learn a foreign language and gain international experience, but also influences compassion for culturally responsible behavior. Previous research suggests that study abroad impacts students’ identities on social, national, global, and personal levels. The current study explored how the identities of American students were influenced by study abroad in South Africa. Employing qualitative research methods, including in-country in depth interviews and PhotoVoice, a methodology which allows participants to recall important experiences through the use of photography, the purpose of this research was to document and investigate the lived experiences of study abroad students as they navigated and learned from their foreign environment. A total of nine students participated in this research. Within the context of identity, students were able to identify their own growth on social, national, global, and personal levels. Findings revealed that students perceived their own identities as changed by having increased confidence, a more tolerant, well-rounded view of South Africa, and an altered view of their home culture. These ends were the result of experiencing new social norms, forming relationships with South Africans, isolating themselves in a foreign environment, taking risks, observing social and financial class differences, and immersing themselves daily in unfamiliar situations and contexts.

A Case Study of How French Teachers Understand Purpose in Educating Immigrant Students

Dana Doggett, English - Senior
Mentor: Dr. Nina Levine, English Language and Literature

The purpose of the study was to comprehend how two French teachers understood their roles in teaching immigrant students. To achieve this goal, I observed classes at a middle school in Pau, France over the course of three months. I recorded extensive field notes and conducted two in-depth interviews with both of the teachers I observed. After returning to the United States, I coded my notes, identifying and analyzing patterns in the data. Among other conclusions, I discovered that these teachers emphasized students’ individual identities, including their diverse national and cultural backgrounds, while at the same time pushing the students towards eventual integration into mainstream classes with native French-speakers. This case study is pertinent to my future career as a high school English teacher, during which time I am bound to encounter immigrant students whom it is my job to encourage and educate.
Latina Motherhood in the US: Stories of Hardship and Triumph  
*Mallory Turner*, Baccalaureus Artium et Scientiae - Senior  
Mentor: Dr. Deborah Billings, Health Promotion Education and Behavior  
South Carolina has one of the fastest growing Latino populations in the country. As this population increases, its social, physical, mental, and economic well-being become increasingly important as a group and as a part of South Carolina. The objective of this research was to explore the strength and resilience of Latina immigrant mothers by identifying challenges they face and how they overcome those hurdles. The methodology was to conduct ten in-home interviews about experiences related to the raising of children, prejudice and discrimination, and work in the US. Some of the major obstacles the research revealed in preliminary results were learning English and being separated from family, while a strong desire to help fellow community members and grow as women emerged as existing strengths. This research will give insight into unmet needs of this community, existing strengths that can be enhanced to foster growth, and further areas of exploration related to this topic.

The Place Where My Future Starts  
*Gerald Davis Jr.*, Social Work - Senior  
Mentor: Dr. Susan Parlier, Social Work  
During my spring 2013, fall 2014, and spring 2014 semesters, I had the opportunity to intern at Palmetto Place Children's Shelter. Palmetto Place is an emergency shelter for children who have been abused and/or neglected. Many of these children have been victims of child maltreatment, physically abused, sexually abused, or physically and emotionally neglected. My responsibilities include coordinating and working with these teenagers who is identified as being an Unaccompanied Youth by teaching them independent living skills. The Unaccompanied Teen Life Program uses the Casey Life Skills Assessment. This assessment is used to evaluate different categories such as daily living, self-care, relationships and communication, housing and money management, work and study life, career and education planning skills they currently have and will possess in the near future. We use the data information collected from this assessment to help meet the needs of the teenagers as identified by the assessments. As a Social Work major at the University of South Carolina, my internship provided me with the necessary tools, skills, and knowledge to work with all groups of people especially young children and teens. Lastly, one of the success stories is an African American male that I mentored. Through my mentoring efforts, he was able to obtain his driver’s license, obtain high scores on the SAT, and complete applications for college where he plans to major in athletic training.

Social Sciences II

The Influence of Gender on Brand Extension Evaluation  
*Hemangi Dhir*, Management - Senior  
Mentor: Dr. Alokparna Monga, Marketing  
A well-liked brand name can be used to market a variety of products in different categories, allowing the firm to use the consumer goodwill associated with a brand to new products. Brands like Ralph Lauren have been very successful in extending the brand to many different product categories (e.g., Ralph Lauren restaurants). However, consumers do not like all brand extensions equally. The key research finding is that consumers evaluate brand extensions better when the extension “fits” with the parent brand. Surprisingly, no one has questioned whether or not these findings are applicable to male and female consumers, even though an emerging stream of research in psychology has shown that male and female consumers differ in the way they think and reason about the world.

In the study, 185 adults were recruited from an online consumer panel, and the study was conducted on Qualtrics survey software. Our findings show that for consumers with an independent self-construal, there were no gender differences for the low fit (Gillette shoes) and the moderate fit brand extension (Gillette hair dryers). However, for consumers with an interdependent self-construal, differences in fit perceptions between the low and moderate fit extensions were larger for males than for females. This project was a great opportunity for me to learn new things that can be applied both to my professional and personal life. I was able to strengthen this skill set by working with my mentor Dr. Monga. For the research project I had to do a lot of hands on work involving data collection and studying different markets. This experience taught me excellent analytical skills that I was able to use during my internship and it also helped me to challenge by creative side as well as further develop my research skills.

An Examination of Bug Bounty Programs in E-commerce  
*Jonathan Larry*, Business Administration - Senior; USC Aiken  
Mentors: Dr. Ravi Narayanaswamy, Business Administration; USC Aiken  
Dr. Leanne McGrath, Business Administration; USC Aiken  
The purpose of this research is to examine the emergence of “bug bounty programs” (BBP) that are used by e-commerce organizations in the United States. BBPs are used by e-commerce providers as a proactive step to gain assistance from various stakeholders, such as customers and independent researchers, in identifying and reporting errors related to their web infrastructure. The rationale is that using a larger base of benign security professionals, the e-commerce provider has a chance to identify and eliminate the security risk before potential attackers use it to cause harm. The data for this research was collected from the Internet Retailer Top 500 Guide, the Fortune 500 Companies List, and the Alexa listing. The findings of the study were used to develop a framework that organizations can use to structure bug bounty programs. It was discovered that few e-commerce organizations had BBPs, but interestingly, a large number of them had a feature to capture security related issues, such as software...
realized how my own perceptions shape my relationships and opinions. I learned
that I needed to understand all the sides to a story before making decisions,
as well as understanding how cultural sensitivity is necessary to navigate the
complex global relations of today. I hope that, through my story of being in the
middle of an international conflict, other students will understand the importance
of history in international relations and apply this to their thinking as well.

**The Impact of Perceived Characteristics of Teenage Mothers on Attitudes Toward Teenage Pregnancy**

**Shalise Bowens**, Psychology - Junior  
Mentors: Dr. Suzanne Swan, Psychology  
Mr. Andrew Schramm, Psychology

Teenage moms are at a heightened risk for becoming impoverished, failing
to complete high school, and developing mental health problems. The stigma
associated with teenage pregnancy, however, often results in marginalization of
teen moms, and the denial of the services and support they need to overcome
the challenges they face. Thus, an understanding of the factors contributing to
negative attitudes toward teenage mothers may have important implications for
decreasing the risk that stems from teenage pregnancy. Against this background,
this study examines whether attitudes toward teenage mothers are impacted by
the characteristics of the teenage mother. Participants were randomly assigned
to read one of three vignettes describing either the statistics behind teenage
pregnancy (control condition), a responsible teenage mother, or an irresponsible
teenage mother. Then, participants were asked to fill out a survey, which assessed
their attitudes toward teenage parents. Attitudes were coded on a numeric scale
with higher scores indicating more negative attitudes toward teenage mothers.

I predicted that people would report different attitudes based on which version
of the vignette the person read, with the most negative attitudes being reported
by participants who read the vignette describing the irresponsible mother.

Results indicated that the vignette read by the subject had no significant effect on
attitudes toward teenage pregnancy. However, a significant negative correlation
was found between knowing a teenage mother and expressing negative attitudes
toward teenage mothers. On this basis, future research could aim to evaluate
whether introducing people to teenage mothers decreases negative attitudes
toward teenage parents.

**Experiencing and Understanding Chinese-Japanese Tensions**

**Erika Kalkofen**, International Studies - Senior

The historical tensions that exist between China and Japan is the focus of my
presentation. As I was in the middle of the conflict, I wish to share how these
tensions affected me and how they continue to affect the countries themselves.
During my sophomore and junior year, I had the opportunity to study abroad
in both Shanghai, China and Osaka, Japan. Studying abroad in East Asia was an
invaluable experience that taught me about international politics, history, and
cultures. One of the most impressionable events to affect me while I was abroad
was the heightening of the Senkaku/Diaoyu island conflict. Having both Chinese
and Japanese friends, as well as having lived in both countries, I could understand
the feelings behind both sides of the conflict. Yet even with background
knowledge of their history and my personal connections to it, I couldn't
comprehend how two of the most powerful countries in the world could not come
to an agreement over what I considered an insignificant issue. In that moment, I

A small country with a large and diverse religious population is frequently the
equation for disaster, so how has Mauritius become the exception and what is the
true level of justice and tolerance in a country that portrays a harmonious image
to the world? Through an 8-week immersive study in Mauritius, I have gathered
the perspectives of 23 leaders from around the island and compiled them to build
a database of quotes that represent their opinions. While the leaders' quotes and
my time in Mauritius have allowed me to gain my personal perspective, I have
built a website to share the leaders’ opinions and my experience so you are able
to gain your own perspective on the level of tolerance and justice in Mauritius.
Please visit tolerantmauritius.com for the full Mauritian experience.
The Biomechanical Characterization of Tissue Engineered Vascular Constructs

Alexandra Moreira, Biomedical Engineering - Sophomore
Mentor: Dr. Tarek Shazly, Mechanical Engineering
We have developed an approach to fabricate living tissue engineered vascular constructs using micro-carrier beads seeded with human umbilical vein endothelial cells and vascular smooth muscle cells. Toroid shaped constructs having an outer diameter of 4mm, an inner diameter of 2mm and a wall thickness of 1mm are cultured in a tubular agarose mold for 12 days during which the elaborated extracellular matrix contains collagen and elastin. Based on uniaxial tensile test data on both cellularized and decellularized toroid constructs, a constitutive model has been created to characterize this tissue and obtain intrinsic material parameters. These material parameters will enable the prediction of the theoretical mechanical behavior of elongated tubular constructs fabricated from the same tissue-engineered material. The ultimate goal is to fabricate mechanically compatible vascular grafts for future patients who are diagnosed with systemic cardiovascular diseases.

What does a nonabelian group sound like?

Matthew Corley, Computer Science - Junior
Mentors: Dr. William DeMeo, Mathematics
Dr. Reginald Bain, Music
Underlying many digital signal processing (dsp) algorithms, in particular those used for digital audio filters, is the convolution operation, which is a weighted sum of translations f(x-y). Most classical results of dsp are easily and elegantly derived if we define our functions on \( \mathbb{Z}/n\mathbb{Z} \), the abelian group of integers modulo n. If we replace this underlying index set with a nonabelian group, then translation may be written \( f(y-1x) \), and the resulting audio filters arising from convolution naturally produce different effects than those obtained with ordinary (abelian group) convolution. The aim of this project is to explore the idea of using the underlying finite group (i.e., the index set) as an adjustable parameter of a digital audio filter. By listening to samples produced using various nonabelian groups, we try to get a sense of the acoustical characters of finite groups.

Catalyst Synthesis with a New Platinum Precursor

Jayson Keels, Chemical Engineering - Senior
Mentor: Dr. John Regalbuto, Chemical Engineering
Metal-containing catalysts are found in processes which produce commodity, specialty and pharmaceutical chemicals, abate pollution, produce fertilizer for the agricultural industry, and alternate energy for the power industry. In short, they underpin the world’s economy and our standard of living. As important as they are, the methods to prepare catalysts are still very empirical.

Our work is in fundamental studies of catalyst preparation. We are trying to find simple, scientific ways to synthesize heterogeneous catalysts, which are metal nanoparticles anchored in place on high surface area catalyst “supports” such as alumina oxide, silicon oxide, and carbon.

We have studied whether sodium tetrachloroplatinate (II), which gives the 2+ Pt coordination complex platinum tetrachloride, \([PtCl_4]^{-2-}\), (PTC) will serve as a more reliable platinum precursor for metal nanoparticle synthesis by strong electrostatic adsorption (SEA) as compared to the commonly used Pt (IV) complex of platinum hexachloride, \([PtCl_6]^{-2-}\). Solutions of both precursors were prepared and aged while checking the pH at various time intervals to observe trends in stability. Uptake experiments of PTC onto two different supports: \( \gamma \)-Al2O3 SBa 200 and carbon black Vulcan XC 72 were carried out. Although PTC was indeed found to be more stable in solution than CPA, it was found that it did not adsorb as much onto either support. The maximum surface density obtained for PTC was 1.3 \( \mu \)mol/m2 for both alumina and carbon while CPA reached a maximum of 1.6 \( \mu \)mol/m2 and 1.7 \( \mu \)mol/m2 for alumina and carbon respectively.

Developing a Novel Chitosan Coating with Silver Nanoparticles and Antibiotics for Titanium Implants

Kathryn Kingsmore, Biomedical Engineering - Senior
Mentor: Dr. Mauris DeSilva, Naval Medical Research Unit - San Antonio; USC
Traumatic head injury, subsequent reconstructive cranioplasty, and post-surgical infection have been of primary concern within the military following insurgence in Iraq and Afghanistan. Infection following cranioplasty occurs in 8-15% of all surgeries: multidrug-resistant (MDR) bacterial strains including Acinetobacter baumannii, Staphylococcus aureus, Pseudomonas aeruginosa, and Proteus mirabilis are responsible for the majority of these infections. Furthermore, infection leads to prolonged hospital stay and recovery time. Chitosan, a biodegradable, bioactive polysaccharide is known to have antibacterial properties and has been used to coat titanium implants. The objective of this work was to develop a chitosan coating containing silver nanoparticles, rifampicin, and tobramycin and to evaluate the ability of this coating to prevent acute implant infection through localized delivery of antimicrobial agents. Studies have shown that silver incorporation can enhance the antibacterial efficacy of antibiotics and this novel approach aims to take advantage of the cocktail of these bioactive agents to maximize bacterial inhibition. Rifampicin and tobramycin were chosen based upon bacterial studies that illustrated their maximal combined efficacy against the targeted organisms compared to other antibiotics. The chitosan coating was evaluated for its drug elution properties and ability to inhibit bacterial growth. Eluates were collected over a 10-day period and tested against S. aureus and methicillin-resistant Staphylococcus aureus (MRSA) in turbidity assays. Antibacterial loading was confirmed through redissolution studies. Future work aims to optimize the sustained delivery of antimicrobials and to evaluate in vitro and in vivo biocompatibility of the coating.
Controlling the Generic Formal Fiber of Local Domains and Their Polynomial Rings

Anna Kirkpatrick, Mathematics - Junior
Mentor: Prof. Susan Loepp, Williams College, Mathematics and Statistics; USC

A ring in which all ideals are finitely generated is called Noetherian, and a Noetherian ring which has exactly one maximal ideal is called a local ring. We define a metric on local rings by using the structure imposed by the single maximal ideal. A local ring is said to be complete if it is complete when considered as a metric space; the completion of a local ring is its completion as a metric space. Let $T$ be a complete local ring with maximal ideal $M$. Let $C$ be a countable set of incomparable prime ideals of $T$, and let $B_1$ and $B_2$ be sets of prime ideals of the power series ring over $T$, denoted $T[[x]]$ where $x = \{x_1, \ldots, x_n\}$, such that both $B_1$ and $B_2$ have cardinality less than that of $T$. We present necessary and sufficient conditions for the existence of a local domain $A$ with completion $T$ such that the generic formal fiber of $A$ has maximal elements equal to the ideals in $C$ and the generic formal fiber of $A[[x]](M \cap A, x)$ contains every element of $B_1$ but no element of $B_2$.

Targeted Insertion of the Transposable Element, mPing, by Manipulation of Transposase Proteins

Ashley Strother, Biology - Junior; USC Aiken
Mentor: Dr. C. Nathan Hancock, Biology/Geology; USC Aiken

Transposable elements, like mPing, are mobile pieces of DNA that move throughout the genome of a cell through a cut-and-paste mechanism. The rice transposon, mPing, is mobilized by two proteins, ORF1 and Transposase, encoded by the autonomous transposons, Ping and Pong. This element preferentially inserts in gene-rich regions and has high transposition activity, making it a great tool for disrupting genes to determine gene function. My goal is to modify the ORF1 and Transposase proteins to produce targeted insertion of mPing. If the transposon's insertion can be targeted to specific sequences in the genome, specialized mutagenesis applications could be performed. To determine if targeted insertion of mPing is possible, I added a GAL4 DNA binding domain to the N-terminus or C-terminus of the ORF1 and Transposase proteins. The transposition rate and quality using the modified proteins was tested using a yeast transposition assay. The results indicated that addition of the GAL4 binding domain to the proteins reduces transposition frequency to different degrees depending on where it is located. However, these modified proteins show increased frequency of insertion near a GAL target sites compared to control proteins. These results suggest that targeted insertion of the mPing element is possible, providing a potentially new mechanism for plant genome modification.

Social buffering of the Stress Response in Peromyscus polionotus

Anna Capps, Psychology - Senior
Mentor: Dr. Sandra Kelly, Psychology

In the wild, the animals within the Peromyscus polionotus (PO) species have been observed as being monogamous throughout their reproductive life. There are currently no laboratory measures of social bonding between adult breeding pairs of POs. However, research on another monogamous rodent, the prairie vole (Microtus ochrogaster), has shown that the stress response and in particular, the stress hormone corticosterone is related to the strength of the pair bonding. Accordingly, the present study was conducted using two stress conditions, in which the Peromyscus were exposed to piece of towel saturated with a predator odor. Testing conditions were classified as either Isolated (separate from the mated partner) or Paired (with the mated partner), and six male animals from each of the species, PO and BW, were tested in each of the two conditions. It was hypothesized that through measuring duration of avoidance and non-avoidance of the towel, and other stress behaviors, we would observe a decreased stress response from the POs in the paired condition compared to the isolated condition and that stress-induced increase in corticosterone levels would be smaller in paired POs than the isolated PO animals or the BWs in either condition. It was also anticipated that the two species would show differences in c-Foes protein activation in the amygdala, nucleus accumbens and the hippocampus, three brain regions involved in fear and social bonding. Through these behavioral, hormonal, and immunohistochemical analyses, a partner-dependent buffering of an animal’s stress response is predicted to be shown. (Funded via USC Magellan Scholars Program & USC Honors College)

The Effects of a High Sucrose Diet on Anxiety and Cortisol Levels in Sprague-Dawley Rats

Wynter Koger, Biology - Senior; USC Aiken
Mentor: Dr. Michelle Vieyra, Biology/Geology; USC Aiken

The effects of a high sugar diet on stress in rats There is evidence that an increase in the consumption of sugar in America has led to increases in many health problems including obesity. There is also evidence that an increase in body fat is related to increases in cortisol levels. Increases in sugar consumption in America is also correlated with a 25% increase in anxiety disorders. This study looked at sugar consumption in rats to see if it is correlated with increased stress avoidance and urinary cortisol levels. Rats were given a 10% sucrose solution for six months and then given two behavioral stress tests, an elevated plus maze and a light dark exploration task. Both tests allow a rat the choice of spending time in an enclosed environment or exploring a more open environment. Urine was also collected and cortisol was measured using an ELISA test kit. Sugar consumption seemed to affect females more than males. Sugar fed females spent significantly more time avoiding stressful situations in both the elevated plus maze and light dark exploration task as compared to control females. They also had significantly
higher levels of urinary cortisol as compared to control females. Both male
groups had higher cortisol levels than both female groups but there was no
difference between sugar-fed males and control males.

The Effect of Antibiotic Treatment on Liver Function in the ApcMin/+ mouse
model of Cancer Cachexia
Elizabeth Durante, Biological Sciences - Senior
Mentor: Dr. James Carson, Exercise Science
The ApcMin/+ mimics quite a few characteristics of cancer cachexia including
chronic inflammation, splenomegaly, and a subsequent loss of fat and muscle
mass. Severely cachectic mice have elevated systemic inflammation, but
surprisingly inhibit liver inflammatory and anabolic processes by inhibition of
the corresponding markers p – NF-KB and p – S6. Cachexia severity thus seems
to suppress hepatic cellular processes due to chronic systemic inflammation. The
purpose of this study was to determine if immune suppression by administration
of antibiotics would attenuate liver dysfunction in the cachectic ApcMin/+ mouse. We used the gram – negative targeting antibiotic Polymyxin to suppress
immune function. The mice were divided into three groups: C57BL/6, ApcMin/+ and ApcMin/+ + Polymyxin. Mice started antibiotic treatment at 13 weeks of
age, at a dose of 1mg/ml of polymyxin administered through drinking water,
till sacrifice. Animals were euthanized using the ketamine cocktail and organs,
muscle, fat, and blood were collected for analysis. Analysis employed qPCR and
Western Blots using the markers p-NF-KB, albumin, MMP-2 for inflammation
and p-MTOR and p-AKT as markers for anabolic signaling. Administration of
Polymyxin reduced spleen and mesenteric lymph node size in the cachectic
mice, indicating a suppression of immune proliferation. But this suppression of
immune proliferation failed to attenuate liver anabolic or inflammatory processes
as both Akt/mTOR signaling and NF-kb/MMP-2 pathway remained suppressed
in the antibiotic treated mice. Thus, antibiotic treatment does not seem to have a
significant effect on the outcome of liver dysfunction in cachetic mice.

The effects of sugar consumption on body fat and fasting glucose levels in rats
Breanna Marshall, Biology - Senior; USC Aiken
Mentor: Dr. Michelle Vieyra, Biology/Geology; USC Aiken
The obesity rate in America is rising at an alarming rate and the consumption of
sugar is often blamed. In order to study the effect of sugar on human health, rats
are often used as model organisms. High concentrations of sucrose fed over a
short period of time have been shown to produce high body fat content, increased
body weight and insulin resistance. Many of these affects have been shown to
lead to diseases such as hypertension and Metabolic Syndrome. In this study,
rats were given a 10% sucrose solution immediately after weaning for a period
of six months. This concentration of sucrose is comparable to that consumed
by humans. It was expected that the rats given sugar would have greater body
weight, higher body fat content, and increased fasting blood glucose levels.
Twenty-four rats were fed 10% sucrose water from April through September
2013, while eighteen rats were on a control diet. Body weight was monitored
weekly and fasting blood glucose levels were measured after the six month
period. Fat was dissected from two locations and percent body fat calculated.
Fasting blood glucose levels, though not outside of normal, were significantly
higher in the experimental rats. There was no difference in body weight between
the groups but sucrose-fed rats had body fat percentages that were significantly
higher than control rats.

Determining the Nature of Affective Responses to Video Clips
Mary-Catherine Newell, Psychology - Senior
Mentors: Dr. Svetlana Shinkareva, Psychology
Dr. Douglas Wedell, Psychology
The International Affective Digitized Sounds and the International Affective
Picture System databases provide affective values for a large number of stimuli
along the dimensions of valence and arousal, which has allowed them to be widely
used in various research areas (Baucom et al., 2012). Video stimuli offer a more
dynamic and natural way to present stimuli, opposed to static/picture stimuli,
which allows for a stronger BOLD response in neuroimaging studies (Huth et
al., 2012). The goal of the current research was to develop and validate a set of
affective video stimuli, so that these stimuli can be used in future neuroimaging
studies. Videos of naturally occurring stimuli (e.g. dog bark) were downloaded
from the Internet and edited for time/quality. Videos sampled the four quadrants
of the valence-by-arousal affective space, and behavioral experiments were
conducted for validation. Stimuli were designed from each affective quadrant
and were balanced for semantic content (e.g., living vs nonliving). Initial stimuli
development involved creating unique exemplars, and the second phase focused
on strengthening previously validated exemplars by creating an extensive set of
replicates. The previous method was improved by adding a neutral affective state
(now sampling five affective states) and implementing a trial designed to compare
the videos as sound and visual combined, audio only, and video only- to compare
the differences in sensory modalities more directly. Data were analyzed using
multidimensional scaling techniques. Preliminary results indicate good separation
of dynamic stimuli by valence, and offer other interesting findings about specific
video qualities that can influence affective state.

The effect of a high sucrose diet on cognition in rats
Rachel Roberts, Biology - Senior; USC Aiken
Mentor: Dr. Michelle Vieyra, Biology/Geology; USC Aiken
According to statistics from 2005 to 2010, about 13% of the calories adults
consume come from sugar. This is high considering the Dietary Guidelines for
Americans suggests that only 5% to 15% of calories come from a combination
of fat and sugar. Due to a high saturated fat and refined sugar diet, 36% of
Americans were cited as overweight in 2012 and rising obesity rates bring
attention to the risks of being obese. Obesity increases an individual's chances of
developing insulin resistance, type II diabetes, hypertension, hyperglycemia, heart
disease, stroke, but what about cognitive ability? Rats have been used as models
to better understand the effect of high sugar diets on the cognition of humans. In
the following study, a 10% sucrose solution, the percentage found in sweetened
beverages, was fed to a group of rats for twenty-eight weeks. During this time
long-term and short-term memory was tested using a Morris Water Maze (MWM)
and a Novel Object Recognition (NOR) test. The serum concentrations of brain-derived neurotrophic factor (BDNF), which is linked to learning and memory, were also analyzed using a rat BDNF ELISA kit. The results were analyzed using a two way ANOVA. A 10% sucrose solution fed to Sprague Dawley rats ad libitum significantly increased the short-term memory of female rats fed sucrose compared to control rats in the NOR test but did not significantly affect long-term memory in the MWM or serum concentrations of BDNF.

Fe Isotopic Fractionation at Various Temperatures
Emily Hardin, Marine Science - Junior
Mentor: Dr. Seth John, Earth and Ocean Sciences
Iron is an important nutrient for phytoplankton in the world’s oceans, and often limits growth in many areas. Iron is present in two oxidative states – Fe(III) and Fe(II). While Fe(II) is unstable in the ocean environment, it is the form required by organisms for growth. Fe(III) can be reduced to Fe(II) through various redox reactions, including photochemical (via sunlight) and chemical reduction. Different isotopes of Fe may react at different rates, leading to isotopic fractionation during reduction. This study examined the effect of temperature on the rate of reduction and Fe isotopic fractionation during the chemical reduction of Fe(III) to Fe(II). Hydroxylamine hydrochloride was added to solutions containing Fe(III)-EDTA in artificial seawater at various temperatures, ranging from 0°C to 100°C. The temperature of the solution greatly affects the rate of reaction, with colder temperatures requiring significantly longer reaction times than warmer temperatures. At 0°C, the reaction time to reduce 5% of the Fe(III) to Fe(II) was 16,170±212 seconds; at 23°C, the reaction time was 5,520±339 seconds, at 60°C it was 507.5±22 seconds, and at 100°C the reaction time was 54±1 seconds. Fe isotopes will be measured to determine how temperature and reaction rate influence the behavior of Fe stable isotopes during redox processes. Information from this experiment about the fractionation of Fe isotopes will allow us to better understand the chemical mechanisms of fractionation, and therefore better analyze the data that Dr. John’s lab has on natural seawater Fe isotopes.

Zn and Cd isotope ratios in cap carbonates as tracers of past life processes in the surface ocean
Emily Townsend, Marine Science - Junior
Mentors: Dr. Seth John, Earth and Ocean Sciences; Ms. Angela Rosenberg, The International SeaKeepers Society; USC
Zinc and cadmium are essential micronutrients in the ocean that are depleted from the surface waters and enriched in deeper waters by the biological pump. Primary producers at the surface preferentially assimilate the lighter isotopes of both micronutrients and release these isotopes as they remineralize in deeper waters. As a result, a surface-to-deep Zn and Cd isotope gradient is established. In the marine environment, both micronutrients in the surrounding seawater are incorporated into the crystal lattices of cap carbonate minerals during precipitation. Thus, measurements of Zn and Cd isotope ratios in cap carbonates can be used as proxies for patterns of past primary production in the surface oceans, providing insight into past marine life. To date, cadmium isotopes have never been measured in cap carbonate samples. To measure these isotopes, we adapted previously published cleaning (Kunzmann et al., 2013) and chromatography (Conway et al., 2013) methods for carbonates. Tests of pure carbonate spiked with a multi-element standard showed that the modified procedures result in high extraction efficiencies, and fully separate Zn and Cd.
from the calcium carbonate matrix. Using the modified procedures, Zn and Cd were measured in 35 different cap carbonate samples from Flinders Ranges, South Australia. Preliminary measurements of cap carbonate samples from the same location result in $^{66}\text{Zn}$ values ranging from $\pm0.14$ to $\pm0.98 \%\text{o}$, and $^{114}\text{Cd}$ values ranging from $-2.10$ to $-0.01 \%\text{o}$. Synchronous changes between $^{66}\text{Zn}$ and $^{114}\text{Cd}$ indicate that both isotope ratios in carbonates serve as a valuable record of past ocean life processes.

**Small mammal community structure within urban greenways**

**Samantha Poarch**, Biology - Senior; USC Upstate  
Mentor: Dr. Jonathan Storm, Natural Sciences & Engineering; USC Upstate

Urbanization often leads to the destruction of wildlife habitat and is a major contributor to the loss of biodiversity. Retaining greenways within the urban matrix is one method of mitigating such habitat loss. Urban greenways are parklands, often linear in shape, that are maintained in a more natural condition than typical urban parks. In many cities, greenways are retained along floodplains and facilitate both recreation and wildlife conservation. Although several studies have addressed the use of urban greenways by birds, little is known regarding their conservation value for small mammal communities. In this study, we sought to determine whether urban greenways in Spartanburg, South Carolina contain small mammal communities similar to that of rural forests. In addition, we wanted to determine whether vegetation density influences the abundance of white-footed mice (Peromyscus leucopus). During May and August of 2013, we live-captured small mammals at 4 urban greenways and 2 rural forests. We used a vertical profile board to visually estimate the density of vegetative cover at each site. The white-footed mouse was the most abundant small mammal at 5 of the 6 sites, comprising 50 – 100 \% of all individuals captured at urban greenways and 59 – 83 \% of all individuals at rural forests. Vegetation density was significantly higher within urban greenways than at rural forests. Across all study sites, we found a positive trend between vegetation density and the abundance of white-footed mice. Our results suggest that urban greenways provide suitable habitat for native small mammals in South Carolina.

**Effect of Ornithodiplostomum sp. on The Functional Response of Bluegill Sunfish (Lepomis macrochirus), Feeding on Prey**

**Aubrey Shealy**, Biology - Senior; USC Aiken  
Mentor: Dr. Derek Zelmer; Biology/Geology; USC Aiken

Food web studies typically do not include parasites, in spite of the fact that parasites can comprise up to three percent of host biomass, and can have a total biomass greater than that of the top predators within these food webs. Ornithodiplostomum sp. uses fresh water fish as intermediate hosts and could create an energetic cost that influences the consumption rate of infected fish and therefore might influence food web dynamics by changing the functional response of these predators. The functional response of ten bluegill sunfish (Lepomis macrochirus) was determined by presenting the fish with 1-10 Eisenia fetida every 48-72 hours, and measuring the number and biomass of worms consumed. Once all 10 fish were exposed to the entire range of prey abundances, 5 randomly selected fish were exposed to 20mL of water containing cercariae pooled by 5 shedding snails. One week post-exposure, the 5 exposed and the 5 non-exposed fish were again exposed to the entire range of prey abundances following the same protocol as the initial trials. Differences in the functional response between trials were evaluated by incorporating indicator variables into a nonlinear regression fit of Holling’s disk equation integrated over time. Infection with Ornithodiplostomum sp. did not influence the functional responses of the bluegill sunfish.

**Multi-decadal hindcasts of larval connectivity**

**Hilde Oliver**, Mathematics - Senior  
Mentor: Dr. David Wethey, Biological Sciences

Ocean circulation models are a useful tool for determining larval connectivity, but they are only available for a limited number of years. In contrast, meteorological reanalysis data time series data are available over multiple decades. Since larvae are typically found in surface waters which are highly influenced by winds, we examined the relationship between connectivity and wind in order to develop a long term hindcast of larval dispersal. We used the UCSC 31-year hindcast of the California Current System to model the inter-estuarine transport of Abarenicala larvae from 1981 – 2010 and identified 4 major connectivity patterns using the Self-organizing map (SOM) clustering algorithm. We developed regression models for those connectivity patterns using meteorological reanalysis winds and found we could explain most of the variance in connectivity with the wind data. The validated regression model was used with winds from 1960 – 1980 to hindcast connectivity beyond the time range of the original ocean model.

**The effect of captive diet on the skulls and teeth of carnivores**

**Hannah Selvey**, Biological Sciences - Junior  
Mentor: Dr. Adam Hartstone-Rose, Cell Biology and Anatomy

Studies have shown that captive “big cats” (genus Panthera) that are fed pre-processed, soft diets have more periodontal problems than their wild counterparts and that their cranial osteo-morphology responds to environmental and behavioral factors. Considering that captive diet affects teeth and gums, the Hartstone-Rose Lab, conducted thorough background research on the differences in mechanical diet across captive and wild populations of lions (P. leo) and tigers (P. tigris). We obtained digital renderings, utilizing forty-three key landmarks, of a population of eighty-nine lion and tiger skull specimens, collected with a microscribe unit from collections at the American Museum of Natural History, and the Mammal Division of the Smithsonian Institution’s National Museum of Natural History. We performed three-dimensional morphometric examination of the renderings with Morphologika and MorphoJ software, and analyzed the samples with Principle Component Analyses to statistically discern the factors driving the variation within our sample. We found that captivity status is evident in felid cranial morphology even more than features of sexual dimorphism. The implications of this research could serve as a possible basis for the reformation of captive diet, thus improving husbandry, for its own sake, and improving the survivorship of any Panthera that may be reintroduced into their natural habitat. I am still participating in the Hartstone-Rose Lab and we hope to expand this research to include additional Pathera specimens as well as other carnivores, like bears and sea lions, that may be affected by captivity.
USC Connect Showcase

B.G.L.S.A. (Becoming a Gay Leader at a Southern Academy)
Mason Lee Branham, Psychology - Senior
Mentor: Ms. Kayla Lisenby, Multicultural Student Affairs
Learning to be proud of one’s identity extends beyond simply being ‘out’, and learning to be an effective leader is about a great deal more than merely joining a board. I learned both of these important lessons not in the classroom but from the inspiring individuals whom I met along my journey with the Bisexual, Gay, Lesbian, and Straight Alliance (B.G.L.S.A.). As President of B.G.L.S.A., I mastered my role as “Leader of the Gays”, but I also needed to master how to be a leader who openly identifies as gay. The pushback I received from my conservative University, at times, was daunting, but I know that I am a stronger person because of said “pushback”. I honed my facilitation skills, conquered the art of event coordination, and successfully lead B.G.L.S.A. to become Student Organization of the Year 2013. However, the most powerful characteristic in my arsenal came from my ability to look in the mirror and genuinely love the person staring back at me. My secret weapon stems from learning to love one’s self in order to love others. This acceptance rears confidence, and learning to be confident is, truly, how I Became a Gay Leader at a Southern Academy.

Leadership and Learning through Greek Organizations
Thomas Landzert, Political Science - Senior
Greek organizations play a major part in promoting academic success, cultivating personal growth, developing lasting friendships, pursuing philanthropic causes and fostering leadership. My most significant contribution to the University of South Carolina has been my commitment to improving the Greek life experience at the University. Becoming a member of Lambda Chi Alpha fraternity has greatly enhanced my college experience by allowing me to strive for academic excellence, grow socially and develop my leadership skills. These were all unexpected benefits. Through the experience of serving as president and leading the efforts to successfully rebuild our chapter, I learned to think critically to solve complex problems, interact with a diverse group of people, and communicate effectively. My presentation will discuss the insights I gained about my leadership abilities as well as the positive impact Greek life has had on my college experience and shaping me as an individual.

Growth: Personal & Professional
William O’Shields, Political Science - Senior
Developing yourself and an organization takes a lot of work and may seem to be two different things, but they really are not. I will go through my experience with becoming involved on campus and helping to grow a new student organization on campus, called Swype and how this helped to grow personally, both mentally and physically. Being a part of Swype helped me to understand people better; it helped me to gain valuable knowledge that will be useful and it also helped me to kick-start to become active again and make drastic changes in my life.

Insights of a Year at the Chinese University of Hong Kong (CUHK)
Ralph Perullo, International Business - Senior
I am a senior in the Moore Business School completing a double major in Finance and International Business, and minoring in Chinese Studies. As an incoming freshman, I was a member of the IBCE program (International Business Chinese Exchange) and spent my sophomore year at the Chinese University of Hong Kong (CUHK). My experiences in Hong Kong helped me to successfully navigate not only the remainder of my academic experience at USC, but also the job interviewing process, and land my dream job as a consultant with Deloitte Business Risk Consulting. Key Insight #1: Through my experiences on the CUHK varsity basketball team, I discovered that when there are language barriers, good communication may be difficult, but not impossible. Key Insight #2: By living in the International Dormitory on campus, I learned that exposure to and embracing cultural diversity broadens one’s perspective and ability to think outside of the box. Key Insight #3: Even though I am fluent in both Spanish and Mandarin, it wasn’t until I spent considerable time China and in Argentina that I learned how cultural immersion not only sharpens one’s language skills, but also expands and enriches one’s understanding of foreign business practices. Studying abroad brought a deeper, richer level to my understanding of people. I will be a better leader in my international business career because living in foreign countries has strengthened my communication skills, my ability to bring together and utilize a group of diverse talents, and think outside of my American culture.

Study Abroad: What’s Over the Pond?!
Kelsey Ashford, Public Relations - Senior
In the fall semester of 2013, I studied abroad in at the University of Kent in Canterbury, England. My biggest fear about going studying abroad was: Can I afford it? It was beneficial that I received the Benjamin Gilman Scholarship which allowed me to go overseas and gain diverse experiences academically, socially and culturally. After graduation, I plan to pursue a career as a public affairs specialist in the Office of Public Affairs with the FBI. The one thing that I’ve learned since studying abroad is this: Everything happens for a reason. I’m glad that I waited until last semester to study abroad. I’m glad that I’ve matured as a student because being there I’ve learned that you have to be on your toes if you want to be successful. The University of Kent is not for those who don’t enjoy a challenge. My experiences back home prepared me to study abroad and I am grateful for that. I would like my audience to understand my experiences abroad. I collaborated with the Study Abroad Office here at USC which allows students to publish a blog page. I created video blogs and posts that explained my process of studying abroad and my experiences. The University of Kent offered a full curriculum in English that allowed me to receive in-depth education. I was exposed to a more “hands-on” and less “hand-holding” atmosphere. Traveling to other countries also taught me about other cultures and perspectives that I wouldn’t have known in the U.S.
Applying for the Rotary Global Grant
Leila Heidari, Baccalaureus Artium et Scientiae - Senior
Throughout the process of applying for the Rotary Global Grant, I have learned about Rotary Clubs and Rotary International and how my own interests and goals fit within their mission and areas of focus. This scholarship funds one year of graduate level study abroad in one of Rotary’s areas of focus, and I have applied for the MSc in Public Health at the London School of Hygiene and Tropical Medicine, which aligns with Rotary’s area of focus in disease prevention. To apply for this grant, I began by attending a workshop in the Office of Fellowships and Scholar Programs (OFSP), which is an invaluable resource. The advisors in OFSP, as well as my sponsoring club, the Rotary Club of Five Points, have supported and guided me in this process. The application process includes selecting a graduate program, writing essay responses explaining why and how my completing this graduate program will help advance Rotary’s mission, seeking sponsorship from a local Rotary club, and interviewing at the District level. As a result, I have been nominated as one of the Global Grant Scholars from Rotary District 7770. Through applying, I have also reaffirmed my values and goals, clarified my academic and professional path, and met many inspiring Rotarians and fellow students. This scholarship provides a wonderful opportunity that opens doors for me in the future, and I hope that many more USC students will engage in the application process and seize this opportunity, as well.
The lighting best supported their efforts, causing me to continuously adapt my plans as the show evolved. Finally, self-evaluation was key throughout the process, as I critically examined each aesthetic decision in order to determine what worked best and what could be improved. The end result was a significant artistic achievement, but this experience is even more valuable for the many things I learned through the creative process.

**A History of Henry William Ravenel and His Impact on the 19th Century Botanical Community of the United States**

*Amie Rischbieter*, Biological Sciences - Senior  
Mentor: Dr. John Nelson, Biological Sciences  
When I first approached Dr. John Nelson (botanist and curator of The University of South Carolina's A.C. Moore Herbarium), I never thought that an independent study about plants could turn into a history lesson. I went to him with the expectation of collecting plants in the field, but I ended up working with archived, scientific specimens, some collected more than 170 years ago. After brainstorming possible project ideas, Dr. Nelson proposed that I catalogue the collection of Henry William Ravenel, a preeminent botanist from South Carolina. The collection, originating from Converse College, includes specimens collected in the 1800's by Mr. Ravenel and his many botanical colleagues. During the past three months, I have examined nearly 400 specimens. For each specimen I have catalogued information including the scientific name, the location at which it was collected, and the specimen's stage of restoration in the herbarium. One of the most challenging aspects of the project has been deciphering the handwriting of each of the collectors. Some of the labels are in poor condition, which makes them difficult to read, and in many cases, due to the handwriting characteristic of the 1800's, difficult to interpret. This ongoing project will serve to help illuminate the botanical history of the state of South Carolina and the social community of the time.

**Archiving the Robert S. Chamberlain Collection of Military Medals and Coins**

*Emily Eliza Still*, Psychology - Junior  
Mentor: Dr. Gail Barnes, Music  
My objective for this research project was to contact novice and veteran orchestra teachers to assess their perception of their undergraduate degree programs success in preparing them to teach orchestra and string classes in K-12 settings. Results indicate which programs or experiences are most beneficial to prepare a pre-service string and orchestra teacher. Results may be of value to current string teacher educators as they develop and refine their curricula.

**The 39 Steps Lighting Design**

*Ashley Pittman*, Theatre - Junior  
Mentor: Prof. Jim Hunter, Theatre and Dance  
I was the Lighting Designer for The 39 Steps, a fast-paced, four actor comedy based on Alfred Hitchcock’s movies, and a Main Stage production of the Department of Theatre and Dance in February 2014. In preparation for this production I began by analyzing the text for time of day and location, for mood and atmosphere, and for other indications of lighting requirements in the play. I then conducted in-depth research on previous theatrical productions of The 39 Steps, visual styles and storytelling methods in Alfred Hitchcock’s movies, moving light technology, and the Film Noir genre. I also researched images for inspiration in using light to create specific locations, including a train station, the Fourth Bridge, and an apartment in London. I implemented my design by translating my creative ideas into specific equipment, pattern, color, and placement choices that I could communicate to the production crew. Throughout the rehearsal process I collaborated with the directors, the other designers, and the actors to ensure that
of materials. In working on the collection's archival process, I learned quite a bit about military medals, nineteenth century wars, and Spanish conquistadors. More generally, I developed organizational skills while learning about the type of work done in an academic library.

What is Man? A Study in Philosophical Anthropology
Joseph Studemeyer, Religious Studies - Senior
Mentor: Dr. James Cutsinger, Religious Studies
What is a person? In discussions on law, philosophy, science & religion, a conception of the human person is often used to justify an action or defend a position, often to very different ends. My research brings together geographically and temporally distinct views of human personhood into a single volume, focusing particularly on the voices of the world’s contemplative traditions. I seek to provide a response to the central question of Philosophical Anthropology: namely, how are the ancient accounts related? I suggest that while cross-cultural interactions may explain some similarities, another hypothesis, one which is supported by language of transmission within the ancient texts, provides a more convincing response.

Overlapping Magisteria: An Inquiry Into the Compatibility of Athonite Cosmology with Trends in Modern Science
Joseph Studemeyer, Religious Studies - Senior
Mentor: Dr. Daniel Buxhoeveden, Anthropology
This project examined the perspectives of the ascetic monks of Mount Athos, GR on the nature of the relationship between science & religion. I attempted to discern if, from the Athonite perspective, cosmologies presented by modern science are compatible with traditional Christian conceptions of time, reality and matter. Though traditional religious groups and modern science differ widely in their premises, both groups claim to ostensibly be searching for the same thing: the true nature of reality. In opposition to the anthropologist Stephen Jay Gould’s claim that science and religion occupy “non-overlapping magisteria”, I propose that traditional religious communities, like the monks of Mount Athos, demand a unified cosmology.

Electrospun Polylactic Acid Nanofiber Scaffold for Mimicking Bone Tissue Morphology
Ibrahim Askar, Biomedical Engineering - Senior
Mentor: Dr. Esmaiel Jabbari, Chemical Engineering
Synthetic scaffolds have yet to match the mechanical strength found in true bone while maintaining sufficient biocompatibility and degradation rate. In this study, we utilized electrospinning techniques to fabricate polylactic acid (PLA) nanofibers used for the preparation of an osteomimetic scaffold. Electrospinning is a technique by which the polymer fibers are prepared from polymer solutions. Fiber diameter and alignment can be controlled by modifying the machine parameters. The primary method employed in an attempt to achieve an optimal scaffold design was to alter the calcium phosphate content present in the scaffold. Increasing CaP4 concentration results in an increased mechanical strength for the scaffold. Furthermore, channels were drilled orthogonally to the axis of the scaffold tubes to more closely mimic the perforated canals observed in osteons. The mechanical strength, morphology, and degradation rates of the synthetic scaffold were characterized throughout the study. Additional research may be carried out in cell work to determine the potential to be used in orthopedic applications. I have learned quite a bit from working in Dr. Jabbari’s lab. The opportunity to work in a laboratory setting has helped me to improve upon problem solving with a research team, and familiarizing myself with standard laboratory procedures. Additionally, I plan to pursue medical school, therefore having knowledge of how bone remodeling scaffolds are synthesized, as well as the current limitations and complications, will prove to be very useful in the orthopaedic field.

Targeting of COPZ1 protein using CTZ drugs
Taylor Barnes, Pharmacy - Sophomore
Mentors: Dr. Michael Shuttman, Drug Discovery and Biomedical Sciences
Mr. David Oliver, Drug Discovery and Biomedical Sciences
Cancer is defined as a disease caused by mutated cells uncontrollably dividing in the body. Currently, there is no cure for cancer. Most of the drugs used to treat cancer act by causing DNA damage or inhibition of signaling pathways. However, there are other ways to target cancer cells. ζ1, a subunit of the COPI complex, is the protein which we are targeting. COPI functions to transport other proteins from the Golgi to the endoplasmic reticulum. Loss of ζ1 function has been shown to cause cancer specific cell death. This is because COPZ2 is silenced in cancer cells, and they must rely on the ζ1 protein for COP1 function. When ζ1 is inhibited, cancer cells undergo cell death while normally functionally cells do not. The structural and biochemical analyses of ζ1 have determined that ζ1 does not function as an enzyme which makes designing drugs to target it difficult. Targeting protein-protein interactions is the only way to prevent the ζ1 subunit, from interacting with the rest of the COP1 complex. Inhibiting ζ1 interaction inhibits the entire COPI complex which results in cell death in cancer.
cells. Knowing this, the question becomes “How can we target protein-protein interactions?” Several other groups are also targeting protein-protein interactions with small molecules for cancer treatment. (Zhuang, Latorre, Shangary) Dr. Shtutman’s lab is collaborating with other laboratories to design small molecule inhibitors of the β1/COPI interaction. My research in Dr. Shtutman’s lab has been testing the small molecules for efficacy in a cellular system.

Reducing Inflammation Increases the Therapeutic Index of ATMi and Decreases Toxicity to Normal Brain

Caila Boyd, Biomedical Engineering - Junior
Mentor: Dr. Kristoffer Valerie, Virginia Commonwealth University; USC

Malignant glioma is the deadliest form of brain cancer with a median survival of only 12-15 months even with state-of-the-art treatment including surgery and chemotherapy. After radiation, tumors activate the ataxia telangiectasia mutated (ATM) kinase, a master regulator of the DNA damage response. Recently, we demonstrated that inhibiting ATM with KU-60019 (ATMi) overcomes radiation resistance in human gliomas and improves the survival of immune-compromised mice with the greatest response seen with p53 mutant gliomas. Since ATM knockouts and knockdowns show increased oxidative stress in the brain, we set out to determine the effect of the ATMi on normal brain. Furthermore, ATMi is required for apoptosis of neurons. Herein, we show that ATMi radiosensitization significantly improves the survival of C57bl/6 mice growing syngeneic gliomas. To examine the role of inflammation in glioma progression and the response to the ATMi, we added a nonsteroidal anti-inflammatory drug (NSAID), diclofenac to suppress inflammation. We found a trend towards improved survival with diclofenac added to the ATMi regimen. The effects of ATMi and radiation on normal brain are unknown. Therefore, we examined neuron viability/toxicity by immunostaining (NeuN), and also scored for degenerating neurons (Fluoro-Jade B) and apoptosis (cleaved-caspase 3). As expected, a significant decrease in viable neurons and increase in degenerating neurons and apoptosis was observed in mice treated with radiation. Surprisingly, ATMi alone had no effect on neuron viability and did not induce neurodegeneration or apoptosis. Importantly, ATMi did not further increase radiation toxicity. This suggests that ATMi alone does not induce neuron damage nor increases radiation toxicity. We speculate that the lack of toxicity to normal brain is due to a normal p53 response. Altogether, diclofenac reduces the toxicity of radiation to the brain and improves ATMi radiosensitization and survival suggesting that diclofenac may have therapeutic potential by improving the therapeutic ratio.

Role of Conformational Switching of Human Thymidylate Synthase in Response to Oxidative Stress

Kathryn Kingsmore, Biomedical Engineering - Senior
Mentor: Dr. Sondra Berger, Drug Discovery and Biomedical Sciences

Thymidylate synthase (TS) is an enzyme that is essential for the synthesis of DNA. TS has been studied extensively as a target for cancer drug development because TS is required for the growth of tumor cells and elevated levels of TS are associated with increased risk for tumor formation. Structural studies revealed that human TS (hTS) populates a novel conformation and that this conformation lacks catalytic activity. Stabilization of hTS in this conformation, termed the inactive conformation, offers a novel approach for inhibition of hTS activity; however, the function of the inactive conformation is unknown. Thus, to further investigate the role of the inactive conformer, the cytotoxic effects of acute and chronic exposures to tert-butyl hydroperoxide (TBHP), an oxidizing agent, were conducted. Furthermore, the relationship between hTS conformation and the cellular response to acute and chronic oxidative stress was analyzed. To accomplish these objectives, three primary techniques were used. These techniques included the cultivation of Chinese hamster lung (CHL) cells that express hTS in active or inactive conformations, analysis of cytotoxic effects by determination of cell protein concentration through Bradford or BCA assays, and subsequent Western blot analysis. The A191K cells seemed to be more resistant to the TBHP as they formed colonies when chronically exposed to the oxidizing agent, suggesting that the inactive conformer of hTS has an advantage in environments with oxidative stress. Investigation of the response of the effects of TBHP on the active conformation is ongoing and further analysis of the cellular biomarkers of oxidative stress is being conducted.

Customized Three-Dimensional Vascular Tissue Fabrication Strategies

Brooks Lane, Biomedical Engineering - Senior
Mentor: Dr. John Eberth, Cell Biology and Anatomy

Cardiovascular disease remains the leading cause of death in the developed world and researchers seek unique engineering strategies to study and treat vascular diseases such as atherosclerosis or abdominal aortic aneurysms. Two-dimensional cell-plate studies fail to capture crucial features of vascular disease causing a shift to three-dimensional (3D) studies with 3D engineered tissue as an essential laboratory tool. Traditionally, tissue engineering has been limited to simple tubular vessels which do not accurately represent anatomical and physiological geometries or those found in diseased states. This, in turn, has heightened the need for improved methodologies to create geometrically tunable scaffolds. Complex vascular geometries, such as a fusiform aneurysm, a thoracic aorta from a sheep, and U-shape vessels were modeled with CAD and Finite Element Analysis software and used to create polylactic acid (PLA) plastic molds through the use of a 3D printer. Polyvinyl alcohol (PVA) is used with the 3D printer in order to make a water soluble lumen insert. Collagen, the most abundant protein in the human body, is biologically compatible and is one of the main structural components in physiological vascular tissue. Acid-solubilized collagen was manipulated within these molds by altering solution pH to a more basic configuration causing collagen cross-linking and polymerization within the molds. The PVA lumen was then washed away leaving a 3D collagenous scaffold fit for cell-seeding. These collagenous scaffolds can be used in order to fully understand the relationship between geometry, mechanical function, and cellular function.
HIV-1 transgenic rats exhibit increased synaptosomal [3H]dopamine uptake in prefrontal cortex and striatum

Richard McCain, Biological Sciences - Sophomore
Mentor: Dr. Jun Zhu, Drug Discovery & Biomedical Sciences

The central dopamine (DA) neurotransmission plays a crucial role in the development of neurocognitive dysfunction in patients with HIV-1 associated neurocognitive disorders (HAND). We have demonstrated that HIV-1 Tat protein in vitro inhibits DA transporter (DAT) allosterically and modulates dopamine binding sites on DAT in rat striatal synaptosomes and cells expressing human DAT. To understand how in vivo expression of HIV-1 viral proteins influences DAT function, kinetic analysis of [3H]DA uptake in prefrontal cortex (PFC) and striatum, and [3H]WIN35,428 binding in striatum were determined in HIV-1 transgenic (HIV-1Tg) and Fisher 344 rats. Compared to Fisher 344 rats, the maximal velocity (Vmax) of DAT-mediated [3H]DA uptake into prefrontal and striatal synaptosomes in HIV-1Tg rats was increased by 34% and 32%, respectively, whereas the Km values for DA uptake were reduced in striatum but not in PFC of HIV-1Tg rats. In addition, HIV-1Tg rats exhibit decreased maximal binding sites (Bmax) of [3H]WIN35,428 and increased DA uptake turnover rate (Vmax/Bmax) in striatum, compared to Fisher 344 rats. To explore the potential mechanism(s) underlying alteration of DAT function in HIV-1Tg rats, our ongoing study is to determine whether the increased DA uptake in both regions is due to redistribution of membrane DAT or changes in DAT-associated proteins in membrane microdomains. Collectively, these results suggest that neuroadaptive changes have occurred in the HIV-1Tg rats that might help to compensate for HIV-1 viral protein-induced inhibition of the DAT function.

Homodimerization and Phosphorylation Control the Subcellular Localization of PDE11A4

Geetanjali Pathak, Baccalaureus Artium et Scientiae - Senior
Mentor: Dr. Michy Kelly, Pharmacology, Physiology and Neuroscience

Cyclic nucleotides (cAMP and cGMP) are second messengers that are key players in intracellular signaling and are therefore critical for physiological processes. They are known to be degraded only by phosphodiesterases (a superfamily of enzymes), therefore phosphodiesterases are crucial for physiological function. We are interested in the most newly found phosphodiesterase: PDE11. PDE11 has 4 isoforms. We are currently studying PDE11A4, which has the longest N-terminal with confirmed phosphorylation sites and both GAF domains: GAF-A and GAF-B. The GAF-A domain binds cGMP and the GAF-B domain is a protein-protein binding domain that mediates homodimerization of PDE11A4. Currently, nothing is known about what signals control the subcellular localization of PDE11A4, but our lab hypothesized that homodimerization via the GAF-B domain and phosphorylation of the N-terminus may impact PDE11A4 trafficking. We used immunoprecipitation to validate that our full length PDE11A4 does bind the isolated GAF-B domain. Transfection, microscopy, fractionation, and Western Blotting were used to determine the effects of disrupting dimerization or phosphorylating the N-terminus on the subcellular localization of PDE11. We found that the phosphorylation of S162 (closer in proximity to the GAF-B domain) shifted the PDE11A4 to the cytosol of cells whereas the phosphorylation of S117 and S124 (further in proximity from the GAF-B domain) promoted the punctate nature of PDE11A4 labeling within cells. Furthermore, the addition of the isolated GAF-B domain to the different constructs promoted the cytosolic nature of PDE11A4 within the cells.

High Throughput Drug Screening System for Induction of Interferon β

Jankiben Patel, Biological Sciences - Senior
Mentor: Dr. Ashok Chauhan, Pathology, Microbiology, & Immunology

When viruses first infect cells, the host’s innate immune system comes into effect to provide immediate defense against the pathogen. Interferons (IFNs) are proteins that are secreted by cells of the immune system and they are known to enhance the host immune response, particularly antiviral immunity. Because IFNs are an integral part of the immune system, immunostimulants should be able to induce IFN activity in human cells. The idea was to screen the drug library of several thousand compounds to induce IFN-β. To screen the drug library, an interferon assay system is needed. In this project, we used a regulatory DNA region (promoter) of IFN-β and fused it with a green fluorescent reporter gene (ZS green). This DNA-cassette of IFN-β promoter and ZS gene in a plasmid vector was stably established in HEK 293 cells. The cells were then treated with Poly I:C, an immunostimulant, to see if it would stimulate IFN activity in the cells. No significant differences were found between the treated and untreated reporter cells. This could mean that there was something in the cells that was suppressing the IFN activity even when the cell was introduced to an immunostimulant. More research in this area will lead to effective ways of amplifying IFN synthesis, which can strengthen the innate immune system and treat certain diseases.

Cell-Based Delivery of Angiogenic Factors from 3-D ADSC Cultures for Vascularization of Engineered Tissues

Lindsay Rucker, Biomedical Engineering - Junior
Mentor: Dr. James Blanchette, Chemical Engineering

Adipose derived stem cells (ADSCs) produce angiogenic factors and have demonstrated the ability to promote vascularization. Their application in cell-based tissue engineering therapies could provide advantages over synthetic growth factor delivery systems because of their responsiveness to biological cues and their physiologic delivery profiles. Because hypoxia can cause upregulation of angiogenic factors, such as vascular endothelial growth factor (VEGF), spheroid culture of ADSCs could further enhance their therapeutic effects. In a previous study, our lab found that differences in spheroid size and external oxygen concentration result in different levels of hypoxia inducible factors (HIF) activation and VEGF secretion. In this study, we attempted to determine how endothelial cell behavior is influenced by the enhanced secretion VEGF from ADSC spheroids. Media conditioned with ADSC spheroids of different sizes in different oxygen concentrations was applied to endothelial cell monolayers and the resulting degree of proliferation was quantified colorimetrically. The degree of directed migration through a transwell membrane of endothelial cells cocultured with ADSCs was also determined through a colorimetric assay. 10,000-cell and 60,000-cell ADSC spheroids cultured in 2% oxygen induced proliferation equally.
as well as the VEGF supplement control. 10,000-cell ADSC spheroids cultured in 2% oxygen promoted more migration of endothelial cells than the positive VEGF control while 10,000–cell ADSC spheroids in 20% promoted less migration than the VEGF control. These results suggest that while ADSC spheroids show promise as an angiogenic therapy, consideration of geometry and implant oxygenation will be necessary to optimize their therapeutic efficacy.

Loss of petal initiation in Arabidopsis ant ail double mutants is not due to reduced auxin levels

Olivia Haley, Biological Sciences - Junior
Mentor: Dr. Beth Krizek, Biological Sciences
The shoot apical meristem, a dome of cells at the apex of a plant, gives rise to flower primordia around its periphery. These flower primordia give rise to four types of floral organs (sepsals, petals, stamens and carpels) at precise positions within four concentric rings or whorls. These initiation sites are defined by accumulation of the plant hormone auxin. Four petal primordia arise in the second whorl in positions just inside of and between two adjacent sepal primordia in the first whorl. Previously it was shown that defects in petal initiation in several Arabidopsis mutants could be rescued by a transgene (PTL:iaaH) that confers auxin biosynthesis in the intersepal zone, a region adjacent to the site of petal initiation. Four members of the AINTEGUMENTA/PLETHORA (AIL/PLT) gene family: ANT, AIL5, AIL6 and AIL7 play important roles in petal initiation and growth. We hypothesized that the petal defects in ant single mutants and ant ail5, ant ail6 and ant ail7 double mutants are due to reduced auxin levels. We tested our hypothesis by transforming these mutants with the PTL:iaaH transgene. We have not observed any rescue of the petal defects in one PTL:iaaH ant ail5 line and six PTL:iaaH ant ail7 lines homozygous for the transgene. These preliminary results suggest that the petal initiation defects in these mutants are not a consequence of reduced auxin levels.

Cancer research

Oran Logan, Chemistry - Junior
Mentor: Dr. Michael Shhtutman, Drug Discovery and Biomedical Sciences
This research is designed to discover a method in which cancerous cells can be put to death through apoptosis while still allowing normal healthy cells to live. In this case specifically, the focus will be narrowed to gaining evidence and factual knowledge pertaining to the COPI complex. The COPI complex is one of the three major vesicular transport systems in cells, each of which is essential for the sorting and transport of proteins and lipids to their proper destination. COPI is specifically involved in the transport of materials from the Golgi apparatus to the Endoplasmic Reticulum, Golgi stack maintenance, autophagosome maturation, and early endosome recycling. COPI is also important for the activity and clearance of several toxins Shiga toxin, ricin, and Pseudomonas exotoxin A which all require proper transport to the ER for proper activity. The functionality of the COPI complex is not completely known, including the roles of the subunit isoforms, recruitment, uncoating, and regulators in COPI function. With this lack of information on the functionality of COPI it is important to develop methods of discovering new information on the system. This experiment is a study using Brefeldin A combined with a shRNA screen to identify potential regulators of COPI function in mammalian cells. Brefeldin A is an inhibitor of COPI function through inhibition of the ARF-GEF, GBF1. The experiment is setup to add a library
of shRNA to a population of HeLa cells and then treating them with Brefeldin A for a 3 day period. The BFA will have killed majority of the HeLa cells after the 3 days. The remaining cells that survived the BFA treatment should then, in theory, contain an shRNA which provides the cell with a resistance against the BFA treatment that allows it to continue to live. Knowing that shRNAs only target a single gene, we can identify which gene that the shRNA targeted and silenced during the BFA treatment. We can therefore conclude that the gene may play a role in survival during COPI dysfunction.

**Influence of Genes Downstream of FOXO on Lifespan of Daphnia pulex and Daphnia pulicaria**

*Jacob Nelson, Biological Sciences - Senior*

Mentor: Dr. Rekha Patel, Biological Sciences

Cellular stress is the strongest contributing factor influencing the aging process in living organisms. As a result of vital metabolic processes taking place at the cellular level an accumulation of molecules that induce cellular stress occurs. These molecules are referred to as free radicals, with the superoxide anion being the most common. Once the stress on the cells reaches a threshold their functionality decreases, and the aging process continues. Within model organisms, like Caenorhabditis elegans, molecular biologists have discovered a transcription factor named Daf-16 whose expression and subsequent regulation appears to be directly related to the lifespan of an organism. In other model organisms in which this transcription factor has been identified it is termed FOXO. This transcription factor regulates the expression of many genes, such as superoxide dismutase, heat shock protein 25, and catalase whose primary function is to reduce cellular stress. Daphnia pulicaria and Daphnia pulex are two closely related ecotypes with drastically different lifespans. Daphnia pulicaria live 60-65 days on average, while Daphnia pulex live for approximately 25-30 days. By examining the expression of FOXO, as well as the genes regulated by this transcription factor; we can compare the longevity related gene expression between these two ecotypes with different lifespans. Using the data obtained from this experiment a strong case can be made for the future use of Daphnia as a model organism for molecular aging studies.

**Investigation of Diethylstilbestrol Regulated MicroRNAs in T cells**

*Drasti Patel, Biological Sciences - Junior*

Mentors: Dr. Narendra Singh, Pathology and Microbiology  
Dr. Mitzi Nagarkatti, Pathology and Microbiology  
Dr. Prakash Nagarkatti, Pathology and Microbiology

Diethylstilbestrol (DES) is a synthetic estrogen which was used in the US to prevent spontaneous abortion. Approximately 5–10 million expectant mothers and developing fetuses were exposed to DES during this time. This exposure has caused long-term adverse effects to mothers and has been shown to increase the risk of breast cancer. DES has also been shown to affect immune functions leading to immune suppression/autoimmune diseases later in life. The goal of this research was to determine the effect of DES on T cell functions and examine microRNA profile in T cells and their role in the regulation of gene(s) leading to immune suppression. T cells harvested from C57BL/6 mice were activated with ConA over night. The following day, T cells were treated with vehicle (DMSO) and various doses (5, 10, and 20 μM/ml) of DES for 24 hours. There was a dose-dependent apoptosis in T cells in the presence of DES when compared to vehicle; demonstrating DES-mediated killing of activated T cells. Real-Time PCR was used to determine expression of several genes in the treated T cells. There was upregulation of Fasl and Foxp3 but downregulation of COX-2 and IL-17 expression in T cells treated with DES, when compared to vehicle-treated T cells. The analysis of microRNAs profile of T cells revealed dysregulation of a large number of microRNAs in the presence of DES. Presently, we are in the process of examining upregulated and downregulated microRNAs and their role in the regulation of various genes, pathways, and diseases.

**Correlation of Macrophage Phenotype with Collagen Type VIII Deposition in Human Atherosclerotic Plaques**

*Daniel Peters, Biomedical Engineering - Senior*

Mentor: Dr. Susan Lessner, Cell Biology and Anatomy

Coronary artery disease (CAD) is the most common type of heart disease and the number one cause of death for both males and females in the United States. The disease is characterized by plaque that accumulates on the artery wall leading to eventual occlusion of vital blood vessels. This disease occurs within other areas of the vascular system and is generally referred to as atherosclerosis. The exact mechanisms of atherogenesis are not fully characterized. Macrophages are major contributors to the growth of atherosclerotic plaques. It is now thought that macrophages have a spectrum of phenotypes ranging from phagocytic (M1) to wound healing (M2), the latter having an important role in both extracellular matrix (ECM) degradation and deposition. Since plaque ECM composition determines the mechanical strength of a plaque at high shear flow areas, it also correlates with the likelihood of further complications associated with plaque rupture. Collagen type VIII is a network-forming collagen that accumulates in the ECM of atherosclerotic lesions. Collagen VIII is thought to play a role in plaque stabilization by providing anchor points for migrating smooth muscle cells (SMCs), elastic fibrils and other mechanical components. This collagen type is normally found in wound healing events and shown to be part of the secretome of (M2) macrophages. Because of its implications in plaque stability, it is important to determine which macrophage phenotype(s) co-localize with areas of collagen VIII deposition within a plaque in relation to fluid shear stresses at the surface.

**Use of PLGEOF And Related Nanoparticles for Controlled Growth Factor Release**

*George Plisko, Biomedical Engineering - Senior*

Mentor: Dr. Esmaiel Jabbari, Chemical Engineering

Tissue engineered scaffolds support cells of interest with structure and organization, while exposing the cells to growth factors to ensure proper cell maturation. This project studies the potential of novel nanoparticles based on poly(lactide-co-glycolide ethylene oxide fumerate) (PLGEOF). Several versions of this copolymer were fabricated into nanoparticles to verify their ability to store and release these growth factors in a controlled manner. Growth factor solutions, each containing one variant of this copolymer, were dialyzed against deionized.
water to initiate self-assembly of the nanoparticles, while also loading them with
growth factor in the process. For this study, these particles, and the controls, were
loaded with bovine serum albumin (BSA) to model their patterns of release over
30 days for large protein growth factors, such as bone morphogenetic proteins. The
target growth factor peptides were also fabricated, but the release studies for
these peptides are still in progress. By the end of week 2, the percent BSA release
for the nanoparticles PLGEOF(LA70:GL30), PLGEOF(LA90:GL10), PLEOF, PLCEOF(LA70:GL30), and PCEO,
was approximately 100%, 85%, 47%, 18%, and 6%, respectively. The mass loss of these nanoparticles at day 14 was
approximately 80%, 52%, 41%, 20%, and 8%, respectively. This study has
demonstrated the ability of these nanoparticles to release growth factor and
degrade at a variety of different rates, giving them the potential to meet the needs
of many tissue engineering applications.

**The Effect of Caloric Restriction on Aging When it is Limited to Specific Phases of Maturity**

*Christopher Stout*, Biological Sciences - Senior

Mentor: Dr. Jeff Dudycha, Biological Sciences

This study was performed to examine the effects of caloric restriction on aging
when limited to specific periods of lifespan with various durations. Individuals
were divided into 8 treatment groups of 100 individuals per group. Each group
received either the high-calorie diet of 20,000 cells/mL or the low calorie
diet of 5,000 cells/mL during three specific phases of their lifespan: juvenile,
maturity, and adulthood. Six groups received variable food levels, while positive
and negative control groups received 5,000 and 20,000 cells/mL, respectively,
throughout their lifespan. Individuals who received the restricted diet for only
6 days lived, on average, 0.614 days longer than those whose diet was restricted
for 12 days or more, indicating that duration did not play a significant role. All
treatments had a greater mean survival time than the negative control except
groups B and C, both of which had a restricted diet during maturation (days 6 to
12). Group B, which had the restricted diet from days 6-12 only, had the shortest
mean survival time of 23.7 days, indicating that a restricted diet during this period
causd a reduced lifespan. Furthermore, the three groups (A, E, and F) that did not
receive a restricted diet during this period had the highest mean survival times at
27.8, 28.2, and 28.6 days, respectively.

**What Happens in Romania... Comes Back to the United States and Becomes a Quilt**

*Kaitlyn Torres*, Biological Sciences - Senior

*Ashley Ehlers*, Political Science - Senior

Mentor: Dr. Richard Showman, Biological Sciences

Our senior thesis project is a quilt that chronicles our experiences in Romania and
the operating room, and the types of sutures and surgeries we learned on that
trip. We have included some of the most common surgeries we saw: anastomosis,
oophorectomy, mastectomy, appendectomy, cholecystectomy and inguinal hernia
repair. The final product of this quilt shows every level of the abdominal muscles
and organs from the anterior skin to the kidneys. The basis of our research is
from our time in Romania. With the assistance of Dr. Blanck, the gross anatomy
professor at the USC School of Medicine, we gained access to the gross anatomy
lab to study the cadavers to create a more comprehensive quilt with an exact
interpretation of organs based on measurements and observations taken in the
lab. We portrayed the image of a patient’s body on the operation table. The
majority of the body will be covered by “sterile” material with the abdominal
organs exposed and the skin and muscle layers visible. The location of each
operation will be denoted by the suture knots that would have been utilized at
the operation site. In addition, we have made the organs being “operated” on,
removable. In order to increase interaction with our piece, we will demonstrate
hand tying suture knots, and give the option to “suture” the abdomen shut “post-
operation.”

**Homeologous Recombination**

*Bryan Wehrenberg*, Biological Sciences - Senior

Mentor: Dr. Alan Waldman, Biological Sciences

Homologous recombination is an important method by which mammalian
cells accurately repair double-strand breaks (DSB) in DNA during the S and G2
phases of the cell cycle. Cells tend to maintain strict homology standards for
sequences utilized when undertaking a repair recombination event, ensuring
that the donor sequence used in the repair process is identical to the damaged
recipient sequence. Lessening homology requirements is dangerous for the cell
as it can lead to genomic instability and therefore a slew of problems including
cancer. In some cases homeologous recombination, recombination between
two imperfectly-matched sequences can occur in lieu of normal homologous
recombination, resulting in errors. As part of a larger study, we undertook
a careful examination of whether mismatched sequences can undergo a
recombination repair event. We constructed DNA substrates containing both
gene with a disabling mutation, and a sequence that is capable of restoring
function to the mutated gene through the process of a recombination event.
The donor sequence is similar to the mutant recipient but contains several
mismatches, meaning that the two sequences are not totally homologous. The
particular donor examined here contained 25 base-pair mismatches surrounded
by regions of homology with respect to the recipient. We allowed cells containing
the substrate to either undergo spontaneous recombination, or we provoked
recombination with an induced DSB and then recovered recombinants by genetic
selection. Analysis of these recombinants will be reported.
LabVIEW programming of AC reflectance and thermal infrared imaging for forensic science  
Nicholas Boltin, Biomedical Engineering - Senior  
Mentor: Dr. Michael Myrick, Chemistry and Biochemistry  
AC reflectance and thermal imaging aids in visualizing and distinguishing blood stains important in forensic investigations. A previous generation of instrumentation we developed used a camera with a nonstandard interface, only 12-Bit readout, and an asynchronously-modulated light source. LabVIEW was used to collect the images, but all processing was performed in Matlab to measure reflectance data. An updated instrument has been programmed in the LabVIEW environment to increase functionality and ease of use. We have recently introduced light sources that can be synchronously modulated, as well as a lower-cost FLIR thermographic camera. The addition of this camera gives us a 16-bit readout and digitally-controllable I/O ports with a gigabit ethernet interface and an electronically controllable focus. This poster will describe how the LabVIEW language was used to program this instrument for AC reflectance and thermal re-emission imaging. How the tendency of the camera to produce striations, focus improperly, and to interrupt data acquisition for internal calibration were minimized by processing and low level control. We will show example data acquired and processed with the new control software. We will also show how post processing techniques are important when doing visual data analysis.

Antifolate-mediated Degradation of Human Thymidylate Synthase  
Jillian Claire, Biochemistry and Molecular Biology - Senior  
Mentor: Dr. Qian Wang, Chemistry and Biochemistry  
The ubiquitin-proteosome system (UPS) is an intracellular quality-control system responsible for regulating the homeostasis of the proteome, part of which is the regulation of errant protein folding. The monitoring of exposed hydrophobic residues, the trademark of misfolded proteins, is regulated by molecular chaperones and is a target for proteolysis via the UPS. However, some intracellular substrates are subjected to an ubiquitin-independent pathway. The enzyme Thymidylate Synthase (TS) presents such an example. This has made TS a target for substrate and co-factor inhibitors in cancer therapies. The administration of antifolates and 5-fluorouracil has become a clinical standard for treating colorectal cancer. However, the treatment regimens are thought to augment TS stability and promote TS expression, reducing the efficacy of these therapies. This work will examine the implementation of a TS-specific degradation system using an antifolate, a biocompatible linker, and a hydrophobic-ligand designed to mimic the state of proteins necessary to promote degradation of TS.

Materials synthesis of crystal oxides via high and low temperature flux methods  
Kendall Hughey, Chemistry - Senior  
Mentor: Dr. Hans Conrad zur Loye, Chemistry and Biochemistry  
Derivatives of neodymium germanium oxide crystals [Na2NdGeO4(OH)4 and Na5Nd4Ge4O16(OH)] have been synthesized via a high temperature flux reaction. The main focuses of the project included solving the unique crystal structures and determining the ideal reaction conditions under which to obtain the compounds separately. The drive behind this research was the discovery of two pairs of unpaired electrons, which leads to paramagnetism. Complex luminescent rare-earth containing oxides were initially investigated in our laboratory as a method of obtaining a high efficiency, low-cost alternative to LED lighting. My research involved the successful co-doping of two or more rare earth oxides in a high-temperature flux reaction to determine the feasibility of combining the oxides as well as the optical properties that the co-doped compounds emit. Zeolites act as catalysts for reactions that take place within the framework structure. We have created the first zeolite that does not contain aluminosilicate minerals, but rather replaces them with a transition metal, iron. This discovery will increase the catalytic activity of zeolites and display interesting magnetic properties. The crystals were grown in a low-temperature flux reaction via a teflon bomb method.

Exploration of Competitive Monosaccharide Inhibitors of Trypanosoma cruzi Glucokinase  
Sean Kearns, Biology - Sophomore; USC Beaufort  
Mentor: Dr. Edward D’Antonio, Chemistry; USC Beaufort  
Chagas’ disease (or American Trypanosomiasis) is a neglected tropical disease caused by Trypanosoma cruzi protozoa. Worldwide, there are approximately 8 million people infected by T. cruzi parasites, which is life threatening in advanced stages. Available medicines for Chagas’ disease are problematic because they are intolerable (lead to adverse side effects) and toxic; therefore, drug development is highly mandatory in this area. New insights into trypanosomal drug targets reveal that T. cruzi cells are highly susceptible when glycolysis, an energy-producing biochemical pathway, is inhibited. The goal of this study is to design and test for potent competitive inhibitors of gateway enzymes in glycolysis, such as glucokinase and hexokinase. Glucokinase phosphorylates its substrate glucose to product glucose 6-phosphate at the carbon-6 (C-6) hydroxyl in the presence of ATP to help trap glucose in the cells. Glucose-analogues that lack this key hydroxyl group at C-6 were used as a starting-point, primarily because C-6 phosphorylation cannot occur. The method used on hypothesizing for potent inhibitors was structure-based drug design using available protein databank coordinates, such as PDB entry 2Q2R. These inhibitors were then tested against T. cruzi glucokinase (TcGlcK), in-vitro. The X-ray crystal structure of TcGlcK complexed with a rare 6-deoxy glucose-analogue compound will be presented along with its corresponding inhibitor kinetics. These results will follow with a discussion about the long-term objective, in which a selective inhibitor of TcGlcK will be developed with respect to the human homologue.
Analysis of Polar Ring Galaxies in the Infrared
Kyle Lackey, Physics - Junior
Mentor: Dr. Varsha Kulkarni, Physics and Astronomy
We have proposed to investigate the astronomical bodies known as Polar Ring Galaxies (PRGs) through the use of a relatively new tool, the MOPEX (MOsaicker and Point source Extractor) software package, which itself must be investigated in order to understand its capabilities, limitations, and applications in terms of the Infrared Imaging of extragalactic objects.

Fatty Acid Specificity of the P450 Decarboxylase OleT(JE)
Megan Mitchell, Biochemistry and Molecular Biology - Sophomore
Mentors: Dr. Thomas Makris, Chemistry and Biochemistry
Mr. Job Grant, Biochemistry
Mr. Chun Hsieh, Biochemistry
The metal catalyzed oxidative cleavage of inert carbon-carbon bonds is a central reaction to a variety of industrial transformations, including the production of fuels from renewable biomass sources. Recently, a P450 peroxigenase (OleT(JE)) has been isolated that efficiently decarboxylates fatty acids, yielding carbon dioxide and alkene co-products. Substrate chain length specificity of OleT(JE) was explored using optical absorption spectroscopy as the binding of long chain fatty acids (C18 and above) results in a significant conversion of the heme-iron from low- to high-spin. The optical data was used to determine equilibrium binding constants for each substrate. Binding of short chain fatty acids did not result in significant spin state conversion, however the displacement of a bound long chain substrate was assessed through a reverse-binding approach. The binding reaction was additionally explored using transient kinetic stopped-flow techniques, which indicated a slow and complex binding reaction. Together, these results indicated a dramatic chain length selectivity of P450 OleT(JE) for fatty acid substrates, which may be critical for utilizing this enzyme for the synthesis of short alkene products in the future.

Experimental Setup for Magnetic-Field Tests of Small-Sized Light Sensors at Jefferson Lab
Cameron Nickle, Physics - Senior
Mentor: Dr. Yordanka Ilieva, Physics and Astronomy
In preparation for the Electron Ion Collider, small-size sensors, such as Silicon Photo-Multipliers (SiPM) and Multi-Channel Plate (MCP) photomultiplier tubes are being considered for use in a Detection of Internally Reflected Cherenkov Light (DIRC) detector. Since DIRC will be operated in the strong field of a magnetic spectrometer, the gain of the sensors must be evaluated in high magnetic fields. A dedicated test facility, which makes use of a solenoid magnet with magnetic fields of up to 4.7 T, is being developed at Jefferson Labs. This paper describes the configuration and operation of an entirely non-magnetic dark box that will house the sensors during the tests and allows the sensors to be rotated about two axes relative to the field. This paper also describes the development of a ROOT-based analysis method to extract the gain of SiPMs from raw Analog-to-Digital-Converter (ADC) spectra as a function of the intensity of the magnetic field and the sensor’s relative angle to the field. This dark box and the analysis method was tested with Hamamatsu multipixel SiPMs and our results are consistent with previous measurements of the same sensors. The methodology developed in this work will be routinely used for the upcoming high-B field tests.

Identification of Critical Regulatory Elements Controlling Gene Regulation in E. coli
Priyanka Patel, Biological Sciences - Junior
Mentor: Dr. F. Wayne Outten, Chemistry and Biochemistry
Transition metals, such as iron and nickel, are important cofactors that carry out essential roles in biological function. However, even essential metals can be toxic if present in excess. Cells must coordinate the transcription of multiple genes that encode proteins used for transporting, storing, and incorporating metal ions, processes known collectively as metal homeostasis. The nickel-responsive transcription factor YqjI represses its own transcription in addition to repressing the transcription of the neighboring yqjH gene, which is involved in iron homeostasis. Previous studies suggest that YqjI regulates transcription of the target genes yqjI and yqjH by blocking access of the RNA polymerase enzyme to the target promoters. This regulation is reversed in the presence of elevated intracellular nickel that binds directly to YqjI, thereby allowing yqjH and yqjI expression to increase under high nickel levels. β-galactosidase assays conducted on yqjI promoters fused to lacZ were used to measure the effects of the deletion of upstream DNA sequences on the transcription of the downstream yqjI gene. Deletions of DNA sequences -41, -66, and -146 base pairs upstream of the transcriptional start site were constructed in the promoter-lacZ fusions. By comparing the transcription levels of each gene fusion construct, we were able to identify regions essential to the transcription of yqjI, including potential binding sites for unknown regulatory factors. Based on these results, the most substantial change in promoter activity occurred when the DNA between -146 and -66 bp was deleted, upstream of yqjI, with another notable change between -66 and -41 bp. Now I will narrow down specific sequences within these regions for further study.

Mechanistic Investigation and Substrate Expansion of Silylation-Based Kinetic Resolutions
Julia Pribyl, Chemistry - Senior
Mentor: Dr. Sheryl Wiskur, Chemistry and Biochemistry
In preparation for the Electron Ion Collider, small-size sensors, such as Silicon Photo-Multipliers (SiPM) and Multi-Channel Plate (MCP) photomultiplier tubes are being considered for use in a Detection of Internally Reflected Cherenkov Light (DIRC) detector. Since DIRC will be operated in the strong field of a magnetic spectrometer, the gain of the sensors must be evaluated in high magnetic fields. A dedicated test facility, which makes use of a solenoid magnet with magnetic fields of up to 4.7 T, is being developed at Jefferson Labs. This paper describes the configuration and operation of an entirely non-magnetic dark box that will house the sensors during the tests and allows the sensors to be rotated about two axes relative to the field. This paper also describes the development of a ROOT-based analysis method to extract the gain of SiPMs from raw Analog-to-Digital-Converter (ADC) spectra as a function of the intensity of the magnetic field and the sensor’s relative angle to the field. This dark box and the analysis method was tested with Hamamatsu multipixel SiPMs and our results are consistent with previous measurements of the same sensors. The methodology developed in this work will be routinely used for the upcoming high-B field tests.
Computing

IT Capstone Project – Plan and host IT ‘discovery day’ for high school students at IT-oLogy

*Diego Ampuero*, Integrated Information Technology - Senior  
*John Wertz*, Integrated Information Technology - Senior  
*Eric Claggett*, Integrated Information Technology - Senior  
*Craig Murphy*, Integrated Information Technology - Senior  

Mentor: Dr. Karen Patten, Retailing

The annual IT ‘Discovery Day’ for high school students is an annual workshop, sponsored by IT-oLogy. IT-oLogy is a non-profit collaboration of businesses, academic institutions and organizations dedicated to growing the IT talent pipeline, fostering economic development and advancing the IT profession. The goal of our project was to work together with IT-oLogy to inform high school students about careers in information technology, while teaching the students about some of the technology that is currently out there and the possibilities involved with each technology. By informing the students about jobs in the IT world, we hope to encourage those students to major in Information Technology at USC. Our Capstone Project team planned and developed a series of technology workshops including 3D printing, Raspberry Pi, and video game design. This year we recruited a USC University Technology Student panel that consisted of IT, Computer Science, and Library Information Science students. Over 50 high school students attended the one day workshop. Based on verbal student feedback, they found the day really interesting and a majority said they enjoyed the 3D Printing. We would appreciate the opportunity to present a poster at the 2014 Discovery Day.

3D Modeling and Art Assets for Ghosts of the Horseshoe

*Casey Cole*, Computer Science - Junior  

Mentors: Dr. Duncan Buell, Computer Science and Engineering  
Dr. Heidi Cooley, Art

Ghosts of the Horseshoe is an iPad and iPhone application currently under development that brings the history of South Carolina College and its role in slavery to the mobile micro-screen as an interactive experience to generate empathic awareness to users. To aid in this experience it was vital to create an environment within the app that is both visually stimulating and engaging. To achieve this goal models, animations and other art assets were needed. Among the latest additions to the app are a series 3D models constructed using the open source software Blender. These models allow participants to explore buildings and other structures that are no longer standing on our historic Horseshoe offering a more complete exploration into the slavery era South Carolina campus. The main focus of this presentation is the design and implementation of 3D models of the First President’s House and the Caroliniana Library. Using Blender (a free and open-source 3D computer graphics software product) and historical photographs of the buildings (provided by public history students) it was then possible to reconstruct buildings with remarkable likeness to how the buildings would have actually looked at in that time period. This presentation will highlight the process of designing the models and the impact that they, and others like these, will have on this type of a project.

Affordable Medical Ultrasound Training Simulation

*Logan Hood*, Computer Science - Senior  

Mentor: Dr. Jijun Tang, Computer Science and Engineering

Ultrasound diagnosis is an important skill in the medical field and is used in a wide range of routine and emergency medical situations. Ultrasound training, therefore, is important for many students preparing for careers in medicine. Previously, ultrasound training typically has taken place with live subjects and real ultrasound equipment, both of which are expensive and time-consuming to obtain. Some computer-based ultrasound simulation systems already exist, but they often require expensive hardware such as dummies or proprietary motion sensing controls. We have built a prototype of our own ultrasound training simulator that is designed to be very affordable. By utilizing an inexpensive game controller (e.g. the LEAP Motion) and designing the software to run on a normal PC, we ensure that our simulator is inexpensive and accessible. The simulation uses the motion of the LEAP Motion controller to move a virtual probe around a virtual model of the human body, allowing simulated ultrasound images to be generated in real-time, corresponding to the position and orientation of the virtual probe.

IT Capstone Project –Web & video development & support for Arnold School of Health Community Engagement Grant

*John Hunt*, Interdisciplinary Studies - Senior  
*Michael Armstrong*, Integrated Information Technology - Senior  
*Charles Brown*, Integrated Information Technology - Senior  

Mentors: Dr. Duncan Buell, Computer Science and Engineering  
Dr. Heidi Cooley, Art

The Arnold School of Health Community Engagement Grant project is intended to share public health information for small communities within SC. Our team’s project will include the analyzing and updating sections of a Website and content management system by doing development updates as needed. The site includes public health videos, information, forums, calendars and contacts for health professionals, the general public, and schools in rural districts and communities within SC. We believe that these assets could be a great boon to the health in our entire statewide community and are trying to help in the sharing of these. The main focus of the project is the Community of Practice which will engage participants in continuing their education of health information. User testing and feedback used for understanding weakness and strengths of the Community of Practice section of the site. With this there has been the creation of tutorial videos which will be used to guide beginning users, and to help the utilization of the tools and assets already made available on site. The creation of the videos, as well as suggestions for a more friendly UX design and integration of social media incorporation constitute the major deliverables for our team project.
IT Capstone Project – Web analytics for USC’s The Center for Teaching Excellence’s Website
*Aditya Sharma*, Integrated Information Technology - Senior
*Jie Liu*, Integrated Information Technology - Senior

Mentor: Dr. Karen Patten, Retailing

The University of South Carolina’s Center for Teaching Excellence (CTE) had the need to upgrade their current Website. Before updating their Website, CTE hoped to better understand how faculty and other users currently used their Website so that CTE could make the Website more efficient. Our IIT Student Capstone Project’s main focus was to develop specific recommendations for this potential Website upgrade. To do this, we first identified and compared various Website technology analytic tools, such as Google Analytics or Piwik. We selected Google Analytics because it was compatible with USC’s Website technologies. We then collected user data for three weeks and analyzed this incoming traffic using the selected analytic tool. Based on the data analysis, we made specific recommendations for the Website improvement. The Website will be upgraded over the summer. As a result of this IIT Capstone Project, the improved CTE Website will improve learning opportunities for users as well as faculty.

Cost Effective Method of Validating and Improving Computationally Modeled Protein Structures
*Jilbert Ogunji*, Computer Science - Senior

Mentor: Dr. Homayoun Valafar, Computer Science and Engineering

More than 90% of protein structures submitted to the PDB databank each year are homologous to some previously characterized protein structure. The extensive resources that are required for structural characterization of proteins can be justified for the 10% of the novel structures, but not for the remaining 90%. To address this problem, we have developed 2D-PDPA that is capable of using unassigned data obtained from nuclear magnetic resonance (NMR) to identify similarity of an unknown protein against a library of structures. Using 2D-PDPA, a cost effective method of screening and identifying novel proteins can be established. We have demonstrated the success of 2D-PDPA in numerous cases including identifying the most appropriate computed structure of an unknown protein. The goal of this presentation is to use the 2D-PDPA scoring mechanism in order to perform protein structure refinement. We have demonstrated our refinement procedure from unassigned NMR data to proteins 1P7E and the unknown protein T12. We have validated the ability of our proposed refinement protocol in improving an initial structure that is 1.7Å (1P7E) and 3.3Å (T12) from their native conformation. Structural quality improved to within 0.72Å, and 2.2Å respectively for proteins 1P7E and T12. The primary novelty of our approach is by relinquishing the need for assignment of NMR data, which imposes a significant increase in data acquisition and cost of studying protein structures by NMR spectroscopy. We estimate a reduction of 2-3 orders of magnitude in the cost of structure determination based on our proposed method.

Towards Improving the Performance of the ADCIRC Storm Surge Modeling Software
*Nick Weidner*, Computer Science - Sophomore

Mentor: Dr. Jijun Tang, Computer Science and Engineering

Accurately predicting storms and hurricanes is critical to saving lives and reducing economic loss. Therefore, it is necessary to use the most current software and hardware technology available in order to improve the performance and fidelity of these predictive mathematical models. For over ten years, the Computational Hydraulics Lab (CHL) at the University of Notre Dame has been involved in developing the high-resolution ADVanced CIRCulation (ADCIRC) storm surge model to predict storm surges in coastal areas. The objective of this work was to port a novel adaption of the parallel ADCIRC code, which uses the Discontinuous Galerkin formulation, to the state-of-the-art Intel Xeon Phi Co-Processor system (Stampede) at the Texas Advanced Computing Center (TACC) and ideally demonstrate speedup on a set of benchmark calculations. The porting process was accomplished by identifying fine-grained parallelism and vectorizable compute-intensive loops that could be offloaded to the 61-core Xeon Phi co-processors while leveraging their 512-bit wide vector units. Due to transfer latencies, offloading excessive amounts of code can reduce the effectiveness of using the Xeon Phi co-processors so the code was initially profiled in order to identify the code hotspots where the host processors spent the majority of their time (and demonstrated good potential for data parallelism). This analysis allowed us to focus co-processor offloading to those regions. After determining the code hotspots, these sections were rewritten using Xeon Phi programming directives to successfully offload the code instructions and data, and ensure successful compilation and execution on a sampling of test cases.
Developing a Water Irrigation System for Organic Coffee Crops in La Victoria, Ecuador

Corey King, Civil Engineering - Junior  
Ronald Geylin, Environmental Science - Sophomore  
Mentor: Dr. Jim Burch, Epidemiology and Biostatistics  

Engineers Without Borders USA is a non-profit organization that designs and implements projects in the developing world. Engineers Without Borders USC chapter (EWB-USC) received its first project in La Victoria, Ecuador to help increase the water supply for irrigation of organic coffee crops that contend with difficult dry seasons. EWB-USC travelled to La Victoria twice in 2013, partly funded by the Magellan research grant program, to assess the available water supplies, feasibility of pipeline implementation, and collect GPS data. In January 2013 EWB-USC determined that a nearby mountain stream would be the best year round water source for a simple gravity fed pipeline to the community's storage ponds. Preliminary GPS data was collected with multiple units borrowed from the geography department. Then in May 2013 EWB-USC purchased a high quality handheld GPS unit with funding from a USC Mini-grant. With some assistance from the local engineers, the points collected from this data were successfully used to fully design the gravity-fed pipeline. Additionally, EWB-USC designed a siphon spillway pipeline entrance and cleanout structures to prevent sediment buildup from occurring in the pipeline. An implementation trip in January 2014 was prepared but postponed until May due to a supplier not delivering the materials yet. After implementation, EWB-USC will look forward to monitoring the effect of the pipeline on water supply and begin the assessment and design of a water reuse/irrigation system in the coffee farms proper.

Mitigation of False Alarms and Integration with Diagnostic Applications

Joshua Slice, Electrical Engineering - Senior  
Mentor: Dr. Bin Zhang, Electrical Engineering  

Attempting to detect faults in a system as early as possible usually causes high false alarm rates, which makes the system ineffective and increases cost. However, early detection can offer more time for correction and help avoid possible damage to the system. The objective of this research is to develop specific mitigation strategies for these potential false alarms. The first step is to determine the thresholds of fault detection using statistical analysis, and to balance probability of false alarms and probability of detection with case studies on bearing faults. The real-time estimation of fault state, which is updated continuously, is compared against a healthy baseline to determine if the threshold needs to be adjusted. The second step is to fuse information from multiple algorithms to arrive at a more confident decision in diagnosis and integrate these algorithms with Dr. Bin Zhang’s work. Once complete, these research outcomes can be integrated into various industrial and commercial applications to help reduce risks and increase system safety, while reducing system maintenance and downtime.

Is the Reversible Necklace Poset a Symmetric Chain Order?

Emily Theus, Mathematics - Junior  
Mentor: Dr. Jerrold Griggs, Mathematics  

The Boolean lattice $B_n$ consists of all subsets of the set $\{1, 2, 3, \ldots, n\}$, partially ordered by inclusion. A subset in $B_n$ can be represented naturally as strings of $n$ 0’s and 1’s, e.g., $01100$ represents the subset $\{2, 3\}$ in $B_5$. Now suppose elements of the Boolean lattice are considered equivalent under cyclic rotation, e.g., $01100$ is equivalent to $00110$. The resulting equivalence classes form the necklace poset. K. Jordan (2010) proved in her dissertation at Carolina that the elements of the necklace poset can be arranged very nicely into what is called a symmetric chain decomposition (SCD). An SCD in turn implies a host of other poset properties that $B_n$ itself has. We consider the similar reversible necklace poset, in which subsets are equivalent over both rotation and reflection, e.g., $10110$ is equivalent to $00110$. The resulting equivalence classes form the necklace poset. This conjecture of this project is that the reversible necklace poset also has a SCD. This would be a major step to verify the much larger conjecture posed by R. Stanley (1980)—that for any group $G$, $P/G$ has a SCD. Using methods adapted from Jordan’s proof, we have verified the conjecture for all values of $n$ up to 9. We choose a representative element of each necklace and build a SCD produced a graphical analysis of the PEG molecular weight and the resulting rejection, with the molecular weight cut off (MWCO) at 90% rejection across all membrane thicknesses. Additionally, the flux for each membrane thickness with deionized water was also determined and also correlated with membrane thickness. Scanning electron microscopy (SEM) and atomic force microscopy (AFM) images were acquired for visual comparison of the graphene membrane thicknesses as well. Through using graphical analysis, visualization, and flux calculations, an ideal thickness and MWCO for a graphene membrane was selected for further hemodialysis experimentation.

Ultrathin Graphene-Based Nanofilters for Hemodialysis applications.

Jacqueline Plyler, Biomedical Engineering - Junior  
Mentor: Dr. Miao Yu, Chemical Engineering  

Graphene-based material is promising as a new generation of membrane material for preparing ultrathin and chemically and mechanically stable membranes for separation applications. Due to its ease of construction, extraordinary characteristics, and recent integration into bioinstrumentation, membranes fabricated from graphene sheets appear to have potential for dialysis when considering its inertness, controllable pore sizes, and high flux. We prepared nanofiltration membranes, based on these graphene sheets. Graphene-oxide was reduced to gain an organized membrane at a variety of thicknesses with hydrophobic properties. These ultrathin membranes were each assessed by filtration-rejection measurements using various polyethylene glycol (PEG) molecular weight solutions, and total organic carbon (TOC) measurements were performed for each sample of permeate and filtrate collected. Data calibration produced a graphical analysis of the PEG molecular weight and the resulting rejection, with the molecular weight cut off (MWCO) at 90% rejection across all membrane thicknesses. Additionally, the flux for each membrane thickness was determined and also correlated with membrane thickness. Scanning electron microscopy (SEM) and atomic force microscopy (AFM) images were acquired for visual comparison of the graphene membrane thicknesses as well. Through using graphical analysis, visualization, and flux calculations, an ideal thickness and MWCO for a graphene membrane was selected for further hemodialysis experimentation.
The Application of Boundary Element Method to Tissue Fusion and Spreading

**Elijah Wright**, Computer Science - Senior; USC Upstate

**Jaime Jahuey**, Mathematics - Senior; USC Upstate

Mentor: Dr. Xinli Wang, Mathematics & Computer Science; USC Upstate

Boundary element method is used to study two of the key mechanisms in bioprinting: tissue spreading and fusion where the cellular aggregates are modeled as a very viscous droplet. The mathematical formulation includes the Stokes equation and the convection-diffusion equation. First, our numerical results showed that the varying tissue surface tension caused by non-uniform distribution of adhesion molecules retards the fusion process. Second, our numerical results verified a universal scaling law of cell spreading observed in experiments that the contact radius is proportional to the cubic root of time $R \sim t^{(1/3)}$ for a cylindrical cellular aggregate.

---

Sperm physiology and structure in bird species exposed to radiation in Chernobyl

**Humna Fayyaz**, Biological Sciences - Senior

Mentors: Dr. Andrea Bonisoli Alquati, Biological Sciences
Dr. Timothy Mousseau, Biological Sciences

An error at the Chernobyl nuclear power plant on 26 April 1986 in Ukraine released a great magnitude of radioactive material, consisting mainly of iodine-131 and cesium-137, and possibly affecting living organisms in the surrounding environment. Because of the increasing interest in nuclear energy worldwide, the study of nuclear power plants and potential accidents serves as a platform to understand the environmental and health risks related to nuclear energy production. In this study, we explored the question of whether the structure and morphology of living sperm is affected by radioactive contamination. With sperm samples collected from wild populations of birds in 2011 from contaminated areas in Chernobyl, we captured still images using a Java-based image processor of live sperm and measured structural features of the sperm, including measuring sperm head, midpiece, and tail. We then analyzed these measurements to test whether morphology and motility in individuals and species were affected by exposure. Our study helps identifying the mechanisms underlying the deleterious effects of radiation on fertility. Research from the Chernobyl area has revealed that higher radiation exposure has led to reduced abundance and diversity of animals, along with a significant increase in the rate of mutations in plants and animals from contaminated areas. This study will advance the research efforts of the effects of radioactive contamination on bird populations, as well as revealing a possible species-specific effect demonstrating species' sensitivity to radiation.

---

Phytoplankton and Zooplankton Communities in Relationship to Nutrient Concentrations in Winyah Bay, SC

**Dale French**, Marine Science - Junior

Mentor: Dr. Tammi Richardson, Biological Sciences

The purpose of this study was to measure the nutrient concentrations in Winyah Bay, SC, and identify the phytoplankton and zooplankton distribution between the estuarine and more oceanic areas. The water in the estuarine zone of the bay has a longer residence time than the more oceanic zone, so different plankton communities were expected in each zone. The estuarine zone had significantly higher macronutrient concentrations than the oceanic zone, and the plankton community was different with the difference in concentration of nutrients. Extended study should be done to examine this relationship further; however, the correlation between nutrient availability and plankton communities can be used to predict community shifts over time.
Response of an arctic barnacle to climate change: the role of temperature in reproductive success

Abigail McConahay, Biological Sciences - Junior
Mentor: Dr. Jerry Hilbish, Biological Sciences
Climate change has been implicated as the driving force behind changes in species’ distributions in both marine and terrestrial environments. There is substantial interest in prediction of future changes in distribution, particularly from a conservation perspective. The cold-water barnacle Semibalanus balanoides provides an excellent study organism for assessing climate change, because it is a competitively dominant species that controls biodiversity in intertidal marine communities. Recruitment in populations of S. balanoides is strongly correlated with cold winters. Based on this, variation in range expansion and contraction for this species is correlated with regional patterns of winter temperature. In this study, we test the hypothesis that temperature influences larval development during the time where larvae are incubated by their parent. We predict that the successful completion of development is greater under cold temperatures than warm. We tested this prediction by rearing adult barnacles that were incubating embryos at 7, 10, and 13oC. We found that at 7oC, adult reproductive output was about 4 times greater than at 13oC. We conclude that variation in reproductive success is significantly controlled by temperature during larval incubation. In addition, variation in reproductive success contributes greatly to the recruitment and subsequent oscillation in geographic range of this species. We predict that future climate warming may lead to reproductive failure and rapid loss of geographic range in this dominant marine species.

Climate Influence on the Phenology on Larval Shrimp in a South Carolina Estuary

Craig Raffenberg, Marine Science - Senior
Mentor: Dr. Ryan Rykaczewski, Biological Sciences
In the coastal estuarine environments of the Southeastern United States, climate variation on monthly to seasonal timescales is a significant driver of biological processes. While other research has focused on changes in mean organism abundance, we were interested in examining the relationship between abiotic environmental variation on these timescales and phenological shifts, specifically focusing on the seasonal timing of arrival, disappearance, and peak abundance of shrimp larvae. Utilizing a 23-year dataset of fortnightly sampled zooplankton from North Inlet in Georgetown, SC, we examined the relationship between the abiotic climate factors (e.g. temperature, salinity) and phenological shifts in shrimp belonging to the genera Palaemonetes and Alpheus. We found significant correlations between the timing of phenological events and water surface temperature. If we assume that these empirical relationships will persist under future climate scenarios, we can apply temperature projections from general circulation models to estimate future variation in the timing of phenological events. Here we will discuss the implications of changing estuarine temperatures and the ensuing consequences for the phenology of these shrimp genera.

U-Pb zircon geochronology of fore-arc volcaniclastic and other rocks, Antarctic Peninsula

Jason Titus, Geological Sciences - Senior
Mentor: Dr. David Barbeau, Earth and Ocean Sciences
Jurassic and lower Cretaceous volcaniclastic and other sedimentary rocks that are found in the fore-arc region of the Antarctic Peninsula are poorly understood, which prevents their full use in reconstructing an accurate geologic history of this important magmatic arc system. In this study we present U-Pb zircon geochronology ages from volcaniclastic sedimentary rocks collected from the Fossil Bluff Group of eastern Alexander Island, and from the hypothesized correlative rocks on Adelaide Island in the fore-arc region of the southern and central parts of the Antarctic Peninsula, respectively. This work was completed by disaggregation of whole rocks, followed by mineral separation of zircon using density and magnetic techniques. Zircon grains were then analyzed using laser-ablation inductively coupled plasma mass-spectrometry at the University of South Carolina Center for Elemental Mass Spectrometry. The resulting single-grain 238U/206Pb ratios acquired from randomly selected zircons enables the calculation of crystallization ages, which then allows an interpretation of the sediments’ provenances, and the age model for the basins in which they occur.

American Shad Program at SC DNR Campbell Hatchery

Karl Wiant, Environmental Science - Senior
Mentor: Dr. Ryan Rykaczewski, Biological Sciences
The American shad (Alosa sapidissima) is an anadromous fish inhabiting the coastal ecosystems of eastern North America. Shad is a critical forage fish for larger predators and supports a minor recreational fishery in South Carolina. In the Broad and Wateree River systems, the shad population is augmented by a stocking program at the Cohen Campbell Hatchery from which juvenile fish are released to the environment. In recent years, complications arising from bacterial infection (Columnaris) and pH anomalies have limited the projected number of juveniles released. To address these issues, changes to the system were implemented in 2011 and 2012. The goal of my project was to investigate the effectiveness of such changes. A specialized haul tank was developed to transport the fish from the re-diversion canal in St. Stephens, SC to minimize the injury to fish scales, minimizing wounds which facilitate bacterial infection. pH abnormalities were addressed through investigation of well water supplied to the hatchery, and we discovered two of the three wells tapped supplied water of suboptimal pH. By balancing the water flow from the wells into the mixing tower we can now maintain a constant pH of 6.5. These changes have allowed the hatchery to release about 500,000 shad into to the Broad and Wateree river systems, and the hatchery continued to modify the environmental conditions and had a goal of releasing 1,000,000 shad this year. After a iron contamination was found several weeks into the program this year, no shad have been released.
Understanding the Impacts of Conventional and No-Till Agriculture on Infiltration Rates on a Small Urban Farm

Bethany Williams, Environmental Science - Senior
Mentor: Dr. Robin Kloot, Earth Sciences and Resources Institute

This project worked with City Roots, a sustainable urban farm in Columbia, SC that is transitioning from conventional till (CT) to no-till (NT) farming, as part of an ongoing research project (Kloot 2012; Hobbs 2007). Research suggests that NT agriculture helps maintain healthy soils, allowing for lower bulk density (BD) and increased infiltration rates (IR) (Azooz and Arshad 1996). Over 9 weeks, we compared CT and NT soils based on IR, measured with single ring (SR) and double ring (DR) infiltrometers, and BD. We hypothesized: 1) That IR would be high immediately after tillage, but that this benefit would degrade over time as pore spaces collapsed, whereas NT treatment would allow for a sustained and higher IR than CT (Dingman 2008); 2) That this would be reflected in a decrease in BD over time for the NT treatment; and 3) That SR and DR infiltrometers would produce results that strongly correlate (Verbist et al. 2010). These hypotheses were not supported by our research. We found that there were no significant trends for IR or BD between the CT and NT fields and that SR and DR IR did not correlate. An analysis of air temperature, soil temperature, and precipitation showed no influence on the results. The results were most likely contaminated by the inherent disturbance caused by repeated IR measurements in the same location. Our results would have been improved by a better understanding of the man-made soils at City Roots and a more thoughtful experimental design.

JAM (Joint Action Mini) Camp

Lily Gullion, Exercise Science - Freshman
Mentor: Dr. Roger Newman-Norlund, Exercise Science

Dr. Newman-Norlund, senior Exercise Science students, and I collaborated with the local YMCA to provide the community with Joint Action Mini, or JAM, Camps. Joint action tasks include activities that require two or more participants to coordinate their actions, predict other people’s movements, and respond accordingly. During these 1 hour camps, students have the opportunity to participate in a variety of teamwork tasks (including computer-based tasks, cooperative group games, team sports, joint musical performances, etc.), learn about different aspects of joint action in a fun way, and brainstorm about ideas for new joint-action games. This project, which will continue to run in upcoming years, helps the children in the community develop many valuable skills, such as cooperation, teamwork, and social skills, and also allows for future researchers to have a setting in which to conduct their own research. In an age where children spend more and more time doing very solitary actions, such as watching television, joint action motor skills need to be practiced. JAM Camp provides specific games and activities to get children active and engaged. As one of the directors for this program, I helped develop the format, design the games, direct the volunteers, and actively work with the children at the YMCA. The weekly camp began on January 7th and will conclude on the April 30th.

An Examination of Core Strength and Stability in Normal Weight and Obese Adults

Allison Jolley, Exercise and Sports Science - Senior; USC Aiken
Samuel Lamunion, Exercise and Sports Science - Senior; USC Aiken
Mentor: Dr. Brian Parr, Exercise and Sports Science; USC Aiken

Obesity is associated with poor balance and stability which can lead to an increased risk of falls and injuries. This has been attributed to low core muscular strength in obese individuals. Previous research shows that exercise to increase core strength has been shown to improve balance in normal weight subjects. Purpose: The primary purpose of the study is to examine the relationship between core strength and stability in normal weight and obese adults. The secondary purpose of this study is to determine the effect of a core strength training program on stability and balance in the same population. An additional purpose is to verify the accuracy of the UStabilize mobile app for measurement of stability and balance. Hypothesis: It is hypothesized that there is a relationship between core strength and balance. It is also hypothesized that a core strength training program will improve balance in all subjects, but will improve the balance in obese subjects to a greater extent. Methods: Forty subjects will undergo measurement of height, weight, and body mass index as well as assessments of core strength and balance, including the plank, STAR, and Berg balance tests on two occasions. A subset of subjects will complete a 6-week core strength training program between tests. Data Analysis: The relationship between core strength.
and balance will be determined using correlations. The significance of differences in core strength and balance between baseline and follow-up testing will be determined using paired t-Tests.

**Does Bright Light Improve Sleep Quality in Veterans with Combat-related Posttraumatic Stress Disorder?**

*Nidha Khan*, Biochemistry and Molecular Biology - Junior

Mentor: Dr. Shawn Youngstedt, Exercise Science

Posttraumatic stress disorder (PTSD) is classified as a type of anxiety disorder which occurs after exposure to a traumatic event. It is currently the most common mental health diagnosis of veterans returning from combat. Studies implemented to better understand the effects of PTSD indicate that it is associated with disturbed sleep. Some evidence suggests that disturbed sleep after a traumatic event is predictive of the development of PTSD. Conversely, treatment of sleep disorders has elicited improvement of PTSD symptoms in patients. Although there are drug treatments available, expert opinion varies regarding the efficiency of these treatments. Bright light exposure, however, can elicit profound sleep-promoting effects that persist for weeks or months after treatment. This study investigated the influence of bright light treatment vs. placebo treatment on 70 combat veterans with PTSD. Following screening and baseline assessment, participants were randomized into one of two 4-week studies treatments. One group of participants was exposed to bright light while the other group was exposed to a placebo consisting of a negative ion generator. Both groups completed self-reported questionnaires weekly to determine the severity of PTSD, sleep quality, and other comorbidities. The hypothesis is that compared with placebo treatment, bright light will result in significant improvement in sleep quality for participants. The null hypothesis would suggest that bright light will not improve sleep quality or any comorbidities of PTSD.

**The role of the gp130 receptor and IL-6 expression in mouse skeletal muscle morphology**

*Emily Learner*, Exercise Science - Senior

Mentor: Dr. James Carson, Exercise Science

Glycoprotein 130 (gp130) is cell surface receptor that initiates intracellular signaling with the interleukin-6 (IL-6) cytokine family. The IL-6 family of cytokines is classically involved in inflammatory processes, but also influences skeletal muscle processes related to growth, recovery from injury, and wasting with chronic disease. The purpose of this study was to examine the morphological changes in the tibialis anterior (TA) muscle associated with gp130 receptor loss and IL-6 expression in mouse skeletal muscle. Two genotypes, a heterozygous knockout (skm gp130 +/−) and homozygous knockout (skm gp130 −/−), for the gp130 knockout mice were bred on a C57BL/6 (BL/6) background. Skeletal muscle morphology was compared between these two genotypes and wild-type BL/6 mice. All mice received either a blank vector or an IL-6 overexpression for 3 practice days. Statistical Analysis: Descriptive statistics for all dependent variables will be calculated. ANOVAs will be used to determine differences in the dependent variables between Npx and matched controls. Mean GI symptom values will be compared using Mann-Whitney tests. Anticipated Outcomes:
Participants taking Npx will have an increase in GI permeability, TNF-α and IL-6, and a decrease in Pvol and P[Na+], leading to a quicker increase in Tc and more GI symptoms during exercise compared to controls. If our results support our hypothesis, athletic trainers may be able to identify individuals potentially at greater risk for EHS due to NSAID use.

**Examining the Effects of Aging and Stroke during Trail Making**

*Angela Ross*, Exercise Science - Senior  
Mentor: Dr. Troy Herter, Exercise Science  
The Trail Making Test (TMT) is a popular neuropsychological task used to assess executive function, a set of mental processes used for planning, organizing and guiding our thoughts and actions. The TMT relies on visual search to guide movements that are used to draw lines between numbered dots as quickly as possible (similar to the ‘connect the dots’ game played by children). Clinicians normally measure speed (total time) and accuracy (number of errors) of hand movements to identify impairments in executive function. However, these measures may also be used to examine a wide range of other neurological processes including visual search, shifts of attention, and action execution. Previous studies have shown that the TMT is sensitive to differences in age, intelligence, education, and impairment. However, these studies have been unable to differentiate whether deficits performing the TMT reflect differences in executive function or the other components of TMT mentioned above. To address this knowledge gap, we have examined how aging and stroke influence the various components of TMT using a robotic device coupled with an eye tracking system. By computing quantitative measures that are relatively specific to executive function, visual search, shifts of attention and action execution, we found that many components of trail making are influenced by age and stroke. We conclude that abnormal measures of speed and accuracy do not necessarily reflect an impairment of executive function, and eye tracking can help to better understand which components are affected by aging and impairment.

**The Association of School Factors and School Day Physical Activity**

*Mary Runey*, Exercise Science - Senior  
Mentor: Dr. Russell Pate, Exercise Science  
Introduction: Physical activity declines as adolescents get older and many factors may contribute to this decline. Fifth grade students are faced with many constraints during this life changing year of adolescence. The school that a student attends has the opportunity to influence the physical activity opportunities and resources that a child may be exposed to. Purpose: The purpose of this study was to identify school factors that are associated with school-day moderate to vigorous activity of fifth grade students. Methods: Participants were 1002 fifth graders from 21 elementary schools in 2 districts. Participants wore an accelerometer for one week, and school-day (7:00 am- 3:00pm) moderate-to-vigorous physical activity (MVPA) was determined. At each school, lead physical education (PE) teachers and school administrators completed surveys that included items about PE opportunities and characteristics, recess practices, and space and facilities for physical activity. Factors from the surveys, including PE opportunity (time) and PE characteristics, recess opportunity and recess practices, space and facilities, teacher characteristics and support for walking/biking to school were identified. The correlations between these factors and school-day minutes-per-hour of MVPA were determined. Results: For both males and females, recess time, PE characteristics, PE opportunities, and space and facilities were significantly correlated with school-day MVPA (.0001). Also, school support for biking and walking was positively correlated with school day MVPA (.002). Conclusion: As adolescents get older, the influence of school-day physical activity may become more important and a determining factor in the activity levels. Schools should continue to evaluate recess and PE opportunities and practices in addition to space and facilities to determine best practices for increasing physical activity levels during the school day. Future studies should look into the association between school-day MVPA and teacher’s behavior and support, school climate, adequate equipment, and not just the opportunity but how active the participants are during the school day.

**Can Sports Supplements Be Replaced By Food?**

*Kyle Sprow*, Exercise and Sports Science - Senior; USC Aiken  
Mentor: Dr. Brian Parr, Exercise and Sports Science; USC Aiken  
The rising popularity in the use of sports supplements by competitive and non-competitive athletes to promote muscular growth, increased cardiovascular endurance, and improved overall health has created a billion dollar industry. With a greater understanding of human physiology and substrate utilization, there has been a drastic push for the need of supplementation. Among the most popular supplements are protein, creatine, branch-chain amino acids (BCAA), fish oil (EPA and DHA), carbohydrates, and carbohydrate-protein combinations. The purpose of this study is to compare the recommended daily allowance (RDA’s) of these nutrients and how they can be obtained through food as opposed to supplementation. The nutritional information for the supplements will be determined based on the product nutrition labels; nutrient and energy content of food equivalents will be assessed using standard nutrition databases. The results of this study are relevant to supplement and non-supplement users because of the financial cost and overall benefits of meeting nutrient RDA’s with real food. It is also important to identify any nutrients that cannot be consumed in adequate amounts in the diet and therefore require supplementation to meet demands.
A Comparison of Articulation Interventions

**Marren Brooks**, Public Health - Sophomore
Mentor: Dr. Krystal Werfel, Communication Sciences and Disorders

Traditional articulation therapy utilizes flashcards to display pictures of stimulus words for teaching particular sounds. With the recent rise in popularity of tablets, such as the iPad, speech-language pathologists have shifted to utilizing such technology to display pictures of stimulus words in therapy. However, the use of iPads in articulation therapy has not been adequately evaluated. This study evaluated the effect of therapy type on children's gains during articulation therapy.

A functional role of motor systems in action sentence comprehension: A study of stroke patients

**Carl Brzorad**, Psychology - Senior
Mentor: Dr. Rutvik Desai, Psychology

The embodied view of semantics holds that brain regions responsible for perception and action also play a crucial role in the process of language comprehension. In contrast, the traditional amodal view is that comprehension proceeds through the recruitment of abstract, symbolic representations that are altogether distinct from perceptual and motor systems. An increasingly large body of neuroimaging data indicates the activation of primary and secondary motor areas in action-related language comprehension, supporting the embodied view. However, these results do not speak to the necessity of these regions for comprehension, as imaging methods are inherently correlational. We addressed the issue of the necessity of sensory-motor regions for semantic processing by testing 33 stroke patients on their comprehension of action-related (The janitor swept the leaves under the tree) and abstract (The bank ignored the pleas from her) sentences. Brain lesions and lesion overlap between patients were defined based on structural MRI scans. We ran a lesion-behavior mapping analysis by correlating lesion location with behavioral scores reflecting the response time to make a sensory judgment on the sentences. We found that the degree of damage to the left anterior inferior parietal lobule (aIPL) predicts deficits in literal action sentence comprehension relative to abstract sentence comprehension, as measured by increased response times. The aIPL is a secondary motor region involved in action planning and hand-object interaction. These results lend strong support to the claim that secondary motor cortex plays a functional role in action language comprehension.

Speech Properties Predicting Cochlear Implant Performance

**Michael Hood**, Baccalaureus Artium et Scientiae - Senior
**Priya Purohit**, Biomedical Engineering - Junior
Mentor: Dr. Daniel Fogerty, Communication Sciences and Disorders

Acoustically, one way we can look at speech is a combination of slow amplitude modulations of its temporal envelope and fast frequency oscillations of its temporal fine structure. The relative contribution of these two cues to speech comprehension was investigated across three different types of background noise. Normal-hearing listeners identified the sentences presented using a closed-set word response interface. Results suggest similar patterns of performance across noise types for envelope and temporal fine structure processing with the exception of speech babble. Additionally, masking release received from different types of noise was observed. Masking release is the benefit that listeners gain from short periods of speech presented at favorable signal-to-noise ratios. The experiment examined the contribution of lexical factors to vocoded speech recognition abilities of young normal-hearing listeners under continuous and fluctuating maskers. Results suggest that masking release of words has little dependence on their lexical processing and is instead dominated by stimuli processing of the words.

Existing vocabulary knowledge, phonological memory, and reading skill as predictors of new word learning

**Hannah Patten**, English - Senior
Mentor: Dr. Suzanne Adlof, Communication Sciences and Disorders

Purpose: Vocabulary knowledge is an important component of literacy, but aside from experience, the factors leading to individual differences in word knowledge are not well understood. Although hundreds of studies have examined children's word learning, relatively few have assessed multiple aspects of acquired word knowledge. This study examined children's existing vocabulary knowledge and phonological working memory as predictors of their ability to learn new words from direct auditory instruction. Method: Forty-five children (mean age = 8 years) were taught novel names for novel object referents within a computerized script. The training included brief descriptions of object features, 21 exposures to the spoken word form, three opportunities for children to practice saying the name of each object, and three opportunities to identify the correct object from an array of multiple choices. Following training, participants completed five tasks...
assessing their phonological and semantic recall and recognition. Participants also completed normative assessments of existing vocabulary knowledge and nonword repetition. Preliminary Results: Hierarchical linear regression analyses with a preliminary sample of 32 revealed that, after controlling for age, nonword repetition explained unique variance in phonological recall, but not semantic recall or recognition. In contrast, existing vocabulary knowledge explained unique variance in verbal and nonverbal semantic recall, but not phonological recall or recognition. These results will be updated with the full sample. Conclusions: Preliminary results suggest that the acquisition of new phonological and semantic representations during word learning depends on different cognitive skills. Implications for vocabulary assessment and instruction will be discussed.

How are speech errors such as “ketchup, uh I mean mustard” corrected?

Aaron Siegel, Psychology - Senior
Mentor: Dr. Fernanda Ferreira, Psychology

Speakers are commonly disfluent, requiring comprehenders to correct the error-laden speech, as in “hand me the ketchup, uh I mean mustard”. The misspoken word (reparandum) must be replaced with the correct word (repair) so that comprehension aligns with the speaker’s intended message. Evidence suggests that disfluency correction involves the cooperation of language-specific and cognitive-general processes. First, disfluent words (uh) affect linguistic processes similarly to fluent words (Bailey & Ferreira, 2003). Second, disfluencies activate attentional resources that prepare to integrate new information (Collard et al., 2008). Interestingly, evidence suggests that the reparandum is never fully replaced; a ghost of the reparandum’s activation may still exist (Bailey, 2004). However, little is known for certain about the reparative process itself. How is a disfluency corrected? We plan to answer this by observing the mental activation of the reparandum and repair during this process. Participants will listen to sentences that contain disfluencies (ketchup, uh I mean mustard) and conjunctions (ketchup and also mustard); a letter-string will appear on the screen during this time and participant must decide whether or not it is a legal word or not. This task, known as the lexical-decision-task, is reliably able to reflect the mental activation of target words (Swinney, 1979). By recording response-time to associated words specifically related to the reparandum (red) or repair (yellow) at specific time-points of the disfluency (reparandum, editing-term, repair), we can observe the exact process by which a specific word is replaced with another word during these reparative operations. Data collection is ongoing.

Examination of temporal envelope and fine structure contributions during speech-on-speech masking

Jiaqian Xu, Biological Sciences - Junior
Mentor: Dr. Daniel Fogerty, Communication Sciences and Disorders

This experiment examined the speech recognition ability of young normal-hearing listeners in the presence of a competing talker. The purpose of this study was to identify how different temporal cues (i.e., temporal envelope, E, and temporal fine structure, TFS) interact during competing speech, as well as how informational masking contributed to the ability of the listener to perceive the target sentence. This study systematically investigated the interaction of E and TFS acoustic cues specific to the target and masking speech. The E and TFS processing was completed by noisy signal extraction using the Hilbert transform. The level of informational masking was varied using forward and reversed speech competitors. The reversed competing sentences were presented to limit masking to acoustic, and not informational, properties. In addition, talker-specific speech cues were explored by examining masking by a different talker of the same or opposite gender. The results were scored for each trial as a percentage of sentences in which the subject selected both the accurate color and the accurate number of the target talker. The results showed that high amounts of informational masking resulted when the target and masking speech had similar acoustic processing. Also, informational masking was highest for the normal masker because the speech is not degraded and therefore has the highest intelligibility. The E target and TFS masker condition had the overall poorest performance, which could be attributed to concurrent envelope masking in the TFS stimulus. Envelope target condition resulted in the overall lowest scores due to the lack of TFS cues that can be used to segregate the target talker from the masking talker.
Exploring the Research Process

**Alexa Black**, Psychology - Sophomore
Mentor: Dr. Kate Flory, Psychology

Last year, I took Dr. Susan Alexander’s Initiating Research class. At the beginning, I was clueless about the research process, however, she helped me to learn more about the numerous ways to get involved in research. At the end of the course, I reached out to Dr. Kate Flory to work in her lab and received an Honors Exploration Grant. Dr. Flory’s study aims to understand more about the social impairments that children with ADHD face and how this contributes to their academic achievement. I found my psychology classes very interesting, but I saw working in Dr. Flory’s lab as a way to take a more active approach and apply what I was learning. Over the summer, I read through the manual to help familiarize myself with the study. Once I began working in the fall, it took me some time to get comfortable with lab procedures, but eventually it became more natural. This experience has taught me an innumerable amount of things about research in general and about myself as well. I was able to go from not even understanding exactly what research was, to feeling comfortable working in a lab setting. I also realized that I enjoy interacting with people much more than entering data. I have really enjoyed my time doing research in Dr. Flory’s lab and plan to continue helping with the study next year. I found out that I may want to pursue research as part of my career path in the future.

Visual enumeration and the effects of prior knowledge

**Brett Corbett**, Psychology - Senior
Mentor: Dr. Melanie Palomares, Psychology

Visual enumeration is the mental processes involved in estimating numerosity through sight. A well-known part of this is accurate estimation of small numerosities (4) called subitizing (e.g. Palomares & Egeth, 2010). In the current study, we investigated whether visual enumeration was affected by number sets possessing contrasting choices among their numerosities. “Dots” or gratings were presented around an imaginary circle on a screen for 50 ms, with possible choices being: 0, 2, 4, 8, 16, 32, 64, and 128 “dots”. Participants (n=62) were placed into one of three conditions: known (n=22), range (n=20), and none (n=20). In the “known” condition, participants were given the possible target numerosities. In the “range” condition, participants were told that the targets are between 0 to 150 elements. In the “none” condition, there was no information given to the participants. Showing of the possible targets resulted in the most accurate responses. However, knowing the range did not improve response accuracy from not knowing any information about the targets. Interestingly, the precision (i.e. variability) of the responses did not differ across conditions. Correlation analyses suggest that accuracy was negatively related to precision. These data suggest that prior knowledge about numerical targets is limited in improving numerosity judgments. References Palomares, M, Egeth, H.E. (2010) How element visibility affects visual enumeration. Visual Research 50(19):2000-2007.

Language Delays and Atypical Attention as Early Markers of Autism

**Aimee Herron**, Psychology - Senior
**Erica Mazur**, Psychology - Senior

Mentors: Dr. Jane Roberts, Psychology
Dr. Jessica Klusek, Psychology

Introduction: Autism is a developmental disorder characterized by social communication impairments and the presence of restricted/repetitive behaviors. Two of the most salient features shown to discriminate those who later develop autism from those who do not are delays in language and atypical visual attention. Past research suggests that infants later diagnosed with autism many children at risk for autism will show language abnormalities by 24 months of age and are less able to quickly shift their attention appropriately in their everyday surroundings. Methods: Data were gathered from typically developing infants (n=4) and infants with an older sibling diagnosed with autism (ASIBS; n=7) at 24 months of age. To assess language development, the Preschool Language Scale-5 was used. Atypical attention was evaluated using the Attention Subscale of the Child Behavior Checklist. The Autism Diagnostic Observation Schedule was used as an index of autism symptom severity. The Mullen Scales of Early Learning were used to control for developmental level. Results: Partial correlations, co-varying for developmental level, were run to analyze relationships between language and autism severity (r=-.384, p<0.05), attention and autism severity (r=.005, p>.05), and language and attention (r=.276, p>.05) in the ASIBS. Correlations were run to analyze relationships between language and autism severity (r=.868, p<0.05) and attention and autism severity (r=.939, p<0.05) in typically developing children. Conclusion: A moderate relationship was found between better language and less autism symptoms in the ASIBS, although this correlation did not reach statistical significance in this preliminary sample. Attention and autism severity were not associated in the ASIBS. In the typically developing group, strong but nonsignificant correlations between attention/language and autism severity were detected, suggesting this study may have been underpowered to detect these effects. Data was preliminary; future research should follow-up the question posed in this study with larger samples.

Measuring physiological signatures of affective reactions to music and pictures

**David Jackson**, Psychology - Senior
Mentor: Dr. Doug Wedell, Psychology

Psychophysiology investigates the interrelation of the mind and body and has been used to study emotion and affect. Pairing self-report methods with psychophysiology methods allows researchers to gain insight into the physiological processes that accompany emotions and to resolve the specific component processes of emotional experiences. The theoretical approach to affect used in the experiment reported here was to evaluate affective states along two dimensions: Valence (degree of positive or negative reaction) and arousal (degree of activation). A third dimension characterizing the stimuli was modality: auditory or visual. Prior research has demonstrated that electromyography (EMG) would show an increase in activity in the zygomaticus major muscle when experiencing stimuli of positive valence and an increase in activity in the
Factors Predicting the Retention of African American Families in Behavioral Health Interventions

Jennifer Overfield, Exercise Science - Sophomore
Mentors: Dr. Dawn Wilson, Psychology
Dr. Becky Siceloff, Psychology
Ms. Lauren Huffman, Psychology

African Americans are disproportionately affected by obesity and associated chronic illnesses, such as type 2 diabetes. Behavioral health interventions have been effective in reducing these disparities to some extent, but challenges around retention of underserved populations still exist. The purpose of this study was to examine predictors of retention in Project FIT (Families Improving Together), a randomized controlled trial (RCT) testing the efficacy of a family-based plus motivational intervention weight-loss program in African American adolescents. To date, 137 parent-child dyads have consented to participate in FIT (69.3% female, Mage =13.65, SD = 1.73). Analyses examined associations of adolescents' gender, age, self-efficacy (confidence) for physical activity (PA) and for diet, family income, and parent education with attrition through a 2-week run-in period, a phase commonly used in interventions to identify participants who are unable to complete the program. A total of 84 dyads (61.3%) completed the run-in period. An independent samples t-test revealed a significant difference by attrition in the adolescents’ age such that adolescents who did not complete run-in (M=14.01) were older than those who were retained (M=13.42; t(135)=1.95, p=.05). Additional analyses revealed no differences between participants who dropped and who were retained on gender, self-efficacy for PA and diet, family income, or parent education. Identifying variables related to retention may be helpful for developing strategies to increase recruitment and retention of underserved populations in research to ameliorate health disparities and these data suggest that the age of the adolescent was important.

Impact of Presentence Investigation Report Types and Gender on the Sentencing of Offenders

Brittany Kridle, Psychology - Senior; USC Upstate
Celeasa Conner, Psychology - Senior; USC Upstate
Mentor: Dr. Susan Ruppel, Psychology; USC Upstate

A presentence investigation report (PSIR) is conducted and presented to the judge by a probation officer. There are two major types of PSIRs: offender-based, which focuses on the person who committed the crime, and offense-based, which focuses on the crime itself. As of 1980, there has been a shift towards offense-based PSIRs which warrants research into potential effects. The current research evaluated the effect of the PSIR type (offender-based or offense-based), the type of crime, and the gender of the offender on sentencing. A significant main effect of crime type and of PSIR type was found. A significant interaction between crime type and PSIR type was also found. The results of the current study can be used to promote awareness of potential sentencing biases in the criminal justice field and to produce more effective PSIRs.

The Relationship between ‘Selfies’, Narcissism, and Self-Esteem

Alison Smetana, Psychology - Senior
Mentors: Dr. Suzanne Swan, Psychology
Mr. Andrew Schramm, Psychology

Within the past decade, technology has transformed the way we interact with others and how we see ourselves. Social media websites such as Facebook, Instagram, and Twitter make it possible to manage our image in a desirable light for others to see, while simultaneously creating an outlet where we can gain confidence or even inflate our egos. One of the ways we have learned to manage our image is through the selfie. A selfie is when an individual takes a photo of themselves using a mobile device or a camera. Many studies have been conducted assessing the relationship between levels of narcissism and self-esteem in comparison to time spent on the internet, such as Meh dizadeh’s research (2010). Meh dizadeh (2010) found that individuals who had narcissistic tendencies or low self-esteem spent significantly more time on the internet than those who did not. In a sample of 42 undergraduates at University of South Carolina (Mage=22.19, SD = 2.48), we predicted to find similar results but instead of time spent on internet, with number of selfies per month. Multiple regression analyses showed that individuals who take more selfies had higher levels of narcissism overall (R2=.190, F (2,35)=2.71, p .05). Implications and future research for the relationship between selfies and narcissism are discussed.
Expression of Vesicular Monoamine Transporter-2 Following Neonatal Ethanol Exposure and Chronic Amphetamine Treatment: Implications for Attention Deficit Treatment

Daniel Wood, Biochemistry and Molecular Biology - Junior
Mentor: Dr. Sandra Kelly, Psychology

Fetal Alcohol Spectrum Disorders (FASD) is a series of physical, cognitive, and behavioral deficits that arise from the consumption of alcohol during pregnancy. It is one of the most preventable sources of neurological deficits in the Western world. Attention deficits are commonly seen in those afflicted with FASD. A hypofunctioning dopaminergic mesolimbic pathway of the mammalian brain has been linked to attention deficits. Vesicular monoamine transporter-2 (VMAT-2), dopamine transporter (DAT), and tyrosine hydroxylase (TH) are proteins that are essential to the proper function of this pathway and are acted on by amphetamine, a drug commonly used to treat attention deficits and that has been shown to be effective in treatment of FASD. It is hypothesized that early chronic amphetamine treatment normalizes the mesolimbic system and can ameliorate the attention deficits seen in those afflicted with FASD. In this project, a rat model of FASD was used. The project was divided into two experiments. The first experiment investigated the dose-response effects of chronic amphetamine treatment on VMAT-2, DAT, and TH in the nucleus accumbens (NAcc), an area involved in the mesolimbic pathway. The second experiment will investigate the effects of perinatal ethanol exposure on VMAT-2, DAT, and TH, in the NAcc and also investigate the effects of chronic amphetamine treatment on these proteins. The results of this project could provide a deeper understanding of FASD and its potential treatments.

Shifting the spatial representation of number across development

Emily Defouw, Psychology - Senior
Mentor: Dr. Melanie Palomares, Psychology

There is a fundamental link between number representation and the perception of space (Dehaene, 2007). In this study, we evaluated the accuracy of the spatial representation of number across development (children aged 6-11; adults aged 18-30). We shifted the numerical range on a conventional number line (0-500) to an unconventional number line (37-537) by modulating numerical location. Participants were asked to estimate the spatial position of a target number (41-412). All participants were administered the Kaufman Brief Intelligence Test, Second Edition (KBIT2), which is an intelligence test that measures verbal (vocabulary and riddles) and non-verbal analytical skills (matrices). Children participants (9 years old) were given the Test of Early Mathematical Ability, Third Edition (TEMA-3). Results show that accuracy improves, with responses becoming more linear, with increasing age. Children’s spatial representation of number becomes more adult-like after the age of 9 years. Across all ages, participants overestimated the position of small numbers in the unfamiliar. We also found that spatial bisection at 0.50 is more prominent when the endpoints are familiar. Results also show that accuracy in the number line is correlated with verbal, nonverbal, and overall mathematical ability scores (TEMA), even controlling for age. This evidence expands the knowledge of children’s mathematical cognition by indicating the strategies used and may lead to possible ways to implement in math education.

Balancing the line between positive and negative numbers

Emily Defouw, Psychology - Senior
Mentor: Dr. Melanie Palomares, Psychology

Previous studies suggest that positive numbers and space are intrinsically connected (Dehaene, 2007). However, there is little evidence that studies the relationship between negative negatives and space. In our study, we investigated how positive and negative numbers are spatially represented on the number line. We asked participants to spatially localize the position of numerical targets. In our first condition, we replicated previous evidence (Palomares & Defouw, 2014) where participants were asked to estimate numbers on a positive number line (0 to 500). Then, participants were asked to estimate targets on a negative number line (-500 to 0), which is an inverse positive number line. We also asked participants to estimate numbers on a balanced line (-250 to 250). We evaluated the spatial bisection strategy, which is the systematic division of a number line in half (Ashcraft & Moore, 2012). We found evidence of a spatial bisection strategy in all conditions (250, -250, 0), suggesting that the concept of half is robust across all numbers. However, results suggest that the representations of negative and positive number lines are not symmetrical. While negative numbers are not “natural” numbers, we found that participants’ representation of negative numbers is more accurate than positive followed by the balanced number.
Do internal features modulate orientation discrimination?  
**Carissa Onorato**, Psychology - Senior  
Mentor: Dr. Melanie Palomares, Psychology  
In real-life circumstances, internal features efficiently alter the perception of an object's direction of motion. Navies in World Wars I and II painted black-and-white geometric patterns on ships to protect them from oncoming torpedo attacks from the enemy submarines. These “dazzle” camouflages skewed their perception of position affecting the accuracy of torpedo targeting (Scott-Samuel, 2011). In our study, we evaluated whether internal features influenced the ability to discriminate between orientations. Participants were shown gratings and instructed to match one of the four orientations, either parallel or orthogonal, with respect to the external envelope of the gratings. In Experiment 1, we varied the shape of the gratings, which had aspect ratios of 1:6, 1:3, 1:4, and 1:2. The targets were ±45 deg. In Experiment 2, we assorted the orientation of the gratings, which were 0, ±30, ±60 and 90 deg. Orientation thresholds were calculated for each condition utilizing a staircase procedure (Palomares et al., 2009; 2011). Results reveal that orientation discrimination worsened with decreasing aspect ratio and increasing slant. Crucially, orientation discrimination thresholds were slightly better when the internal features were analogous than when they were orthogonal to the grating envelope. These results are consistent with intrinsic horizontal connections in the primary visual cortex (Polat & Tyler, 1999), and have implications in object detection and recognition.

Exploring Research Methods Through Independent Correlational Research  
**Benjamin Peele**, Psychology - Senior  
Mentor: Dr. Kate Flory, Psychology  
I was awarded an Honors Exploration Grant in the Spring of 2013 to work in Dr. Kate Flory’s lab at the USC Parenting and Family Research Center. This grant has been my first practical experience with a large-scale research study. Dr. Flory’s study centers on the links between ADHD and social impairment in children aged 8-10. As I applied and researched Dr. Flory’s work, I became interested in gaining experience as a research assistant. Her study allows me to gain organizational skills and research experience while conducting independent analysis on data collected concerning ADHD diagnosis and depressive symptoms. This data has been collected from across the entire study participant pool and includes measures of ADHD symptoms, depressive tendencies, and ratings of social impairment. For my Discovery Day presentation, I will present journal entries of my experience as a research assistant alongside correlational data regarding depression and ADHD diagnosis in children.

Escalated Exposure: First Impressions of Personailty and Trust Judgments  
**Stacey Olson**, Psychology - Senior; USC Upstate  
Mentor: Dr. Andrew Beer; Psychology; USC Upstate  
The current study explores the role exposure plays in first impression judgments of trustworthiness. Researchers examined ratings of personality and trustworthiness judgments with limited exposure versus longer exposure. One hundred and forty-eight participants viewed photographs (first) and videotaped interactions (subsequently) of each of three target individuals, rating the trustworthiness and personality of each target after each exposure. We hypothesized that ratings of trustworthiness would increase with increased exposure. We also hypothesized that the accuracy of personality judgments would increase with increased exposure. Results indicated trust ratings were higher after viewing the video interview versus the photograph, and accuracy levels also increased with longer exposure. In addition, more agreeable judges changed their measures of trustworthiness after viewing the video interview of the target to a greater extent than those lower in Agreeableness.

Comicon World vs. The Real World  
**Charles Taffe**, Psychology - Junior  
Mentor: Dr. Jennifer Vendemia, Psychology  
If you’ve ever seen a Marvel or DC superhero movie you can thank comic books and their inventor. All the revenue made off of these comic books, characters and movies add up to millions in revenue for the comic book industries. A study done at Mediamark Research & Intelligence in 2012 found that white males are the source of most of this generated revenue. With this fact in mind, researchers
wanted to know if themes of gender and race in these comic books furthered ongoing stereotypes in world. After completing a content-analysis of some favored American comic books, an unbalanced representation of gender and race in comparison to the US Census was found. White males appeared most on the pages of the comic books, greatly skewed from the actual US Census count. At another glance it can also be found that white men also were more often the main protagonist of most comic books. Consequences of the lack of representations of women and minorities in comics are debated on whether or not they promote these stereotypes in comic book readers.

Role Model Fathers or Deadbeat Dads? : A Study of Peromyscus Paternal Behavior  
Taylor Wapshott, Biochemistry and Molecular Biology - Senior  
Mentor: Dr. Sandra Kelly, Psychology  
Paternal behavior is a phenomenon that is highly diverse across species and notably rare in mammals, with only 3-5% of mammalian males exhibiting true paternal behavior. Paternal behavior is typically associated with monogamy. Some species such as Peromyscus polionotus (PO) are monogamous but have not had the nature of their parental interactions confirmed by observational work. The current study is a comparative behavioral study that examines the paternal behavior of two species of Peromyscus, the monogamous Peromyscus polionotus (PO) and the promiscuous Peromyscus maniculatus (BW). Mated pairs of each species were used for this study with pups ranging from 5 to 27 days old at the time of testing. The female was removed from the home cage and the nest was disrupted, followed by a 10 minute filming period of the male's behavior and any interaction with pups in the home cage. We hypothesize that the PO males will exhibit paternal behaviors that have been observed in other monogamous species (particularly Peromyscus californicus), such as grooming, retrieval of the pups, and crouching over the nest. We hypothesize that the BW mice, on the other hand, will not engage in these paternal behaviors and will show decreased interaction with and approach toward the pups during the testing period. The data from this study will provide more information about the paternal behavior of PO mice compared to a known non-paternal species and will confirm or modify current ideas on the nature of these behaviors. Supported by the Peromyscus Genetic Stock Center.

Pregnancy and Depression: Factors associated with Depression among Pregnant Latinas  
Salem Carriker, Anthropology - Senior  
Mentor: Dr. Myriam Torres, Consortium for Latino Immigration Studies  
Background: Depression is a prominent issue that has been found to affect pregnant and postpartum women more than women who are not pregnant, even though perinatal women are less likely to think medical issues are the cause of their depression. In addition, Latinas in the United States are less likely to seek out mental health services, such as services to treat depression, than European Americans or African Americans. Among Latinas, acculturation, social support, income, literacy level, and food insecurity have all been found to influence the development of depression in pregnant women. Purpose: Determine which factors are associated with depression during pregnancy in Latinas. Methods: An extensive literature review was conducted to analyze previous research regarding depression in perinatal Latinas. In addition, the Center for Epidemiologic Studies Depression (CES-D) Scale was administered to Latinas attending prenatal care at clinics throughout South Carolina as part of a study conducted by Dr. Myriam Torres at the Consortium for Latino Immigration Studies. Results: Preliminary results show that pregnant Latinas between the ages of 20 and 25 are more likely to show evidence of depression, as are women who report a lower income level and women who have had three or more previous pregnancies. Conclusion: These findings show how a woman’s history and daily life can affect their chances of developing depression during pregnancy. This knowledge could be applied to develop culturally appropriate interventions for depression among Latinas.

Post-fall analysis of elderly patients in a PACE model  
Amelia Coleman, Pharmacy - Senior  
Audrey Johnson, Pharmacy - Senior  
Mentor: Dr. Karen McGee, Clinical Pharmacy and Outcomes Sciences  
Background: Elderly patients are at an increased risk of falls due to multi-factorial changes that occur during the aging process. Falls are of particular concern because increased falls contribute to an increase in mortality. The objective of this quality assurance review is to determine the primary causes of falls in the elderly. Methods: The project was a multicenter analysis of patients enrolled in 4 senior daycare centers with documented falls between November 1, 2012 and October 1, 2013. Patients were excluded due to disenrollment. Data was compiled into categories including: total fall risk score, fall risk score by discipline, time of fall, medications, circumstance of fall, mental orientation at time of fall, diagnoses, intrinsic factors, and environmental factors. The number of falls at each center, injuries sustained, post-fall changes to care, and recent changes in care were also analyzed. Results: Twenty-three falls were documented and reviewed. The average total fall risk score was 17.875, which is considered moderate risk for falls. Time of fall data was skewed due to the limited amount of documentation, but early morning (0700-1000) and early afternoon (1200-1400) suggested a
Finding the inner athlete: a nursing student’s journey to personal fitness and analysis of health promotion

Kathryn Kranjc, Nursing - Senior
Mentor: Dr. Susan Poslusny, Nursing

An important aspect of wellness is physical fitness, the basic components of which are cardiorespiratory endurance, muscular strength and endurance, flexibility and motor skill performance. Multisport promotes many aspects of fitness and health, and American culture has begun to embrace multisport as the pinnacle of fitness. However, many adults may be intimidated by the idea of adopting a vigorous multisport regimen into their own daily routines. The author, a novice athlete, follows 12-week multisport training schedule leading up to a sprint distance triathlon event. Evidence from current literature on multisport training benefits and health promotion are combined with reflections on personal experience to create a guide to fitness planning for healthcare professionals and novice athletes. The author uses Pender’s theory of health promotion as a framework for analysis of health promotion in multisport training.

Obesity Abroad and at Home

Morgan Penzler, Exercise Science - Junior

Mentor: Dr. Myriam Torres, Epidemiology and Biostatistics

Background: The Center for Disease Control and Prevention (CDC) currently defines obesity as a person having a body mass index (BMI) of 30 or higher. BMI is a measure of a person's body fat based on their height, weight, gender, age, and activity level. The CDC also states that obesity rates in 2011 ranged from 20.7% to 34.9% in the US; South Carolina’s (SC) population placed 8th with 30.8% being obese. According to the World Health Organization (WHO), 21.8% of the total global population is obese. Compared to the US average of 33.9%, this is relatively low. While Peru has shown decreases in their obesity rates over a period of six years, populations globally have had increases in obesity. Purpose: To ascertain the prevalence of obesity in Peru and compare it to the prevalence of obesity in South Carolina. Methods: In-depth interviews with physicians, nurses, healthcare providers and everyday people in Peru. Results: The healthcare providers interviewed believed that obesity was a growing problem in Peru, not a shrinking one. They expressed a lot of concern about growing rates of type-2 diabetes, especially in the more rural populations where education about nutrition is not available. When asked about the seemingly shrinking obesity problem they responded that many of those in the more isolated areas were not be accounted for; and these were the people who had the greatest nutritional deficits. While the numbers according to the WHO make Peru out to be properly battling the worldwide obesity epidemic, the gathered information contradicts the numbers. Conclusion: Prevalence of obesity and type-2 diabetes are not decreasing everywhere in Peru, according to some health care professionals, they are increasing at an alarming rate, just as they are here in South Carolina.
In conclusion, scheduling acute appendicitis cases for the next day with a period of antibiotics and fluid resuscitation appears to be a safe alternative to emergent surgery.

**Communication with Healthcare Provider and Depression Among Pregnant Latinas**

**Neha Sharma**, Public Health - Senior  
**Mentor:** Dr. Myriam Torres, Epidemiology and Biostatistics

Background: Maternal depression during the perinatal period is approximately between 10%-20%. Women who face cultural disparities have a higher chance of depression while pregnant, and Hispanic/Latinas that need outpatient care for mental illness are less likely to receive it than Caucasians. Depression is high among pregnant Latinas, with rates ranging from 38% to 51%.  

Objectives: To determine the prevalence of depression among pregnant Latinas, determine whether pregnant Latinas are satisfied with their relationship with their healthcare providers, and establish the relationship between depression among pregnant Latinas and communication with their healthcare providers.  

Methods: 171 pregnant Latinas answered face-to-face surveys collected by the ELLAS Study. Surveys were administered after the first prenatal care visit and included general demographic characteristics and questions about HIV knowledge and beliefs; HIV testing, characteristics of the relationship with healthcare providers and a depression screening scale (CES-D).  

Results: Prevalence of depression among those surveyed was 31.58%. Low monthly income was related to depression. 81% of women with a low monthly income were depressed. The study found no association between depression and communication with healthcare providers.  

Conclusion: Research shows that there is no significant relation between relationship with healthcare provider and depression among the surveyed pregnant Latinas in South Carolina. However, the prevalence of depression among pregnant Latinas was high, with 31.58%. Future studies and programs should address this problem and look at other possible factors.

**Does delayed operative intervention in children change outcomes in acute appendicitis?**  

**Emma Robl**, Biological Sciences - Senior  
**Mentor:** Dr. Juan Camps, Palmetto Health Pediatric Surgery

Acute appendicitis in children has been a longstanding surgical emergency requiring prompt intervention. However, recent literature has shown that this may not be the case. A preoperative interval of antibiotic therapy, to impede the infectious process, and adequate intravenous hydration has shown equivocal results to emergent surgery. At Palmetto Health Richland, these findings have changed management and allowed for next day surgery under a more controlled environment. The purpose of this study is to review our data on perioperative care of these patients with respect to their outcomes. A retrospective review of 241 pediatric cases of acute appendicitis by a single surgeon was analyzed. All patients underwent laparoscopic surgery in the teaching children's hospital. Data was collected on length of stay from time of surgery (LOS), time from initial evaluation to operation (DELAY), time from antibiotic administration to operation, length of operation, and perforation rate. Data was extrapolated and analyzed using the Pearson's correlation. Our analysis revealed there is no correlation between delay of surgery and length of stay (p-val 0.5). Furthermore, it did not correlate delaying surgery to a greater length of operation, or perforation rate.

**The Monitoring of Hospital-Acquired Conditions and Ongoing Reduction and Prevention Efforts**

**Johnathan Stathopoulos**, Biological Sciences - Senior  
**Mentor:** Dr. Elizabeth Mack, Palmetto Health Richland Children's Hospital

Over the past year, in connection with an ongoing nationwide collaborative effort launched by the Ohio Children's Hospitals’ Solutions for Patient Safety, I monitored occurrences of patients who were harmed due to hospital-acquired conditions (HAC) at Palmetto Health Children’s Hospital. This effort is focused on addressing and reducing specific HAC and improving the quality of care for pediatric patients by collecting and sharing data among participating hospitals. My main role throughout this project was to submit HAC data collected at Palmetto Health Children's Hospital onto an online database for analysis and comparison to the data collected by other participating hospitals. By examining the data collected as a part of this nationwide effort, participating hospitals have been able to expand their knowledge base and develop a better understanding of what protocol and prevention practices work best with regards to reducing...
patient harm caused by HAC. The HAC that were monitored included adverse drug events, catheter-associated urinary tract infections, central line-associated blood stream infections, falls, pressure ulcers, surgical site infections, ventilator-associated pneumonia, preventable readmissions, obstetrical adverse events, and venous thromboembolisms. Goals of this collaborative effort include reducing hospital inpatient harm by 40% and reducing readmissions by 20%. Although data continues to be collected at Palmetto Health Children’s Hospital, the positive outcomes of participating in this collaborative effort are beginning to be realized as Palmetto Health Children’s Hospital has been able to better monitor HAC data and make appropriate adjustments to certain safety procedures.

Conflicts Of Interest In Pharmaceutical Sponsored Research On Erythropoietin Receptors In Cancer: An Update

Alyssa Trenery, Biological Sciences - Senior

Mentor: Dr. Charles Bennett, Clinical Pharmacy and Outcomes Sciences

Financial conflicts of interests in clinical studies have been a perennial subject of investigation because of their potential to harm the public’s health. In 2010, we reported the first systematic analysis examining such conflicts in preclinical research, identifying that academic researchers without financial conflicts of interest significantly differed from academic researchers with financial conflicts of interest as well as scientists employed by manufacturers of erythropoiesis-stimulating agents (ESAs). Those with no conflict of interest identified functional erythropoietin (Epo) receptors on tumor cells and that these receptors when activated carried out detrimental cell signaling and tumor promotion effects. The analysis was based on published studies from 1993 to 2008. We now review the status of the peer-reviewed published literature that has been disseminated following a 2008 NCi conference. Articles identified in MEDLINE and EMBASE databases (2008-2012) investigating preclinical findings were reviewed for information on Epo receptors, signaling events, cellular function, and study conclusions. Study findings were classified into 3 groups according to funding source. Academic-based studies authored by investigators without manufacturer funding, academic-based studies authored by investigators with funding from ESA manufacturers, and industry-based studies authored by more than 75% of investigators employed by ESA manufacturers. Convergence has occurred over time regarding the harmful conclusions of ESAs and cancer progression among academic scientists with versus without financial conflicts of interests. Advisory committees may consider particular caution in the use of ESAs among persons with these specific tumor types.

The Analytical Comparison of International Fashion Marketing

Mackenzie Caldwell, International Business - Senior

Mentor: Prof. Puri Crowe, Linguistics

The international comparison of how monetarily successful visual fashion merchandising is in small boutiques (i.e. window designs and store fronts) and buyers reactions and responsiveness to this style of marketing in the metropolitan cities of Bilbao, Spain versus Charlotte, NC, USA. My research will be conducted over a one-year time period and be divided into three major sections. This research will include accumulating information from first hand experiences, developing a survey for a sample group of consumers, interviewing store owners, and reviewing the financial outcomes of retail stores. My research will take me to my hometown of Charlotte, NC to conduct the first part of my research on American fashion marketing strategies and techniques, to Bilbao, Spain to collect research about Spanish fashion marketing, and then back to USC to compile and compare my research for presentation. The study of fashion may not tend to save lives or uncover rare discoveries; yet its significance lies in its internationality. Fashion links cultures and people through immerging styles and trends. Yet, the image of fashion can be perceived very differently across the globe, which is why the study of it is so interesting. Based on the research I collect, small fashion retailers will be able to increase their sales and optimize marketing techniques in order to present the best shopping experiences to their consumers. Customers will also learn that a window display isn’t meaningless; there are many marketing and design strategies that make a significant contribution to the sales of a store. I plan to present my findings at Discovery Day 2014 and to various groups on campus such as Fashion Board.

Skeletal Trauma as a Result of Human Rights Abuses and Armed Conflict in the Former Yugoslavia and Guatemala

Meghan Conroy, Anthropology - Senior

Mentor: Dr. Carlina de la Cova, Anthropology

From 1995-1996, our world saw the end of two genocides that had resulted in the deaths of hundreds of thousands of people. One was in the Former Yugoslavia, also known as the Srebrenica Massacre, and saw over 8,000 deaths. The second was in Guatemala, a civil war on a much larger scale that lasted almost four decades and resulted in the deaths or disappearances of almost 700,000 people. The purpose of the research is to compare and contrast the results of the exhumations of the bodies involved in the conflicts in the Former Yugoslavia and Guatemala. The first was an ephemeral massacre in Eastern Europe while the latter was a thirty-six year civil war in Central America, thus there are variations in the methods in which the victims were killed. The bodies exhumed have been found to have suffered from blast injuries, blunt force trauma, torture, sharp force trauma, gunfire injuries, and disease, and typically a combination of these. Those that were not subjected to blatant trauma suffered from malnutrition or starvation due to a lack of supplies and aid as a result of the embargoes,
Creative Strategy Development for SC Equality's "Know Your Rights" Campaign

Hannah King, Public Relations - Senior
Mentor: Prof. Karen Mallia, Journalism and Mass Communications

Students enrolled in the Spring 2014 JOUR 563 Cause Communication course developed a comprehensive creative strategy for the Know Your Rights campaign for South Carolina Equality as a service-learning project. South Carolina Equality works to expand civil and human rights for all gay, lesbian, bisexual and transgender South Carolinians. Funded by a Richland County grant, the goal of the Know Your Rights was to increase awareness of LGBT related laws and regulations within the LGBT community. Class members investigated the issues in depth, and how other advocacy groups accomplished their objectives strategically and executionally, in order to develop an effective messaging campaign. The team created a series of five print advertisements and companion social media marketing. All campaign draws attention to the obstacles that LGBT individuals must overcome daily, and informs them of the steps to be prepared, highlighting five focus areas and relevant state law: relationship recognition and family protection, non-discrimination policies, transgender inclusion and protection, hate crime prevention and safety, and safe schools. Working on the Know Your Rights effort taught us more than how to create cause communications. We learned the importance of giving others a voice, especially those who are underrepresented or underprivileged by the law.

The Content of Tablets Sold as Ecstasy: Evidence from an Online Testing Service

Hunter Dayton, International Business - Freshman
Mentor: Dr. Eric Sevigny, Criminology and Criminal Justice

The first step of the project entails retrieving data from EcstasyData.org, transferring it into Stata statistical software format, and cleaning the data for analysis. We will investigate both mechanical and automated (e.g., Python) forms of data retrieval and management. All relevant data elements will be obtained, including tablet names, whether the tablet was sold as ecstasy, drug testing results (substance type and quantity or ratio), testing date, location (country, state, city), year of submission, and pill characteristics (e.g., size, weight). Initial analyses will entail recoding and collapsing the variously reported substances into common classes to aid analysis and interpretation. This will require investigating and appropriately classifying hundreds of reported drugs in the database. We will also investigate alternative geographic aggregations of the data (e.g., MSA) and generate estimates of purity from the reported data. We will operationalize purity in various ways to facilitate analyses (e.g., ratio level [0-100%], nominal level [MDMA-only, some MDMA, no MDMA]). Relevant outcome data will then be retrieved from publically available sources (e.g., DAWN) and merged with the EcstasyData.org database. Our main analyses will investigate (1) temporal trends and geographic variations in ecstasy purity/adulterants, (2) predictors of purity (e.g., location, tablet characteristics), and (3) how these various factors relate to negative consequences such as emergency department admissions for ecstasy. Based on prior research, we predict considerable temporal and geographic variation in ecstasy purity. We also expect the adulterant drugs to evolve over time, in light of markets shifts and product availability. Furthermore, we expect there to be a detectable association between ecstasy impurity and negative outcomes.

Nurse Station Assessment and Design

Vivek Malhotra, Biological Sciences - Senior
Mentors: Dr. John Jensen, Management Science
Dr. Sanjay Ahire, Management Science

Efficient nurse station workplace design has been shown to promote efficiency and higher morale of one of the hospital’s most important resources: the nursing staff and patient care technicians. A cramped and badly organized design leads to frustration, physical fatigue, and ultimately unhappiness among hospital staff, including physicians, and lowers the standard of health care for the patients served by the facility. Understanding characteristics of the physical environment that impede or facilitate care is the focus of this project. Lean Six-Sigma is an effective set of tools and perspectives used in manufacturing and service settings to improve process efficiency. This project’s analysis depends on this tool set. Two types of nurse station models were examined at Palmetto Health Richland Hospital: decentralized and centralized. Careful study of the nurse processes occurred firstly to identify important resources of the nurse station,
and to determine each resource’s frequency of use. Walking distance was chosen to quantify utilization of these resources by nurses in a typical day. A higher walking distance signifies a less efficient layout. After analyzing both units, the centralized unit was found to be much less efficient in its resource placement than the decentralized unit. Important next steps would be to study differences in the layouts and suggest possible improvements for the centralized model in order to improve standard of care for the unit.

From Oconee to Awendaw: An Analysis of the Palmetto Trail

Austin Price, Visual Communications - Senior

Mentor: Prof. Ernest Wiggins, Journalism and Mass Communications

When the Palmetto Trail is completed, it will comprise 425 miles of hiking and biking paths that will provide a unique outdoor recreational experience for South Carolina residents and visitors. The trail will stretch unbroken from Oconee in the Upstate to Awendaw on the coast, coursing through forests and cities, showing all aspects of the state. Conceived in 1994, it is one of 16 cross-state trails in the United States. To date, 315 miles of the trail have been completed in the form of passages, which range from just a few miles long to more than thirty miles long. Some of these passages are connected, but many, especially in the upstate, have gaps between them where no trail has been built. A SWOT (strengths, weaknesses, opportunities and threats) analysis shows that the story of the trail and its parent organization, the Palmetto Conservation Foundation, is more complex than it appears on the surface. The analysis was done by first-hand study of the trail as well as interviews conducted with people involved and impacted by the trail in different ways.

Cultural Differences in Business: Germany vs. The United States of America

Mackenzie Taylor, Accounting - Senior
Cody Brown, Accounting - Senior
Carli Smolen, Accounting - Senior

Mentor: Prof. Stan Smith, Accounting

We visited Germany in May 2013 to visit various German companies and interact with the employees. We supplemented this with visits to American companies and German based companies in South Carolina. After our initial observations of the differences in culture in regards to business, we sent surveys to the employees of the businesses we interacted with. These surveys helped us pinpoint the differences in doing business in Germany vs. doing business in America. We hope our findings will not only help students know what to expect when accepting a job offer abroad, but to also help companies understand how to interact with employees from different cultures.

Research & Volunteer Work in Cape Town, South Africa
Emily Weeks, International Business - Senior

Mentor: Dr. Robert Rolfe, International Business

My presentation focuses on my experiences in Cape Town, South Africa during the summer of 2012 with the Magellan Scholars Program. Specifically, I will address the research I conducted at the University of Cape Town in regards to post-apartheid laws, such as Broad-Based Black Economic Empowerment, and their effect on public accounting firms and schools. Secondly, I will also provide an overview of my volunteer experience in the townships as well as in an AIDS clinic in Cape Town, South Africa.
Personal Challenge Implementation In A Middle School Setting

Allison Babcock, International Business - Sophomore

Mentor: Dr. Patrick Hickey, Capstone Scholars Program

This research project was based off the pre-existing Hand Middle School mentoring program, which brings Capstone Scholars in as volunteer mentors for weekly, hour-long mentoring sessions with local middle school students, grades 6-8. Our focus was on assisting the HMS students to select personal challenge goals to work towards for a semester, similar to the Personal Challenge program that Capstone requires of its students. The research process involved recruiting and then training mentors to understand what is required to be a positive mentor, as well as how to assist middle school students in goal setting. Once chosen, mentors were matched with middle school students, and both completed pre-semester surveys, in which they both determined a personal challenge goal to work towards. With the help of their mentors, the middle school students now complete weekly progress reports, which continually hold them responsible for their goal and the specific actions being taken to achieve it. Once the semester of mentoring has been completed, the results of personal challenges and their positive effects will be compared between the Capstone Scholars program and the HMS participants to continue to learn about successful goal setting in all ages. The goal is to further develop the personal challenge program in college students, expanding beyond the Capstone Scholars program, as well as to enable the dreams of young, local students and assist them in effective goal setting strategies.

In Some Way, It Will Make a Difference: Bystander Interventions in Instances of Race-Based Bullying

Kimberly Charlton, Social Work - Sophomore

Ashley Nunnally, Mathematics - Senior

Mentor: Dr. Kelly Lynn Mulvey, Educational Studies

Many consider bullying a growing epidemic because of its prevalence and numerous adverse effects on victims’ health and academic motivation (Blumen, 2011; Buhs & Ladd, 2001). Additionally, bullying and exclusion are often motivated by differences in group membership, such as bias or prejudice towards other ethnic groups (Killen, Mulvey, & Hitti, 2012). Research has documented the powerful influence bystanders can have in stopping bullying (Salmivalli, Voeten, & Poskiparta, 2011). However, no research has examined the role of bystanders in subtle bullying, such as telling race-based jokes. The current study explores adolescents’ evaluations of race-based joke-telling and subsequent bystander behavior. The survey examines participants’ evaluations and reasoning about the joke-telling act (targeting Latinos and African Americans) and participants’ expectations regarding the response of a bystander. Our hypotheses are that responses will vary according to age of participant, presence or absence of target out-group members (i.e. whether or not a Latino is present when a Latino joke is made), and based on which ethnic group is targeted (Latino vs. African American). Preliminary results indicate that participants are generally more accepting of jokes which target Latinos than African Americans, that they do think bystanders should intervene, and that they are concerned about being excluded from their peer group for intervening. Results will be discussed in terms of the literature on bullying, bystander intervention, and intergroup relations. References: Blumen, L. (2011). Bullying epidemic: Not just child’s play. Toronto, ON: Camberley Press. Buhs, E. S., & Ladd, G. W. (2001). Peer rejection as antecedent of young children’s school adjustment: An examination of mediating processes. Developmental Psychology, 37, 550-560. Killen, M., Mulvey, K. L., & Hitti, A. (2012). Social exclusion: A developmental intergroup perspective. Child Development. doi: 10.1111/cdev.12012 Salmivalli, C., Voeten, M., & Poskiparta, E. (2011). Bystanders matter: Associations between reinforcing, defending, and the frequency of bullying behavior in classrooms. Journal of Clinical Child and Adolescent Psychology, 40, 668-676. doi: 10.1080/15374416.2011.597090

Sustainable Food Systems Education

Christina Cole, Geography - Senior

Mentor: Mr. Seth Guest, Green Quad Community

In the three years that I have worked with Sustainable Carolina, I have been a part of a number of worthwhile projects. The ones I am most proud of relate to educating others about sustainable food systems and gardening. Some of the major societal issues we face today are related to problems in our food system and when we learn more about the world around us, we are able to make decisions that are healthier, more satisfying, and contribute positively to society. Through gardening, we are not only able to more fully grasp what goes into getting our food from the earth to our tables, but we gain valuable life skills and experiences. Plus, who doesn’t like to play in the dirt every once in a while and take home fresh veggies? During my internship, I have been a part of creating a number of outreach and service learning projects with K-12 students, USC students and the Greater Columbia community. We have held hands-on composting and gardening workshops, as well as lectures, film screenings and service-learning days. We lead an afterschool garden club at a local elementary school and created Food Justice Workshops, as well as lectures, film screenings and service-learning days. We lead an afterschool garden club at a local elementary school and created Food Justice Week, an annual week-long series of events related to food and farmworker issues. Through these programs, we’ve been able to spread knowledge and appreciation of our relationships between our food systems, our environment, and our daily decisions. I’ve learned a lot here and will continue to educate others about these and other important issues into the future.

Italy Vs. America

Aubrie Frye, Psychology - Senior

Mentor: Dr. Beth Powers-Costello, Instruction and Teacher Education

Behavior has been the focus of research in both psychology and education for many years. Implications affect children families and service providers alike. However, behavioral expectations and norms vary from country to country and culture to culture. I am particularly interested at this time in behavioral comparisons between two different countries because I believe that the difference in children’s behavior and expectations surrounding those behaviors will likely be very different in two very different cultural contexts. While there is some but not a copious amount of research that compares behavioral norms of “culturally
different individuals in the same setting (classroom, region, and country) there is a significant lack of research that considers how behavior varies between children in two different countries. This study seeks to explore: How do behavioral expectations and norms vary across two countries and cultural contexts? In particular, I will focus on two elementary classrooms one in Reggio Emilia, Italy and one in Columbia, SC.

**Taking the Classroom into the Real World: How to transfer skills used in class to educational real life experiences on the outside**  
**Ana Hervada**, Social Work - Senior  
Mentor: Dr. Susan Parlier, Social Work  
Throughout the Social Work 422 class each student was to advocate for a bill for at least 15 total hours. The final presentation was based on creating a google site about the advocacy process as well as reflection on connections between the classroom and outside real world. This presentation will show the work that was done and how the classroom is linked with skills that can be used outside the classroom where students were expected to do the advocacy instead of just theorize sitting in class. This presentation will show the actual google site creating the class and describe the process of advocacy, difficulties and lessons learned, as well as beneficial skills that translate to professional life. The goal of the presentation is to show to impact of technology in the classroom as well as real life experience and it’s benefit to students.

**Discovering the Southern Appalachian Grassy Balds**  
**Nicholas Lenze**, Biochemistry and Molecular Biology - Sophomore  
Mentor: Ms. Amy Duernberger, Newberry College Library; USC  
Grassy balds are unique Appalachian wonders-open meadows in the mountains where, ecologically, there should be trees. It has been theorized that some of the balds originated over ten thousand years ago and were kept open by the grazing of large herbivores such as the mastodon and the wooly mammoth. Over the course of earth’s history, environmental and anthropogenic factors have shaped, modified, and maintained the balds. More than eighty grassy balds are known to exist in the southern Appalachians, and each has its own story. There is one aspect in particular that characterizes the grassy balds and invites human curiosity: undeniable, awe-inspiring beauty. The balds’ natural beauty, along with their scientific worth and chronicle of unique stories, inspired my mentor’s idea to create an informative hiking guide to be published by USC Press. Together, my mentor and I began the project by analyzing relevant literary sources about the balds’ unique plant and animal communities, their Native American folklore, their origins, and their environmental and anthropogenic histories. We researched many grassy balds both collectively and individually, but we chose a representative eighteen of them to actually hike and include in the book. We completed the hikes for each of the selected grassy balds, and for each hike we created GPS tracks, identified waypoints, wrote trail descriptions, and documented photos. Ultimately, we synthesized the historical and scientific information, summaries, maps, and trail descriptions into an informative hiking guide. The histories are intriguing and the hikes were experiences of a lifetime.

**Advocating for Immigration Reform: Bridging the Classroom with Community**  
**Olivia Leskoske**, Social Work - Senior  
Mentor: Dr. Susan Parlier, Social Work  
The social work class Advocacy for Social and Economic Justice created personal achievement by applying coursework knowledge on an issue of interest to effectively advocate for change. My advocacy project focused on Bill S.744, The Border Security, Economic Opportunity, and Immigration Modernization Act. Utilizing advocacy concepts and theories, I constructed my project and began networking with a local agency. Throughout the semester I advocated and shared my knowledge on the topic to help spread awareness about this legislation. The formation of a website exhibits my project activities and conclusions. Through this project I learned a lot about the amount of time that must be dedicated to effectively and efficiently advocate for an issue and how politics works. The effort of collaboration is crucial and advocates must be resilient against rejection. The knowledge and skills of advocacy are beneficial across many fields and I will continue to share information and advocate for vulnerable populations throughout my career.

**Indian Students’ Perceptions of Skin Tone**  
**Erin Steiner**, Political Science - Junior  
Mentor: Dr. Shelley Smith, Sociology  
In Indian society a light skin tone is advertised as necessary for economic, personal, and professional success. To achieve this beauty standard, Indians have been increasingly turning to artificial means. Skin lightening products are easily accessible, available for as little as $1, and are marketed to both men and women. The aim of the research study is to analyze whether college students in Bangalore evaluate a light-skinned Indian more positively than a dark-skinned Indian. If so, does this evaluation correlate with the student’s use of skin lightening products and/or exposure to advertisements for those products? To investigate this topic I surveyed college students at Christ University in Bangalore, India. The survey included questions about the participants’ demographic characteristics, history of use and/or purchase of skin lightening products, exposure to skin care advertisements, as well as questions about the participant’s perception of an unidentified Indian male’s or female’s level of success, beauty, trustworthiness, intellect, health and happiness, based on one of four photographs where the only changing variables are skin tone and gender. These data were used as part of an investigation into the cultural definition of Indian beauty.

**H2O- DC: Advocating for Justice**  
**Molly Yates**, Social Work - Senior  
Mentor: Dr. Susan Parlier, Social Work  
Went to Washington DC and participated in an event where we advocated for social justice by asking our representatives in person to cosponsor and pass the Water for the World Act (HR 2901), which will help ensure that U.S.-funded water programs remain effective and accessible by those in need.
University of South Carolina and being accepted as a Capstone Scholar was a huge accomplishment for me because it gave me automatic acceptance into the number one International Business program in the country. As an International Business student, I have been fortunate enough to learn about many different countries and cultures in my classes, study abroad in one of the economic capitals of the world, and round out my studies with a minor in French. I would like to present my personal reflections about my time in Paris and here at Carolina that encompass what it means to me to be a student in an increasingly international world.

Extended Orientation – Providing First Year Students A Strong Foundation
Mitchell Hammonds, Visual Communications · Senior
Mentor: Mrs. Theresa Sexton, Student Life
The first semester of a college student’s experience can define what the rest of their collegiate experience will be like. First Year Students transition into a new environment that is daunting but exciting, with the task of balancing freedom and responsibility. Through my experience in helping start the Pillars for Carolina extended orientation program, and serving as the executive director for two terms, I have had the opportunity to explore the different issues that face first year students. Some of these issues include academic concerns, knowing and understanding university values and traditions, and feeling a sense of belonging. Examining these issues and more, I was able to work with a student staff to develop programs that helped first year students transition into college with a greater understanding of the University and the skills they need to be successful. My presentation reflects on the foundation in which the Pillars program was built and analyze the success of the program through presenting information gathered during the assessment process.

Southeastern EcoReps Conference
Megan Krystofik, Marketing · Sophomore
I am the president of a student-led organization at USC called EcoReps. Our goal is to educate and engage students living on campus in sustainable living. Many of our members are interested in fields such as environmental science, marine science, etc. We hosted our third-annual Southeastern EcoReps conference on February 28th – March 2nd. The purpose of this conference is to collaborate with other sustainable peer leaders to share our successes, failures, and ideas for improvement of our programs, committee efforts, and campaigns for a more sustainable future. Through the use of breakout sessions, presentations, and community building activities, over 100 EcoReps from 11 schools were able to learn and share with one another. Among the most interesting collaborations was the sharing of how to create and brand your program, as we had individuals attending the conference in an effort to follow USC’s EcoRep program model at their respective universities. USC EcoReps all took away various new thoughts, perspectives, and motivations from this conference. Many are inspired to help to improve composting on campus, stadium recycling efforts, and student population education. As EcoReps, we acknowledge our university’s commitment to sustainability and recognize the need for continual programming and education efforts for the student population. Therefore, this conference is essential to our own organization’s viability as well as the University of South Carolina’s dedication to creating a more sustainable future.
My Experiences as a Physical Therapy Extern

Marie Morrissette, Exercise Science - Senior

As one of the most sought after professions in healthcare, Physical Therapy is a profession that is continuously growing and changing. Physical Therapy is becoming more of an evidence-based practice, making physical therapists in high demand from prospective employers. Because physical therapists can diagnose and treat injuries without invasive methods, they are also becoming the primary provider that patients seek out before going to other specialists. From a very young age, the field of physical therapy has always been one of great interest to me. The physical therapy externship at Providence Hospitals provided me with vital insight into the profession. It allowed me to experience acute care physical therapy as well as provide me with the necessary tools to become an effective physical therapist. With this externship, I was able to see physical therapy being performed in one of the leading cardiovascular hospitals in the state of South Carolina, an orthopedic hospital, and an outpatient clinic. As an extern, I set up and prepared patient rooms for therapy, assisted the therapists in treating the patients, and walked some patients through their exercise routines. I learned how to interact with patients in order to effectively administer treatment as well as manage time between treatments. Through this experience, I was able to better understand the role of a physical therapist in a hospital setting and gain critical clinical skills to apply to future endeavors in physical therapy school.

International Healthcare: Service Learning in Nicaragua

Kaitlin Wainwright, Biological Sciences - Junior

Dalenna Kessler, Biological Sciences - Junior

Mentor: Dr. Patrick Hickey, Nursing

We participated in a service learning trip where students provided health care to the people of Masaya, Nicaragua. This trip provided experiences that enhanced the academic, cultural, and personal aspects of the student. The purpose of the service learning experience was to give students the opportunity to apply course concepts in a real world setting and provide needed services while collaborating with community partners. Academic learning outcomes include the demonstration of knowledge of global issues, processes, trends and systems; the understanding the effect that other countries and different cultures may have on communities and global environments; and the understanding of the various roles of the members of the health care team. Subsequently, we developed a better understanding of the pros and cons of the health care profession and can compare the health care system of Nicaragua with that of the USA. Cultural learning outcomes include the understanding and appreciation of other cultures; the ability to work effectively with the community and other students; and the understanding of the medical needs of those less fortunate. We gained an understanding of the challenges that exist specific to language barriers in accessing health care. Personal learning outcomes include challenging one’s own values, beliefs, and cultural biases through their interactions with local villagers and increasing our knowledge on the decision to become a health care provider. This project will have two students co-presenting on their experiences serving in two different Nicaraguan villages.

A Math Major Interning with the South Carolina Office of the Governor

Hilde Oliver, Mathematics - Senior

At a time when it could be said that often a student’s chosen undergraduate major does not directly relate to their later career or careers, it becomes all-important to be able to put to use the skills learned in the classroom into a professional setting. As a math major with an interest in state executive policy, interning with the SC Office of the Governor was an excellent opportunity to use the problem solving, efficiency, critical thinking, and team skills taught in the mathematics classroom for the tasks required for working for the highest executive office of the state.

How a Dying Fraternity Solidified My Career Path

Christine Severin, Criminal Justice - Senior

In the fall of 2010, I became a member of Phi Alpha Delta, a pre-law fraternity here at the University of South Carolina. Phi Alpha Delta is a student-led organization that focuses on educating pre-law members on general law school information and the admissions process while also promoting member involvement in a tight-knit community. Among other benefits, one of the most important is that the fraternity promotes networking in the field of law by hosting law school representatives, lawyers, and other legal professionals as speakers during the bi-monthly chapter meetings. Through a contact I made in Phi Alpha Delta, I managed to get my first real job at a law firm in 2012 where I was promoted to a legal assistant after completing one summer of being a runner. I gained a lot of knowledge about law practice and it was through this experience that I reaffirmed my passion to commit to the legal field as my life-long profession. By holding an executive position as president of the fraternity, I also learned that once I became a lawyer I would want to be a leader in my community too. From this understanding, I now know that politics will be my next step after my May 2014 graduation. My goal is that once I start working in politics I can then start paving the way for a career path in representation, so that ultimately I can serve as a leader in my community.
Beyond Borders”, a program with International Student Services and attending lectures on “Social Entrepreneurship: Creating an Ecosystem for Global Impact” and “Babes, Dwarves and Dissidents: Writing a New Perspective”. Both speakers were very informative and experiences in their fields. I've taken multiple courses that focus on international concepts at USC and abroad; the two that I focused on for GLD were Women in China, as part of my minor, and Global Sourcing, as part of my majors. I pursued GLD because I felt it was a unique opportunity to summarize the most important aspects of my undergraduate studies in a collaborative way. The key areas that I learned from (which are also my Key Insights from my GLD e-portfolio) are the following: adaptation to cultures, and how my experiences abroad and in other countries enhanced my understanding of this; business strategies, with a focus on Lean Six Sigma; working globally, and how corporate cultures compare; and multiculturalism & business, with a comparison between Asian and European markets.

Summer 2013 Boeing Internship
Bradley Harris, Chemical Engineering - Senior
I completed a 12-week internship with the Boeing company in their brand new site in Charleston, South Carolina. I took the job to discover what an engineer working in the industry would be like, and to gain experience and skills to get a full-time job later on. I was a manufacturing engineer working to optimize various aspects of the manufacturing process of the tail end of the new 787 commercial jets. I worked on various projects over the course of the summer; but one of my largest projects involved preventing multi-million dollar manufacturing errors that were occurring in a large hole-drilling robot. The project required some technical skills and a lot of collaboration with various departments throughout the entire site. The project taught me how important communication and planning is in the completion of complex projects. The result of the project was a new process, which I helped to author; which is being utilized today. This project and the summer overall showed me what working as an engineer for a huge corporation would be like, and perhaps that it is not the perfect first step in a career for me. This experience pushed me to seek out smaller companies for post graduation work.

Learning Leadership as an English Major
Jacquelyn Mohan, English - Senior
As an English major, I had to seek out different types of leadership that would allow me to grow as a leader on campus and also complement my major. I have been part of, briefly, Writers Club and, for a year, The Lettered Olive, but my most important leadership role started freshmen year. After joining the INK! boards and councils I have grasped the importance of women’s organizations as a measure to promote female leadership not only at the collegiate level but also in any workplace or professional setting. My personal experiences and my research will demonstrate that leadership opportunities in sororities are effective in the advancement of young women entering the workforce. I will highlight not only the advantages of leadership education and programming in Panhellenic and similar women’s organizations, but also the power of values-based leadership.

Graduation with Leadership Distinction: Assurance Internship with PwC
Kelly Brittan, Accounting - Senior
During the summer of 2013, I had the opportunity to work with PricewaterhouseCoopers, LLP (PwC), one of the world’s largest professional and financial services firms and one of the “Big Four” accounting firms. As an accounting major, my 8-week internship with PwC allowed me to gain valuable audit experience and industry knowledge. I was able to contribute to two different client engagements by completing accounts receivable, pension plan, and revenue testing, as well as initiating a comprehensive roll forward schedule for use during 2013 year-end audit work. Furthermore, I participated in PwC’s Launch, a three-day Disney Institute program geared toward developing leadership and team building skills. By participating in this internship, I was able to experience the responsibilities and career of a public accountant, specifically the audit role. My internship directly enforced key insights obtained throughout completing numerous undergraduate accounting courses as well as other leadership experiences, including volunteering as a Girls on the Run of Columbia coach and serving as a Supplemental Instruction Leader with the Student Success Center. Working with PwC allowed me to not only obtain a full-time offer as an associate auditor, but also provided me with the appropriate resources and skills to complete the CPA exam and begin a successful career in public accounting.

Sorority Women Who Lead: The Power of Values-Based Leadership
Meghan Brooks, Political Science - Senior
During my four years at the University of South Carolina I have been involved in a National Panhellenic Conference sorority, Gamma Phi Beta. The mission of Gamma Phi Beta is to “inspire the highest type of womanhood” through lifelong leadership and service. Through my experiences in my sorority and on multiple Greek boards and councils I have grasped the importance of women’s organizations as a measure to promote female leadership not only at the collegiate level but also in any workplace or professional setting. My personal experiences and my research will demonstrate that leadership opportunities in sororities are effective in the advancement of young women entering the workforce. I will highlight not only the advantages of leadership education and programming in Panhellenic and similar women’s organizations, but also the power of values-based leadership.

Global Learning: Asia to Europe, From the Ears & Eyes of a Business Student
Taylor Conway, Management Science - Senior
My presentation for Discovery Day is the final component of my Graduation with Leadership Distinction portfolio. Through the USC Connect office, I have completed an e-portfolio and am pursuing the Global Learning area of GLD. I have studied abroad twice; I spent a summer session in Taipei, Taiwan taking an Intensive Mandarin language course and a semester in Rome, Italy, taking courses in international business, photography, history, and Italian language. I have enhanced my GLD portfolio with experiences such as volunteering as a "Buddy...
and creative writing. Focusing on these two aspects and the benefits they can bring to an undergraduate career and beyond, I gave students venues to grow in both areas. My time as President taught me how an English major can be a leader and the importance of helping students within your own major, especially during a time when an English major education is too often undervalued.

**Florence is my favorite!**

**Kelly Olsen,** Hospitality Management - Junior

Mentor: Prof. Annette Hoover, Hotel, Restaurant, and Tourism Management

I was nominated for Discovery day by professor Annette Hoover: I would like to participate to both share my experience studying abroad this past fall in Florence, Italy as well as earning credit for my service project I am required to complete as a result of having earned a scholarship towards studying abroad. I would love to make a poster with pictures from my journey in europe. I was fortunate enough to travel to over 9 countries and visit several cities. I would also love to be an advocate for study abroad and educate students who are more financially challenged that there are opportunities for them.

**Peer Leadership: An Extensive Look at Purposeful Engagement in Beyond-the-Classroom Experiences**

**Kinteshia Scott,** Environmental Science - Senior

While matriculating at the University of South Carolina, I have had the opportunity to engage in purposeful peer-leadership opportunities that have enhanced my time at the university. As a candidate aiming towards Graduation with Leadership Distinction in the field of Professional and Civic Engagement, I have participated in meaningful, beyond-the-classroom experiences that have helped to more thoroughly develop my leadership skills while educating and serving my fellow Carolinians. After becoming a student at the University, I began to take advantage of different leadership opportunities as a means of enhancing the Carolinian Community. In the past three years, I have been fulfilled multiple peer leader positions including being a Resident Mentor, EcoRep, Diversity Peer Educator and MAPP (Minority Assistance Peer Program) Mentor. As I reflect on my time at the University of Carolina, my most memorable and meaningful moments occurred while fulfilling one of these roles. These roles have not only helped me to decide my future career path but have helped me realized the importance of both serving and educating others. By being a peer leader at University of South Carolina, I have forged a passion and become an educator for many different topics, including civil rights environmental justice, which I may have never learned about had I not been a Peer Leader. In the future, I plan to continue along this path, attending Law School to earn my Juris Doctorate specializing in environmental and civil rights law.

**Florence is my favorite!**

**Kinteshia Scott,** Environmental Science - Senior

While matriculating at the University of South Carolina, I have had the opportunity to engage in purposeful peer-leadership opportunities that have enhanced my time at the university. As a candidate aiming towards Graduation with Leadership Distinction in the field of Professional and Civic Engagement, I have participated in meaningful, beyond-the-classroom experiences that have helped to more thoroughly develop my leadership skills while educating and serving my fellow Carolinians. After becoming a student at the University, I began to take advantage of different leadership opportunities as a means of enhancing the Carolinian Community. In the past three years, I have been fulfilled multiple peer leader positions including being a Resident Mentor, EcoRep, Diversity Peer Educator and MAPP (Minority Assistance Peer Program) Mentor. As I reflect on my time at the University of Carolina, my most memorable and meaningful moments occurred while fulfilling one of these roles. These roles have not only helped me to decide my future career path but have helped me realized the importance of both serving and educating others. By being a peer leader at University of South Carolina, I have forged a passion and become an educator for many different topics, including civil rights environmental justice, which I may have never learned about had I not been a Peer Leader. In the future, I plan to continue along this path, attending Law School to earn my Juris Doctorate specializing in environmental and civil rights law.

**E-Portfolio: Learning Beyond the Classroom through Global Learning (GLD)**

**Yena Song,** Biological Sciences - Senior

With emphasis on global learning, my e-portfolio presents the different experiences studying abroad at Sookmyung Women's University (Seoul, South Korea) and University of Leeds (Leeds, England), combined with global experiences in medical mission trips in Mexico and Nicaragua to highlight the beyond the classroom experiences that intertwined with knowledge gained from classrooms to teach something unattainable from the classroom alone. I chose to spend crucial periods of my college career, traveling abroad to study and serve because of my genuine love of traveling and service. Through the USC's Study Abroad Office and the Columbia Korean United Methodist Church, I was able to embark in journeys overseas that I would have never imagined as possible. In South Korea, I learned how diverse perspectives can be created among the same people, each defined by the culture and environment that surrounded it, and how these differences can become unified in order to complete a greater goal. The definitions of “truth” changed to “perspectives” as I met the different people of the world and learned to look through their eyes. These experiences united with my knowledge of Plato’s Allegory of the Cave, acquired during my courses at USC. This connection brought further understanding to how important it is to properly define what we consider as the “truth”. Just like the prisoners in Plato’s Allegory of the Cave question whether their idea of reality is the true representation of reality, we should constantly be open to other perspectives and discern our idea of “truth”.

**Professional and Civic Engagement and Leadership in Athletic Training**

**James Thomas,** Athletic Training - Senior

Mentor: Dr. Jeremy Searson, Physical Education

During the past four years at the University of South Carolina I have been involved in both professional development and civic improvement. I worked in eight different settings within the field of athletic training to integrate in-class topics to out of class experiences. I also served as the vice president of the SCATSA student organization where I coordinated the philanthropic events of the club. During my time at the eight separate clinical settings I was actively engaged in developing patient rehabilitation as well as the prevention, education and recognition of injuries. I chose to participate in these out of class clinical experiences and leadership role to marry the concepts discussed within the classroom to experiences and concepts outside of the classroom. I think that seeing the use of topics and techniques, which were learned within the classroom, outside of the classroom will solidify the importance of the items discussed. Through my experiences I learned the importance of continued education, integration of evidence based medicine, organization, preparedness and cultural competency. These skills are important and significant because they will be key insights that will be used daily as I become a professional and a leader in the athletic training field. Through these experiences I hope to carry the knowledge and skills gained in to my next career goal as a graduate assistant athletic trainer at the College of Charleston while attaining my master's degree in Health, Exercise and Sport Science at The Citadel.
Graduating with a Distinction in Leadership in Professional and Civic Engagement at the University of South Carolina

Emma Van Sant, International Business - Senior

For Discovery Day, I will be presenting on the culmination and interaction between my experiences in and outside of the classroom during my four years at the University of South Carolina. I will demonstrate my extensive and purposeful engagement beyond the classroom and show how my learning in the classroom contributed to how I made decisions and adapted to situations in a “real world” setting. I decided to engage in this project not only to graduate with a Distinction in Leadership in Professional and Civic Engagement, but also to reflect on and examine what I have accomplished in the last four years. I was able to do this reflection mainly through the creation of an online portfolio, which contains links to works I accomplished, and summations of my experiences. Through the process of creating a portfolio, I was able to learn more about how valuable my experiences outside the classroom really were and in what ways I could apply that knowledge to my future after graduation. I took a lot of the things I learned during my experiences for granted before I started the portfolio, and had not properly examined what they really meant in a “real world” concept. I hope that someday all students undertake a way to examine and summarize their experiences in college. It is easy to forget about them once we leave the college setting and creating this portfolio and going through this process has been invaluable to me.

Aesthetic Learning

Bradley Wiggins, History - Senior

Through this presentation I plan to explain the importance of aesthetic learning through travel. Moreover, I hope to elaborate on my experiences abroad such as my community outreach, and academic courses to show how they have impacted my time as a student. Also, through Discovery Day I wish to show other students the potential study abroad has to change their perspective of the world, and influence their future endeavors. During my collegiate career I have participated in two study abroad programs, and an alternative Spring Break trip. My alternative Spring Break consisted of traveling to Athens, Greece for a week to work with refugees, speak to students of Athens University, and participate in outreach to victims of human trafficking. The first study abroad program I enrolled in consisted of living in Dublin, Ireland for a summer semester to study Irish history and literature. This program was through the company IES Abroad. Secondly, I participated in a direct exchange to the University of Warwick in Coventry, England for an academic year.
Proxy Baptisms in the Church of Jesus Christ of Latter-day Saints

Amy Bassett, Religious Studies - Senior
Mentor: Dr. Erin Roberts, Religious Studies

I am conducting an advanced project this semester with Dr. Erin Roberts of the Religious Studies Department exploring the doctrine and practice of proxy baptisms in the Church of Jesus Christ of Latter-day Saints (LDS). The baptism ordinance is believed to be essential for salvation in the LDS church, and living church members may be baptized as proxy for deceased ancestors in order to provide this qualification. The LDS church has developed an entire schema of practices based in this doctrine including genealogical research, temple worship, and proselytizing programs. The establishment of these practices begins with the legitimization of the LDS church for the antiquity, transcendence, and authority of the proxy baptism doctrine. Tracing the legitimization arguments of the LDS church allows for a methodical investigation into the agreement between church doctrine and practices. My research focuses specifically on the legitimization of authority claims through LDS scriptures. In examining these primary texts and comparing the various interpretations, I am mapping the connection the LDS church draws between scripture based doctrine and current church practices. I am finding that the LDS concept of salvation and the role of free-will are central components in this connection. Both of these factors play a critical motivational role in the genealogical, temple, and proselytizing practices. A more complete understanding of these relationships is prerequisite to any further study into LDS church doctrine of additional proxy salvation ordinances.

A Community Study: Preserving Memories of the Carolina Theatre

Marian Humphreys, Art Education - Senior
Mentor: Dr. Karen Heid, Art

After gaining insight on a community project taking place in Allendale, South Carolina, I chose to work with a mentor and a graduate student to further the restoration and preservation of the town’s “Carolina Theatre.” The theatre, worn down and unable to be used for years, was going through a renovation in hopes of becoming a new community treasure for Allendale and the University of South Carolina’s Salkehatchie campus. The old Carolina Theatre, a popular site in the mid-1900s in Allendale, contains an interesting history and memories held by many still living in the area today. I became interested in helping publish a book that would preserve these memories of the theatre, as it was such an important attraction to the community. During my research, I was involved in an extensive interview process in order to obtain history, memories, and future hopes of both the theatre and the town of Allendale. I discovered that, in the mid-1900s, Allendale was a thriving city due to its prime location: as the midway point between New York and Miami. It was a popular stop for those going south for vacation, so the town often received traffic and tourists. In the past few decades, especially after the addition of Interstate 95, the Allendale community changed dramatically. By interviewing those who lived during this active time, publishing a book of rich history and memories, and promoting the opening of the renovated Carolina Theatre, I hoped to help bring back a sense of community in Allendale.

The Astronomical Life of Robert Ariail

Jonathan Kaufman, History - Sophomore
Mentor: Mrs. Elizabeth Sudduth, University Libraries

Robert Ariail was a prominent amateur astronomer, telescope aficionado, and lifetime collector of scientific equipment. His collections, observations, and correspondence have been donated to University of South Carolina and tell his life story. As a researcher, I have worked towards the creation of a finding aid useful to those interested in the life of this fascinating individual. I have arranged the correspondences and observations, searchable by finding aid, to outline specifically what is found in the collection, providing order and aiding the work of researchers. Although this project is a work in progress, the finding aid and materials will be downloaded to a digitized database available to anyone in the world. This finding aid will augment the previously completed finding aid, created by James Risk, with updated information and newly available documents. This accessibility will allow researchers to read a general summary of the collection contents before performing more detailed research. Ariail’s life provides valuable insight into astronomical observations, restorations of important telescopes (such as those of Henry Fitz), and other potential primary sources for a variety of research projects.

The Pinckney Statesmen

Andrew Smith, History - Junior
Casey Lee, History - Senior
Mentor: Mrs. Mary Sherrill, History

This project is focused on taking the personal and professional papers of the three Pinckney Statesmen from the Founding Era of The United States; Charles Pinckney, Thomas Pinckney and Charles Cotesworth Pinckney; and transcribing them online into a digital database that can be accessed by other scholars researching these three men.

The Eight Trigrams Concept of Taoism in Yang-family Taijiquan

Travis Stewart, Biomedical Engineering - Senior
Mentor: Dr. Hal French, Religious Studies

The Yang-style Taijiquan (太极拳 or Supreme Ultimate Fist) martial art system is deeply rooted in the philosophy of Taoism. In fact, what is called the yin-yang symbol  in English is called the taiji (太极) in Mandarin Chinese. A central concept of Taoism is the 8 trigrams, the philosophical extension of yin-yang, expounded upon in the Book of Change (易经 or Yijing). Each trigram is made of three lines, and each line is either unbroken (yang) or broken (yin) for a total of 23=8 combinations of yin and yang qualities. The eight trigrams are . The four primary moves of the Yang Jianhou Large Frame are based on the trigrams: warding off , rolling back , pressing , and pushing . Additionally, there are 4 secondary movements based on the second four trigrams: plucking , rending , bumping , and elbowing . The first four trigrams correlate to the four primary directions (NESW); the second four trigrams correlate to the four secondary directions (the 4 diagonals between NESW). Adding to this complexity, the Large Frame has rolling back in warding off and warding off in rolling back, i.e. and , consistent with the philosophy of Taoism if you look at the Taiji you see that there is yin in yang...
and yang in yin -- the black circle in white crescent and white circle in the black crescent]. Hand-to-hand combat applications are various including an arm break at the elbow for rolling back, a strike at the ribs for pushing, striking with shoulders for bumping, throws for rending, and kneeing techniques under the category of elbowing.

**Lights, camera, action: evaluating the portrayal of pharmacists in film and television**

Amy Yanicak, Pharmacy - Senior
Lindsay Waddington, Pharmacy - Senior
Gabrielle Furgiuele, Pharmacy - Senior
Philipp Monterroyo, Pharmacy - Senior
Shiva Tavassoli, Pharmacy - Junior
Alyssa Chappell, Pharmacy - Junior; USC Columbia

Mentors: Dr. P. Brandon Bookstaver, Clinical Pharmacy and Outcomes Sciences
Dr. Phillip Mohorn, Clinical Pharmacy and Outcomes Sciences

Media portrayals of pharmacists may represent the public’s view of the profession and may influence viewer perception. This retrospective study characterizes the portrayal of pharmacists appearing in movies and television shows available in the United States from January 1970 to July 2013. A comprehensive search of the Internet Movie Database, including characters, summaries and scripts with internet keyword searches using Bing® and Google® search engines were also used to identify data. The study team viewed all identified references, evaluating the portrayal of pharmacist characters as positive, negative, or neutral as determined by an algorithm developed by study investigators and then also documented demographic information, genre, and year of media. A 20% random sampling was viewed by a second investigator. Based on 285 non-duplicate submissions, 230 unique portrayals of pharmacists in film and television were identified, viewed and evaluated (after excluding submissions that lacked a pharmacist, were unobtainable, or released before 1970.) Pharmacists were primarily portrayed as white (75%) males (75%) under the age of 50 years (47%) in a community pharmacy setting. The majority of portrayals (62%) were characterized as negative portrayals while 24% were determined to be neutral. There were 3.8 times as many pharmacists portrayed as victims (23%) as there were heroes (6%). Pharmacists mostly played minor character roles, yet, over the past four decades, the number of pharmacist appearances steadily increased each decade. These results highlight a potential concern in the public’s view and lack of knowledge of the changing dynamics in the profession.

**Optimizing germinal transposition of mPing in Arabidopsis thaliana**

Courtney Burchhalter, Biology - Senior; USC Aiken

Mentor: Dr. C. Nathan Hancock, Biology/Geology; USC Aiken

DNA transposable elements (TE) are repetitive sequences that are mobilized by a cut-and-paste mechanism catalyzed by transposase. The overall goal of our research is to develop the mPing element from rice into an efficient mutagen for plant gene discovery. To be effective, mPing must produce germinal (heritable) insertions that disrupt gene function. In Arabidopsis thaliana, mPing preferentially inserts near genes, but rarely produces germinal transposition events when using the 3SS promoter to drive expression of the transposable genes. Changing to the constitutive RPS5A promoter was shown to produce germinal mPing transposition. Also, a novel chimeric ORF1 (C1) made from the Pong and Ping ORF1 and a nuclear import signal was shown to produce drastically increased transposition in yeast assays. The objective of this project is to test mPing mutagenesis constructs that incorporate these improvements to determine if they increase the germinal mPing transposition rate in Arabidopsis. Our hypothesis is that using new constitutive promoters and the ORF1-C1 protein will increase germinal transposition in Arabidopsis. Constructs with the RPS5A promoter driving ORF1-C1 and the GmUbi promoter driving Pong TPase LA were transformed into Arabidopsis. Transposition in the T1 generation was monitored by observing GFP fluorescence. A high percentage of these plants were found to have large sectored areas of GFP, suggesting they will produce germinal transposition events. The next generation will be analyzed to determine the germinal transposition rate. When complete, this research should provide more information about how to optimize mPing mutagenesis constructs.

**Novel Cross Talk between Notch and p53 During DNA Damage Response**

Michaela Close, Biological Sciences - Junior

Mentor: Dr. Minsub Shim, Biological Sciences

Although Notch signaling plays an important role in self-renewal and cell fate, Notch signaling has also been suggested to be involved in tumorigenesis as well as chemotherapy resistance. Chemotherapeutic agents often function by inducing the DNA damage response. One of the most critical components of this pathway is the tumor suppressor protein p53, which is responsible for initiating DNA repair or apoptosis after the occurrence of DNA damage. Both Notch signaling and p53 signaling have been implicated in cancer; however, we still do not know how these signaling pathways interact. The aim of this research was to explore the potential cross talk between Notch signaling and p53 in DNA damage response. We found that treatment of mouse embryonic fibroblasts (MEFs) with doxorubicin (DOX), a chemotherapeutic agent that triggers the activation of p53, induces an increase in the expression of Jag2 mRNA, a Notch receptor ligand. This increase was mitigated by PFT-α, a specific inhibitor of p53 signaling. Furthermore, induction of Jag2 mRNA by DOX was suppressed in p53 knockout MEFs. Forced expression of Jag2 significantly suppressed induction of p53 in response to DOX treatment.
and reduced DOX-induced cell death. Lastly, overexpression of Jag2 in U2OS osteosarcoma cells decreased DOX-induced p53 accumulation. Collectively, these results suggest that (i) DNA damage activates Notch signaling, as seen through the induction of Jag2, (ii) p53 is an upstream regulator of Jag2 expression, and (iii) Jag2 suppresses DNA damage signaling by reducing p53 levels. Our study identifies the existence of a novel cross talk between p53 and Jag2 and suggests a possible role of Notch signaling in chemoresistance, as changes in p53 activity can contribute to the resistance of cancer cells to chemotherapy. Future study will focus on the role of Notch signaling in chemoresistance.

**Turnover of Protein Succination in Adipocytes**

**Hannah Faile**, Biological Sciences - Senior
Mentor: Dr. Norma Frizzell, Pharmacology, Physiology and Neuroscience

We recently identified a novel chemical modification of protein, S-2-succinocysteine (2SC), that is formed when fumarate (from the Krebs cycle) reacts irreversibly with cysteine residues on proteins. The formation of 2SC, termed protein succination, is not enzyme mediated and is known to alter protein structure and function when it is increased. Protein succination increases on adipocyte proteins when cultured in high glucose; however, this accumulation is reduced when cells are switched to normal glucose conditions, suggesting that succinated proteins are gradually removed by the cell. In this study we investigated the mechanisms leading to the turnover of succinated proteins. Adipocytes maintained in high (30 mM) glucose for 4 days were switched to normal glucose (5 mM) medium and treated with a proteasome inhibitor (MG 132) or a lysosomal inhibitor (chloroquine) for an additional 4 days before protein harvest. Parallel experiments examined adipocyte protein after the cells had been placed back in normal glucose conditions for 1-4 days. Western immunoblotting was performed to detect the levels of protein succination, ubiquitination and markers of autophagy. Protein ubiquitination was increased in the presence of MG132 confirming that the proteasome was inhibited. However, protein succination only remained increased when adipocytes were maintained in the presence of chloroquine, not MG132, suggesting that succinated proteins were being turned over by autophagy rather than the proteasome. Analysis of LC3 protein levels confirmed that autophagy was inhibited in the chloroquine treated cells. We have successfully demonstrated that succinated proteins are removed from the cell in an autophagy-dependent manner.

**Determining the role of target site duplication sequences on the transposition of MITEs**

**David Gilbert**, Biology - Sophomore; USC Aiken
Mentor: Dr. C. Nathan Hancock, Biology/Geology; USC Aiken

DNA transposons are sequences that are mobilized by transposase proteins, which excise and re-insert the element into the genome. Some transposons, including miniature inverted transposable elements (MITEs), do not encode transposase proteins, but are mobilized in trans. In plants, these MITEs reach very high copy number and influence genome evolution. MITE insertion produces identical target site duplications (TSDs) flanking the element. Our focus is to determine how the TSDs influence transposition and repair of the excision site.

To address this, we are using the Tourist-like MITE mPing and the Stowaway-like MITE 14T32-T7 from rice. mPing insertion creates a 3bp TSD, which is then repaired precisely upon excision (reverting the site of insertion back to the original). 14T32-T7 creates a 2bp TSD and but leaves behind the TSD and a small fragment of the end of the element upon excision. To determine the role of the TSD in transposition, we have mutated single bases in the TSDs of both mPing and 14T32-T7 and performed yeast transposition assays. For both elements, we observed that some mutations in the TSD severely inhibit transposition rates. Interestingly, when the two TSD sequences on either end are not matching, the transposition rate is also reduced. To determine cause of this reduction, we are performing assays in yeast that is unable to repair double-stranded DNA breaks by non-homologous end joining, but can perform homologous repair. This will allow us to separate the role of excision and repair and determine which transposition step is responsible for this phenomenon.

**The Role of the E3 ligase ITCH on Intestinal Homeostasis**

**Amanda Hartman**, Biochemistry and Molecular Biology - Junior
Mentor: Dr. Lydia Matesic, Biological Sciences

Cellular homeostasis of the intestine is a highly dynamic process requiring tight regulation over the spatial distribution of the four major cell types of the intestine. The architecture of the small intestine is arranged into finger-like villi that aid in the absorption of nutrients and the crypts of Lieberkühn, which are responsible for maintaining the epithelium of the intestine. Within the crypts reside intestinal progenitor cells that will differentiate into post-miotic cells as they migrate up toward the villi. The E3 ubiquitin ligase ITCH has recently been highlighted as a critical regulator of cell fate decisions in the immune system, as well as the gastrointestinal tract. To investigate the role of ITCH on adult intestinal secretory cell differentiation in the distal small intestine and colon, a mouse model was employed. In adult mice lacking functional Itch expression (Itch-/-), we observed a significant increase (p 0.001) in the quantity of small intestinal goblet cells within the crypt and villi, as well as an increase in the average area of the goblet cells in the villi as compared to WT littermates. Additionally, paneth cell quantity and distribution appear to be affected in both the Itch-/- small intestine and colon. Collectively, this suggests that ITCH is an important modulator of adult intestinal cell fate decisions of the secretory cell lineage. Understanding the role of ITCH in intestinal homeostasis will provide insight into how altering cellular dynamics can lead to various disease pathologies of the intestine.

**Creating constructs to determine craniofacial bone development of mef2ca mutant zebrafish**

**Samana Mehdi**, Biology - Senior; USC Aiken
Mentor: Dr. April DeLaurier, Biology/Geology; USC Aiken

The mef2ca gene is responsible for proper craniofacial skeletal patterning in zebrafish. In zebrafish, loss of the mef2ca gene function can cause craniofacial defects to arise, including premature ossification of the skeleton. To understand how the loss of the mef2ca gene will cause bone defects, we will study the bigap gene, which is known to regulate bone. In this project, a transgenic construct that recombines green fluorescent protein (GFP) is being created and inserted...
Cancer Cell Apoptosis Induced By COPZ1 Depletion

**Emeka Okafor**, Biomedical Engineering - Senior
Mentor: Dr. Michael Shrutman, Drug Discovery and Biomedical Sciences

Within the wide field of medicine, cancer arguably has the most impact on today’s society, affecting over 13 million people in the United States alone. Cancer is characterized by the unregulated growth of mutated cells within the body. Because cancer cells retain similar functions and mechanisms as existing healthy cells, the development of an effective drug therapy system presents significant obstacles. However, Shrutman et al. have identified the ζ1 subunit of the COPI complex, which plays an integral role in vesicular transport, as a prospective target for cancer therapy. The ζ1 subunit is coded by two interchangeable isoforms, COPZ1 and COPZ2. Both isoforms are present in healthy cells while the COPZ2 gene is silenced in many cancer cells. When COPZ1 is depleted by way of siRNAs, cancer cells undergo apoptosis while healthy cells survive on COPZ2 alone. Due to COPI’s role in transport between the Golgi and endoplasmic reticulum (ER), this study investigated whether or not the unfolded protein response (UPR) – an ER stress response pathway – was the main pathway that caused apoptosis in cancer cells upon the depletion of COPZ1. The 3 main UPR sensors, ATF6, IRE1α, and PERK, were blocked using siRNA knockdown. Under the hypothesis that the UPR is the main pathway, I expected to find a reduction of cancer cells undergoing apoptosis since the UPR is a survival mechanism evoked by stressed cells. However, the results from the experiments that have been carried out thus far show that there is minimal effect of UPR signaling on COPI-inhibition induced cell death.

**Negative Regulation of Plant Mitogen-Activated Protein Kinases by MAP Kinase Phosphatases During Herbivory**

**Daravatey Pel**, Biological Sciences - Freshman
Mentors: Dr. Johannes Stratmann, Biological Sciences; Mr. Carlton Bequette, Biological Sciences

Arabidopsis thaliana (Brassicaceae) is a model organism for plant biology, naturally found throughout Europe, East Africa, and Asia. Though plants may seem vulnerable to herbivorous insects due to their immobile nature, they have different physiological and chemical methods of protection. When insects like caterpillars chew on the leaves of the plant, an appropriate defense response is initiated via mitogen-activated protein kinase (MAPK) signaling cascades. Defenses include production of harmful secondary metabolites and enzymes that reduce the caterpillar’s ability to assimilate essential amino acids. MAPK signaling is vital for the plant to mount a defense response. Signal transduction and activation of a defense response is dependent on strict positive and negative regulation of the signaling cascade. The negative regulation of MAPKs depends on MAPK phosphatases. Protein phosphatases are enzymes that dephosphorylate and inactivate MAPKs. The purpose of our experiment is to determine how different phosphatases regulate MAPKs during induced defense responses to caterpillars. We have established homozygous T-DNA insertion Arabidopsis mutant lines for eight different protein phosphatases that are known to interact with MAPKs (pp2c5, mkp1, dsptp1, atptp1, abi1, ikr5, phs1, ap2c1). If a protein phosphatase regulates any of the MAPKs involved in inducing a defense response to herbivory, we expect to see an aberrant response to feeding by caterpillars. The mutant and wild-type plants will be subjected to caterpillar feeding and the caterpillars will be weighed to determine if their growth and development is affected by the loss of a specific MAPK phosphatase.

**Measuring the effect of anti-HIV tat siRNAs on HIV replication**

**Emily Webb**, Biology - Sophomore; USC Aiken
Mentor: Dr. William Jackson, Biology/Geology; USC Aiken

Human Immunodeficiency Virus (HIV) is a retrovirus that infects CD4+ T lymphocytes and progressively destroys the immune system and its functions. If left untreated, HIV infection results in Acquired Immunodeficiency Syndrome (AIDS). Because current treatment options are not curative, it is necessary for further investigations into ways to combat HIV. One vital target of HIV is the viral transactivator of transcription (tat), which is an essential regulatory protein of several HIV genes, in particular tat, seems to be a promising route. siRNAs are short-interfering RNA sequences that can be used to target and cleave specific mRNAs through the DICER/RISC complex. The DICER/RISC complex is recruited to the target mRNA through complementary base-pairing with the siRNA and activates a cleavage reaction of the mRNA that results in down-regulation of gene expression. To study the ability of siRNAs to inhibit HIV replication, four anti-HIV tat siRNAs (si5834, si5860, si5892, si6010) and a control siRNA have been designed and cloned into the retroviral vector; pSuper.retro.neo+GFP, under the control of the RNA polymerase III H1 promoter. Indirect testing of these siRNAs, using a tat-dependent luciferase assay, showed various levels of anti-tat activity, with si5892 showing the greatest efficacy. Currently, direct measurements of the effects these siRNAs have on HIV replication through a HIV p24 antigen capture assay are being conducted.
**Biology and Biomedical Sciences II**

**The cellular effects of HIV-1 Tat-dependent expression of pro-apoptotic tBid and Bax**  
*Claudia Fulmer*, Biology - Senior; USC Aiken  
Mentor: Dr. William Jackson, Biology/Geology; USC Aiken  

Human immunodeficiency virus (HIV-I), a lentivirus in the family Retroviridae, infects and destroys CD4+ T-lymphocytes. It is the loss of these cells that leads to AIDS. Among the virus’ essential genes is the transactivator of transcription, Tat, which acts to dramatically increase the rate of viral transcription through its interaction with the transactivation response element (TAR), encoded within the viral U3/R promoter/enhancer. Because Tat is expressed early in HIV-I infected cells, we hypothesized that it would be possible to exploit this viral function to induce apoptosis, or programmed cell death. The truncated BH3 interacting-domain death agonist (tBid) and the Bcl-2-associated X protein (Bax) are host proteins that are early participants in the apoptotic pathway and act on mitochondria to trigger release of cytochrome C, which induces caspase activation and ultimately cell death. Our lab has cloned a series of plasmids that couple tBid, Bax, or the enhanced Green Fluorescent Protein (eGFP) with the HIV-1 promoter/enhancer (U3R) to render them Tat-dependent. Initial studies of 293T cells, transiently transfected with pU3ReGFP, indicated that fluorescence increased in a Tat-dependent manner. This project investigated the effect of Tat and Bax expression in HEK293T cells using cell viability and apoptosis assays. These studies indicated minimal cell death of HEK293T cells when transiently transfected with pU3RtBid or pU3RBax in the absence of HIV-1 Tat, although pU3RBax-transfected cells showed somewhat lower viability as compared to pU3RtBid-transfected cells. Current studies are underway to assess the effect of HIV-1 Tat on the induction of apoptosis.

**Optimization of Multilocus Sequence Analysis for Identification of Species in the Genus Vibrio**  
*Michael Gabriel*, Biological Sciences - Senior  
Mentor: Dr. Charles Lovell, Biological Sciences  

Multi Locus Sequence Analysis (MLSA) is an important method for identification of bacteria, particularly taxa that are not well differentiated by 16S rRNA gene sequences alone. In this procedure artificial analytical sequences are constructed by combining the nucleotide sequences of various genes and then analyzed to yield a more comprehensive phylogeny. Various numbers of gene sequences have been used in MLSA, but gene selection, as well as the numbers of genes employed can be somewhat arbitrary. There has also been no evaluation of the impact of gene order in the artificial analytical sequences on the outcome of analysis. We examined the effects of gene number and order in MLSA. The recA, rpoA, gapA, 16S rRNA gene, gyrB, and ftsZ sequences from 56 of the 87 species of the genus Vibrio were used to construct molecular phylogenies and these were evaluated both individually and in various combinations. Phylogenies derived from two gene artificial analytical sequences employing recA and rpoA in both possible gene orders were different. The addition of the gapA gene sequence, producing all six possible artificial sequences, reduced the differences in phylogenies to degrees of statistical (bootstrap) support for some nodes. Thus, the impact of gene order on Vibrio phylogenetic analyses appears to be important only in analyses employing low numbers of genes. The overall statistical support for the phylogenetic tree, assayed on the basis of the number of nodes having bootstrap values higher than 80, increased with increasing numbers of genes used up to a maximum of four. No further improvement was observed from addition of the fifth and sixth gene sequences (ftsZ and gyrB) and in fact addition of these genes resulted in lower numbers of strongly supported nodes.

**Sensitivity of Species Within the Plant Family Solanaceae to FACs from Herbivore Saliva**  
*Laquita Grissett*, Biological Sciences - Sophomore  
Mentor: Dr. Johannes Stratmann, Biological Sciences  

Plants cannot move like animals when attacked. Instead they have evolved defense mechanisms tailored to their sedentary life style. When plants are wounded by the caterpillar Manduca sexta, they have the ability to recognize fatty acid-amino acid conjugates (FACs) that are found in the oral secretions of these caterpillars. The FACs induce herbivore-specific signal transduction such as activation of mitogen-activated protein kinases (MAPKs), which regulate the synthesis of the plant hormone jasmonic acid. Jasmonic acid induces expression of defense genes that code for proteins that directly attack the caterpillar’s digestive system. The hypothesis generated prior to conducting the experiments is that all plants within the Solanaceae family respond to FACs because members of the same family are evolutionary closely related. The null hypothesis is that not all plants within the Solanaceae respond to FACs. Sensitivity to FACs is identified by measuring the activity of MAPKs. FAC-induced MAPK activity in leaves of plants of the Solanaceae was measured by immunoblotting using the primary antibody anti-pERK 44/42. This antibody recognizes only active phosphorylated MAPKs.  

The plants analyzed were Nicotiana alata (jasmine tobacco), Solanum tuberosum (potato), the domesticated tomato S. lycopersicum, and the wild tomato species: S. pimpinellifolium, S. cheesmania, S. neoricikii, and S. chmielewskii. My data indicate that N. alata, S. tuberosum, and S. chmielewskii can perceive FACs, whereas the other species are insensitive to FACs.

**Investigation of Golgi Collapse due to Knockdown of COPZ1 in Cancer Cells**  
*Samuel Lee*, Biomedical Engineering - Freshman  
Mentor: Dr. Michael Shatutman, Drug Discovery and Biomedical Sciences  

The efficacy of anticancer drugs against tumors is dependent on the molecular target of the drug. Current anticancer drugs primarily target tumor cells undergoing proliferation and are ineffective against tumor cells that are not. Therefore, therapy with such anticancer drugs fails. However, recent genomic screening has identified knockdown of coatomer protein complex ζ1 (COPZ1) gene as a potential method for targeting non-proliferating and proliferating tumor cells. The COPZ1 and COPZ2 genes code subunits of coatomer protein complex 1 (COP1), which functions in intracellular transport and autophagy. Therefore, knockdown of both COPZ1 and COPZ2 cause Golgi degradation, leading to
apoptosis. In normal cells, COPZ1 and COPZ2 are both expressed, but in tumor cells, only COPZ1 is expressed while COPZ2 is highly down-regulated. Therefore, anticancer drugs that target COPZ1 are a potential method for inducing apoptosis in tumor cells while maintaining homeostasis of normal cells. To observe Golgi collapse due to knockdown of COPZ1, BJ-ELR and BJ-HTERT cells were exposed to the molecule CTZ9, which targets COPZ1, at four different concentrations, 80μm, 40μm, 20μm, and 10μm, in addition to a positive control, Dimethyl Sulfoxide (DMSO), and a negative control, Brefeldin A (BFA) for four hours. After treatment, the two cell lines were imaged to observe the Golgi, which was visualized with two antibody treatments. Cells were treated with first antibody against the Golgi marker, GM130 protein, followed by staining with secondary antibody labeled with fluorescent dye (Cy5). The results of drug effects on Golgi structure in different cell lines will be discussed.

**Developing a Novel Assisted Reproduction Technique in the Deer Mouse, Peromyscus maniculatus**

*Courtney Malo*, Biological Sciences - Senior

Mentor: Dr. Gabor Szalai, Biological Sciences

In the case of any animal model, it is essential that there be a set of key techniques that allow future investigators to effectively complete research. For the deer mouse, Peromyscus maniculatus, a successful artificial insemination (AI) protocol provides opportunities for a variety of studies. *P. maniculatus* is a North American rodent species with 61 known subspecies that range over a large geographic area, making *P. maniculatus* the most common species in the genus. *P. maniculatus* considerably differs from both laboratory mice (Mus domesticus) and rats (Rattus norvegicus), both in the genome and in behavior; therefore, the deer mouse is often used in studies that require a model of a natural population. Our research group has previously shown that it is possible to artificially inseminate *P. maniculatus*; however, the pregnancy would spontaneously terminate before day 18. The goal of this study was to determine the social and hormonal factors that would allow female deer mice to carry and deliver viable offspring. More specifically, we tested the effects of providing the female with a male companion and administering hormones necessary for a healthy pregnancy. Initial studies showed that presenting the female with a male companion had no effect on her ability to maintain the pregnancy. Interestingly, adding an analgesic administration on the day of AI (day 0) and a progesterone administration following AI (days 11-18) resulted in the birth of healthy offspring. This demonstrates the effect of hormonal factors on pregnancy in *P. maniculatus*. Future directions for this work involve testing the paternity of AI offspring. This work has implications in the development of transgenic strains of Peromyscus maniculatus, providing further benefits to using Peromyscus maniculatus as a biomedical and behavioral model organism.

**Optimal Expression of Human Thymidylate Synthase in Recombinant Bacteria for Structural Analysis by NMR**

*Elisabeth Michaels*, Pharmacy - Junior

Mentor: Dr. Sondra Berger, Drug Discovery and Biomedical Sciences

Thymidylate synthase (TS) catalyzes the formation of thymidylate (TMP). TMP is a nucleotide crucial for DNA replication and transcription. Inhibiting TS prevents DNA synthesis; thus TS is a chemotherapeutic drug target to prevent DNA replication and transcription in cancerous cells. The purpose of the project is to optimize the amount of human TS (hTS) expressed in recombinant bacteria in a defined medium, designated as minimal medium. The ultimate goal is to do a structural analysis of the enzyme using nuclear magnetic resonance (NMR). Developing a structural model using NMR will help to better understand the enzyme and how it can be used as a drug target. Cells were grown in a rich medium and then minimal medium. The expression of hTS was measured by monitoring catalytic activity via spectrophotometry and comparing enzyme activities in bacteria grown in the two different media. The cells in the minimal medium and the cells in the rich medium both expressed activity. After optimization, cells grown in minimal medium expressed higher activity than the cells in the rich medium.

**The Biomechanical Characterization of Tissue Engineered Vascular Constructs**

*Alexandra Moreira*, Biomedical Engineering - Sophomore

Mentor: Dr. Tarek Shazly, Mechanical Engineering

We have developed an approach to fabricate living tissue engineered vascular constructs using micro-carrier beads seeded with human umbilical vein endothelial cells and vascular smooth muscle cells. Toroid shaped constructs having an outer diameter of 4mm, an inner diameter of 2mm and a wall thickness of 1mm are cultured in a tubular agarose mold for 12 days during which the elaborated extracellular matrix contains collagen and elastin. Based on uniaxial tensile test data on both cellularized and decellularized toroid constructs, a constitutive model has been created to characterize this tissue and obtain intrinsic material parameters. These material parameters will enable the prediction of the theoretical mechanical behavior of elongated tubular constructs fabricated from the same tissue-engineered material. The ultimate goal is to fabricate mechanically compatible vascular grafts for future patients who are diagnosed with systemic cardiovascular diseases.

**Identifying sequences responsible for the high transposition rate of a Tourist MITE**

*Daymond Parrilla*, Biology - Sophomore; USC Aiken

Mentor: Dr. C. Nathan Hancock, Biology/Geology; USC Aiken

Transposable elements are repetitive sequences that have the ability to move throughout the genome. These elements are very useful because they can be used as tools for mutagenesis and gene discovery. The focus of this study is, mPing, a 430-bp deletion derivative of the natural occurring Ping element, from the rice genome. Miniature inverted repeat transposable elements (MITEs) like mPing, potentially exhibit a very high transposition activity and can reach
very high copy number in plants. For comparison we constructed, mPong, an artificial deletion derivative of the natural occurring Pong element that shares approximately 80% identity to mPing. The mPong element shows very low transposition activity, compared to mPing. The question we are trying to address is how one naturally occurring MITE is mobilized very well, while the other is not? To answer this, we compared chimeric constructs of mPing with mPong. By performing yeast transposition assays on the different constructs, we were able to identify a region that promotes transposition in mPing. The next step after determining the transposition promoting region is to identify the specific sequences required for high transposition. To do this, I performed mutagenesis of mPing using manganese error-prone PCR. We are screening these mutants to identify lines with altered transposition activity. By comparing the sequences of the mutant mPings with mPing we hope to determine the sequences responsible for high transposition. Identification of these sequences should allow us to further understand the behavior of MITEs and allow us to develop more useful mutagenesis tools.

**Cloning a retroviral vector to express anti-HIV RNAs**

Elizabeth Baker, Biology - Senior; USC Upstate

Mentor: Dr. Joshua Ruppel, Natural Sciences & Engineering; USC Upstate

The human immunodeficiency virus (HIV-1) is a lentivirus that targets CD4+ T-lymphocytes, which act to control the adaptive immune response. HIV-1 is the causative agent of the acquired immunodeficiency syndrome (AIDS), which is associated with loss of immune function. We have developed a number of anti-HIV ribozymes and siRNAs that have been shown to down-regulate specific virus functions; however, delivery of these reagents is an important consideration and until recently we have used the pSuper.retro.neo+GFP (pSRNG) plasmid to express these antiviral RNAs from the RNA Polymerase III H1 promoter. Although pSRNG appears to efficiently express these reagents, we have found that it is inefficient at generating recombinant retroviral particles. The retroviral vector, p1744 takes advantage of the picornavirus internal ribosome entry site to express the selective markers β-galactosidase and the neomycin resistance ORF (open reading frame) from a monocistronic mRNA, and has been shown to efficiently produce recombinant retroviral particles; however, it lacks a useful characteristic of pSRNG: the RNA Polymerase III H1 promoter. The goal of this research is to modify the self-inactivating p1744 retroviral vector to express anti-HIV RNAs from the RNA Polymerase III H1 promoter. To do this, the H1 promoter will be amplified from pSRNG using primers engineered to introduce a BspEI site downstream of the promoter. The resulting PCR product will be cloned into p1744, such that the H1 promoter will be in an upstream and opposite orientation to the β-gal/neoR ORF, creating a retroviral vector capable of efficient siRNA delivery.

**Synthesis of carbohydrate porphyrin conjugates via palladium-catalyzed Buchwald-Hartwig reactions**

Elizabeth Baker, Biology - Senior; USC Upstate

Mentor: Dr. Joshua Ruppel, Natural Sciences & Engineering; USC Upstate

The Buchwald-Hartwig reaction has been proved to be a valuable tool in the synthesis of aryl ethers and amines from readily accessible brominated precursors. In this work, we report a general approach for the synthesis of carbohydrate-porphyrin conjugates (CPCs) using the Buchwald-Hartwig reaction. Development of a concise and high yielding route for the synthesis of brominated porphyrins allowed for the development of a modular synthetic approach using the Buchwald-Hartwig reaction for synthesis of CPCs. Carbohydrate-porphyrin conjugates (CPCs) have gained attention for use in photodynamic therapy (PDT) to address several current limitations, including solubility in biological fluids, selectivity, and weak absorbance at clinically useful excitation wavelengths (NIR).

**Using Fourier Transform Infrared Spectroscopy to Estimate Blood Age Under Different Environmental Conditions**

Alena Bensussan, Chemistry - Sophomore

Katherine Witherspoon, Chemistry - Junior

Mentor: Dr. Stephen Morgan, Chemistry and Biochemistry

Blood stains, which are among the traces encountered most frequently at crime scenes, are important for potential extraction and amplification of DNA for suspect identification, as well for spatter pattern analysis to reveal a sequence of events. Estimating the age of blood stains with good accuracy and precision has been an elusive goal for forensic investigations. Estimates of blood stain age can contribute to verify witness’ statements, limit the number of suspects and confirm alibis. Fourier transform infrared spectroscopy (FTIR) can be used in forensic detection of blood stains and age estimation because of signature absorbances in the mid-infrared region at 3300 cm⁻¹ (Amide A), 2800 cm⁻¹ to 3000 cm⁻¹ (Amide B), ~1650 cm⁻¹ (Amide I), ~1540 cm⁻¹ (Amide II) ,and 1200 cm⁻¹ to 1350 cm⁻¹ (Amide III). We have observed position and intensity shifts for these peaks due to aging changes occurring as a result of the denaturation of blood proteins and water absorption/desorption with aging. Partial least square regression (PLS) and interval PLS was used in this work to combine these changes in a multivariate calibration for blood stain age under different environmental conditions. This research will contribute to the understanding of mechanisms of blood aging and provide a nondestructive and simple approach for predicting blood age under a variety of environmental conditions.
Influence of pH on Removal of Chromium Species Using Lysine Functionalized Magnetic Iron Nanoparticles

Michael Eaves, Chemistry - Senior; USC Upstate

Mentor: Dr. Anselm Omoike, Natural Sciences & Engineering; USC Upstate

Magnetic iron nanoparticles (Fe3O4) were synthesized using co-precipitation method with aqueous Fe+2 and Fe+3 under alkaline conditions. Lysine was immobilized onto the surface of the magnetic iron nanoparticles (MNPs) and the particles were characterized using Fourier transform infrared (FTIR) spectroscopy and thermogravimetric analysis (TGA). The removal of chromium species from water using the lysine functionalized magnetic iron nanoparticles (L-MNPs) was investigated at Cr(VI) and Cr(III) concentrations ranging from 0-100 ppm, and varying pH values (3.0, 4.0, and 6.0). The sorption of Cr(VI) onto L-MNPs reached equilibrium in less than 90 min. Chromium removal capacity with L-MNPs was pH and chromium species dependent. The L-MNPs removed 70 mg Cr(VI) per gram and 1 mg Cr(III) per gram at 100 ppm Cr for pH 3.0 and 4.0 respectively. The L-MNPs have potentials for selective solid phase speciation and preconcentration of Cr(VI) species.

Effect of Quantum-Mechanical Tunneling on the Reaction Rate Constant for a Reaction of Hydroxyl Radical with Methanol

Kelby Killoy, Chemistry - Senior

Mentor: Dr. Sophya Garashchuk, Chemistry and Biochemistry

When exposed to extremely low temperatures, most chemical reactions that possess activation energy barriers slow down or even cease. However, recent low-temperature experiments on the interstellar reaction of OH with methanol show a significant increase in the reaction rate, which is found to be 100 times greater at 63 K than at 200 K. Quantum-mechanical tunneling, The probability that a proton penetrations through the potential energy barrier, is likely to explain this unusual trend. A simplified model of the reaction path was constructed using quantum chemistry calculations at CCSD(T)/6-311+G** theory level. The reaction coordinate is defined by the difference of the breaking and forming OH products, while reducing by-products. One method of controlling reactions that target the OH substitution of the transferring nucleus is examined.

Host-guest complexes of coumarin derivatives and organic dyes in a self-assembled bis-urea macrocycle

Brent Koscher, Chemistry - Senior

Mentor: Dr. Linda Shimizu, Chemistry and Biochemistry

There is an increasing interest in controlling chemical reactions to yield specific products, while reducing by-products. One method of controlling reactions is by using confined reaction environments, using materials such as: zeolites, nanocages, and nanotubes. Our group reported the synthesis of phenylethynylene bis-urea macrocycles, which self-assembles to form columnar nanotubes. This self-assembled nanotube offers a large channel that can reversibly bind guest molecules through host-guest interactions within the channel and facilitate highly specific [2+2] photodimerization of coumarin. Herein, we examine the diffusion of small organic dyes and larger coumarin derivatives into these crystalline nanotubes. We found that 7-methoxycoumarin, 1-methyl-2-quinolinone, and the dye Alizarin load well into the host. Observing the loading of dye molecules offers a means of monitoring loading kinetics, a process monitored by UV-Vis spectroscopy. We are investigating the reactions of these complexes under UV-irradiation. We will monitor the reactions and characterize photo-products by H-NMR and Mass Spectrometry.
A Search for Dark Matter at the Large Hadron Collider (LHC)
Anton Kravchenko, Physics - Senior
Mentor: Dr. Milind Purohit, Physics and Astronomy
Dark Matter (DM) has been revealed through gravitational effects and cosmological evidence, but there is no evidence yet of direct interaction with us. What if it couples to regular matter very weakly? This implies a new weak force; such particles are called Weakly Interacting Massive Particles (WIMPs). We search for DM WIMPs, at the Large Hadron Collider (LHC). Even if such WIMPs interact weakly and escape unobserved, they will leave a large imbalance of energy (“missing transverse energy”, or Etmiss). New “razor” variables (not just Etmiss) are a new and better way, and are described in my poster.

Advances in Self-Assembling PS-b-PEO Systems for Nanolithographic Applications
Eric Leonhardt, Chemistry - Senior
Mentor: Dr. Chuanbing Tang, Chemistry and Biochemistry
This project reports the evolution of polystyrene-block-poly(ethylene oxide) (PS-b-PEO) systems utilized in nanolithography. These systems are capable of self-assembly in thin films, which can be employed in the preparation of nanoporous films for templating. The desire for well-defined, long-range ordered, nanoporous films with increasingly small domains has led to several augmentations to PS-b-PEO systems. With linear PS-b-PEO systems, diameter and center-to-center distances of 22nm 32nm were achieved, respectively. By incorporating complexation with lithium chloride solution, diameter and center-to-center distances of 10nm and 20nm were achieved, respectively. With grafted PS-b-PEO systems, diameter and center-to-center distances of 10nm and 20nm were achieved, respectively. The prepared films displayed well-ordered nanostructures that show promise to the field of nanolithography. This project is focused on the synthesis and characterization of these polymer systems, and the preparation and imaging of the corresponding films. This entails the utilization of atom transfer radical polymerization, ring-opening metathesis polymerization, gel permeation chromatography, nuclear magnetic resonance imaging, atomic force microscopy, and scanning electron microscopy. All final products were evaluated for their efficacy as templates for nanolithography.

Determining the Structure of SagG: Part of the Group A Streptococcus Streptolysin Associated Gene Operon
David Mysona, Biomedical Engineering - Senior
Mentors: Dr. Maksymilian Chruszcz, Chemistry and Biochemistry Mr. William Booth, Chemistry and Biochemistry
Invasive infection by Streptococcus pyogenes is commonly associated with disorders attributing to pharyngitis, rheumatic fever, and necrotizing fasciitis. The prevention of the progression of necrotizing fasciitis is the focal point of our work. More specifically, our area of interest lies in the inhibition of the formation and expulsion of Streptolysin S (SLS). SLS is a bacterial quorum sensing molecule that plays an unintentional role in the promotion of cell destruction and progression of necrotizing fasciitis. SagG, a membrane-associated, ATP binding cassette protein, is a product of the streptolysin-associated gene operon. This operon is responsible for the production and release of SLS into the extracellular environment. This presentation will describe our progress towards determination of the SagG structure.

IT Capstone Project - Web design and development for The Hemphill Agency, an entrepreneurial Columbia firm
Lauren Adams, Integrated Information Technology - Senior
Brittany Taylor, Integrated Information Technology - Senior
Chavis Howard, Integrated Information Technology - Senior
Mentor: Dr. Karen Patten, Retailing
The Hemphill Agency, founded by Evangelina Hemphill, specializes in relationship consulting project, especially for marital issues. This IT Capstone Project includes designing and developing a new, interactive Website including social media with the business purpose to grow The Hemphill Agency. The Hemphill Agency’s mission is to provide relationship consulting geared toward women, but specifically to guide couples in business to create a healthy work-life balance. After over a decade of designing and implementing award-winning work-life balance, communication, and conflict resolution campaigns for Fortune 500 companies, Mrs. Evangelina Hemphill left corporate America for a life as an entrepreneur. Her mission is to teach women who have busy lives how to co-create their desired relationship to have a Lifelong World Class Love Affair “with the man in their life.” As an entrepreneur, Evangelina’s work has garnered praise and recognition from the USA, South Africa, Australia, and United Kingdom. Her growing business needed an interactive Website that reaches clients from all over the world as well as shares the communication methods and relationship strategies she’s used to grow and transform her own marriage. The goal of this Capstone Project was to create a Website that is user-friendly and promotes The Hemphill Agency’s services. The Capstone Project team first identified the business needs. Using an easy-to-use content management system, the team designed the interactive Website, which also connected Evangelina’s social media accounts. The team will be working with Evangelina so that she will be able to update The Hemphill Agency’s Website in the future.

Utilizing Activity and Context Recognition to Mitigate Distractions from Smart Devices
Connor Bain, Computer Science - Junior
Mentor: Dr. Srihari Nelakuditi, Computer Science and Engineering
Mobile computing devices with their versatile connectivity and incredible computational capability can easily become an indispensable part of a user’s day. But that same user can quickly become addicted to his/her device, constantly checking Facebook notifications, playing games, etc. This constant distraction can adversely affect a user’s productivity and even his/her happiness. As our appetite for information has grown many have tried to warn of the dangers of a world that is constantly distracted. In fact employee distraction has been shown to decrease productivity. We propose YogiPhone, a system that recognizes the current context, identifies distractions, filters irrelevant interruptions, and learns about the user over time without disconnecting from the network. We’ve developed a prototype of the YogiPhone idea for the Android OS that runs on many devices from Google's
IT Capstone Project – Web design and development for Gourmet Rose, an entrepreneurial Columbia firm

**Desiree Dzamba**, Integrated Information Technology - Senior

**Kytra Moody**, Integrated Information Technology - Senior

**Aaron Jenkins**, Integrated Information Technology - Senior

**Mentor:** Dr. Karen Patten, Retailing

The Gourmet Rose, founded by Columbia entrepreneur, Rose Naccash, is a gourmet catering firm specializing in gourmet dinners and receptions. The goal of this IIT Capstone Project was to develop a new, interactive Website for Gourmet Rose that should result in business growth. The new Website incorporates together a gallery of the many menu items, an ‘about me’ page, as well as an ‘events’ page. The design goal for the final Website is an easily maintainable Website by the client and an easy to navigate Website by its visitors. Expected viewers will be past Gourmet Rose clients, as well as others who have heard of the Gourmet Rose and may become future customers. The basic Website and its color scheme have been completed. The final stages include downloading all the business content and to refine the events page and gallery.

IT Capstone Project – Video technology development, editing, and support for USC’s The Center for Teaching Excellence

**Justin Galloway**, Integrated Information Technology - Senior

**Brittany Belton**, Integrated Information Technology - Senior

**Jesse Erickson**, Integrated Information Technology - Senior

**Abdullah Aldosari**, Integrated Information Technology - Senior

**Mentor:** Dr. Karen Patten, Retailing

For this IIT Capstone Project, we are working with the University of South Carolina’s Center for Teaching Excellence (CTE) to help organize and edit a database of training videos and, then, add them to the official CTE Website and YouTube pages. The videos capture a number of CTE workshops led by USC and visiting faculty. The CTE mission is to enhance the pedagogical knowledge and effectiveness of all who teach at USC in the classroom, online, and beyond. This can only be achieved if the training videos in question are appropriately formatted, contain valuable information, and are user-friendly. The purpose of our Capstone Project is to ensure the quality of the CTE videos. We both assisted and gave an outside perspective on how the videos are viewed and are perceived. We are currently evaluating the individual training videos on their effectiveness and their visual appeal. Upon completion, we will add a uniform intro to each video to give them a sense of unity. The Capstone Project results will be an updated video archive with more useful videos and information.

IT Capstone Project – Web development for USC’s Science Education STEP Project and Grant

**Dennis Grogan**, Integrated Information Technology - Senior

**Brian Burgess**, Integrated Information Technology - Senior

**Julliana Magalhaes**, Integrated Information Technology - Senior

**Mentor:** Dr. Karen Patten, Retailing

USC’s Science Education STEP Project and Grant is in the first stages of a three-year grant to develop teaching resources for middle school science teachers in science, technology, engineering, and math (STEM) disciplines. This semester, one IIT Capstone Project includes designing and developing a STEP Website, which will include resources developed by USC to be accessed by middle school teachers in SC. The project will serve as a content and pedagogy resource, allowing science teachers to access key content on an as needed basis, obtain accurate information about new science practices, and observe live enactment of targeted instructional strategies. This is a project centered on science teacher professional development (middle grades). There are two technology-related goals. The initial goal is to revise/enhance and manage a STEP Project Website (more than the existing static Website). The second goal is to (over time) develop and manage a highly interactive Website that would serve as a science teaching resource. Additionally, future IIT Capstone teams will develop and post video clips, instructional resources, etc., for science teachers. The future Website will allow for teacher interaction with project staff and for teacher-created resource sharing. Currently, the IIT Capstone Project team has completed the initial scope of the project - a functional Website populated with information from the USC Science Education representatives. The team will soon be working with another IIT class, Dr. Daniel Norris’ ITEC 544 class, to deliver several teacher interview videos that will be available on the Website.

IT Capstone Project – Web design and upgrade for Columbia’s Children Theatre

**Christopher Jackson**, Integrated Information Technology - Senior

**Androu Awad**, Integrated Information Technology - Senior

**Marlentae Johnson**, Integrated Information Technology - Senior

**Mentor:** Dr. Karen Patten, Retailing

Our IIT Capstone Project’s client is Mr. Jim Litzinger, who is the vice president of Columbia Children’s Theatre (CCT). CCT is a non-profit, community organization where children are the stars of the show. There they can craft their acting skills and express their creativity through plays and musicals. The CCT needed our help in updating their Website, making it more interactive, and connecting it with their social media tools. We plan to first update the exiting Website by adding a content management system (CMS), Joomla. Through Joomla, we will then add a user blog, link the Website to the CCT’s social media, and add new photo albums. The last part of the project is to incorporate Google Analytics tools so that Mr. Litzinger will be able to determine ways to improve the usefulness of the Website in the future. The goal of the current changes is to make it easier for the CCT to update the Website with fresh content including photos, YouTube videos, and program changes while monitoring the content to determine what their readers enjoy.
IT Capstone Project - Update and develop interactive website for A Chance Through Literacy

Lindsey Niebur, Integrated Information Technology - Senior
Nattaporn Aumpamas, Integrated Information Technology - Senior
Matthew Marcus, Integrated Information Technology - Senior

Mentor: Dr. Karen Patten, Retailing

A Chance Through Literacy (ACTL) is a non-profit organization founded in 2009 committed to creating change by providing access to quality education by supporting the acquisition and through the use of culturally relevant resources. ACTL was founded by Jennifer Wilson, a professor at the University of South Carolina, who was a dynamic teacher, an educational advocate, a recognized researcher, and accomplished writer. As an IIT Capstone Project team of three, we have researched and developed a template for the ACTL, collected videos and updated its Website to be more interactive and help users easily navigate to the donation page. We have researched Web analytical tools to edit the current Website, captured data and prepared recommendations for the ACTL board. We are in the process of training the ACTL representatives to update the Website in the future as needed. The opportunity to present our project at Discovery Day would be an incredible experience.

IT Capstone Project –Web design and development for Poetik Kakes, an entrepreneurial Columbia firm.

Will Simons, Integrated Information Technology - Senior
Travis Witherspoon, Integrated Information Technology - Senior
Mark Herrmann, Integrated Information Technology - Senior
Chris Miller, Integrated Information Technology - Senior
Brian Simmons, Integrated Information Technology - Senior

Mentor: Dr. Karen Patten, Retailing

Poetik Kakes needed a business Website in order for the company to reach a broader audience and expand sales. Poetik Kakes, founded by Kyla Johnson, is a specialty bakery located in Columbia SC that ships cupcakes, cakes, cookies and brownies all over the world. We first identified the client needs and then presented several Website prototypes to determine the client Website design preferences. We created the Website from scratch. As part of a modern interactive Website, we included order and payment processing, social media integration, monthly poem contest submission, and an interactive menu in the website. This project includes designing and developing a new, interactive Website including social media with the goal to grow Poetik Kakes. We have spent three months designing and creating the Website to include all of the aspects that the client requested. We have met the client bi-weekly to giving updates and receiving feedback. Throughout the project we also created weekly status reports and a weekly Microsoft Project updates to track the project. We hope to make a Poster Presentation of our Capstone Project during Discovery Day 2014.

IT Capstone Project – Mobile App design and development for The Boeing Company

Dustin Smith, Integrated Information Technology - Senior
Damian Aguilar, Integrated Information Technology - Senior
Tyrel Button, Integrated Information Technology - Senior

Mentor: Dr. Karen Patten, Retailing

Our IIT Capstone Project is with the Boeing Corporation, an international powerhouse in the aerospace industry. Boeing supports the universities in states where they have production facilities in many ways. One approach is to sponsor Capstone Projects with graduate and undergraduate students. The goal of this Capstone Project was to develop a mobile version of their internal news site, Boeing News Now. At first Boeing suggested, we develop a mobile app for their employees. We did extensive research into app development and recommended that a mobile Website would be a much better solution for them, especially since mobile app development can be very costly. We faced a major project constraint because we, as undergraduate IT students, were not allowed to gain access to their internal servers due to legal and security restrictions. As a result, we agreed to develop and deliver to Boeing a Website wireframe plan with a demo home page. We did further research on wireframe production and used Fluid UI to build our wireframe. Boeing approved our Website wireframe and we are now developing the demo home page. Although we were unable to build a fully functioning Website with the Capstone Project constraints, Boeing is more than happy with what we have produced for them. It has been a very productive and valuable learning experience.
Engineering and Math

Will the incorporation of minimal amounts of bio-inspired polydopamine (PDA) as a polymeric binder radically boost the strength and adhesion of cement mortar suitable for concrete repair and retrofit?
Matthew Barragan, Civil Engineering - Senior
Mentor: Dr. Fabio Matta, Civil and Environmental Engineering
Polydopamine (DA) is a bio-inspired polymer with extreme tensile strength and ability to adhere practically to any surface, including teflon. This polymer was first synthesized in the mid-2000s to mimic the natural adhesive used by mussels and geckos to cling onto slippery and vertical (or even overhead) surfaces. My project team has studied if incorporating very small amounts of bio-inspired polydopamine as a polymeric binder could lead to radically increase the strength and adhesion of cement mortar, making it suitable for fast and high-quality concrete repair systems. Preliminary work by Dr. Fabio Matta and collaborators produced experimental evidence of the ability to mix DA in water, start polymerization, and then add the DA-water solution to a standard mortar mixture. Unfortunately, as the test specimens for the Magellan project were being prepared and contrary to what we expected, the DA we used did not properly polymerize in water and resulted in low-quality specimens. With the help of two graduate students, one of which is working with me on this research, and after several trials with some leftover DA hydrochloride, we determined that a higher temperature (85-90°F) than the one we originally experienced is necessary. This can be easily achieved by heating the contained where the DA-water solution is prepared. Future testing at different temperatures is to be done to better understand how to ensure polymerization, and preparation of additional mortar specimens to test the original idea behind the ongoing Magellan Scholar project shall also be completed.

Aqueous ZnO Nanorod Synthesis
Andrea Hand, Chemical Engineering - Senior
Mentor: Dr. Xiao-Dong Zhou, Chemical Engineering
Nanoparticles are of interest as crystals have different properties when on a nanometer scale. Resistance to electron transport decreases due to a lack of crystal boundaries. Electron flow is less interrupted when collisions occur, so the electrons cannot be diverted far from their original path. Slight changes in surface adsorption conditions strongly affect the electric properties of the particle, as the surface area to volume ratio is so much larger. Zinc Oxide nanoparticles are frequently used as catalysts within electrochemical cells and as sensors to detect changes in gas concentration. There are many methods to produce zinc oxide nanoparticles, however many of these methods require special equipment, harsh chemicals, and extreme conditions while yielding infinitesimal amounts of nanoparticles. This research attempted to optimize an aqueous synthesis method to produce ZnO nanorods in large batches (still below 0.5 g yield). Temperature, pressure, preparation, time of reaction, and concentration of surfactant were all altered to find the optimal conditions to produce ZnO rods of the smallest diameter. It was hypothesized that increased surfactant concentration would decrease rod diameter and increase conversion. It was found that although changes in conditions slightly altered the rod morphology, batches produced large variation in rod size, with a lower limit around 100 nm, and conversion stayed low regardless of conditions. While this method of ZnO nanorod production is safe, easy, and yields comparatively large amounts, other methods should be found to decrease bulk diameter into the nanometer region, to change the bulk properties to that of nanoparticles.

Estimating the Effect of Ezetimibe and Interferon-alpha on Hepatitis C Viral RNA in vitro
Austin Mishoe, Computational Science - Sophomore; USC Beaufort
Mentor: Dr. Swati DebRoy, Mathematics; USC Beaufort
Hepatitis C virus (HCV) infection is a global health problem chronically infecting 3.2 million people in the US alone. HCV infection can result in complications including cirrhosis of the liver, and HCV is currently the leading cause for liver transplant in the US. Treatment with interferon-alpha (IFN) in combination with ribavirin and new age direct acting agents has improved chances of cure in chronic HCV-patients; however, these treatment options fall short for patients with HCV-induced end-stage-liver diseases. Thus, new drugs to treat HCV infection in patients with a compromised liver are in urgent need. The drug ezetimibe (EZT) has been found to synergize with IFN to potently inhibit HCV-RNA in in-vitro experiments. Data was collected on sub-genomic HCV-RNA reduction by monotherapy of EZT, monotherapy of IFN, and combination of EZT and IFN, for up to 60 days post-infection. Here we use ordinary differential equations to model the viral infection dynamics of a replicon cell. Model parameters were estimated from data in related experiments and literature. We hypothesize that these therapies have mainly three antiviral actions, vis-à-vis, 1) reduction of the uptake rate of HCV-RNA by cells with the potential to be infected, 2) blockage of intracellular production of new virions, and 3) slowing the release of assembled virions back into the extracellular medium. By adding appropriate efficacy terms in our mathematical model, the model was subsequently fit to experimental data and the results reveal an estimation of efficacy of these three actions for each therapy.

Modeling the impact of control strategies against West Nile virus
Patrick Niehaus, Computational Science - Senior; USC Beaufort
Mentor: Dr. Kasia Pawelek, Mathematics; USC Beaufort
West Nile virus (WNV) is a vector-borne pathogen spread by mosquitoes throughout the continental United States and other regions of the world. We designed a mathematical model and compared it with surveillance data for mosquitoes. Based on the best fit of the model to the data, we estimated parameters associated with the effectiveness of insecticide treatments as well as the birth, maturation, and death rates of immature and adult mosquitoes. We used these estimates for modeling the spread of WNV to obtain more reliable disease outbreak predictions and performed numerical simulations to test various mosquito abatement strategies. We demonstrated that insecticide treatments produced significant reductions in the mosquito populations. However, abatement
Furthermore, differing methods of preparation and application of catalyst will be tested. Sn/Pt catalysts of various concentrations will be prepared by method of Electroless Deposition. After preparation, the catalysts are tested under laboratory conditions, in a 3-electrode electrochemical cell. The catalysts will be tested by reading current through the electrode, which can be used to obtain power, produced during the oxidation of methanol, catalyzed by each individual catalyst.

Analyzing the Economic Impact of Solar Water Heating

Thomas Weaver, Mechanical Engineering - Senior
Mentor: Dr. Stephen McNeill, Mechanical Engineering

A large factor that deters people from making energy saving improvements to their homes is the high initial investment. Solar water heaters can provide a way to save energy at a price much more affordable than other popular improvements, such as solar panels or geothermal heating systems. I obtained a commercially available solar water system and analyzed the energy savings per gallon of water used in the household. These energy savings translate to a cost savings of about $16 a month. The analysis was done using a flow meter and temperature sensors as well as a digital power meter. The theoretical and actual energy used per gallon was tested for both traditional and solar water heating systems and the results were compared. These results offer a promising trend, over a 28% improvement in efficiency. While solar water heating systems are commercially available, they are not widely used. A well designed and implemented system could potentially be financed such that it cost the customer less per month than is saved by the system. This concept could be used to create a unique business model that would create interest and service revenue over the life of the product as well as the profit from the system itself. There is potential for improvement in this area and possibly a demand for such a product if successfully marketed.

A Bi-Metallic Catalyst for the Oxidation of Ethanol

Charles Staub, Chemical Engineering - Sophomore
Mentor: Dr. John Weidner, Chemical Engineering

Direct methanol and ethanol fuel cells are a relatively new technology. Having ethanol or methanol in liquid form provides us with a very high energy density source, meaning that the energy stored in the methanol or ethanol is high for its volume. Using a bi-metallic catalyst, composed of Platinum and another metal, can safely catalyze the oxidation process of methanol and ethanol. Furthermore, using a composition of Platinum and another metal will reduce the cost of such a catalyst, while at the same time preventing corrosion and poisoning of the catalyst. Research has been done to find an optimal concentration of Ru in an Ru/Pt catalyst, but literature and outside research shows that a composition of Tin and Platinum proves to be the most effective during Methanol oxidation. This project will investigate the effects of using different concentrations of Tin with Platinum in an attempt to find the optimal concentration of Tin in a Sn/Pt catalyst.
**Making Poisons to Manage Intracellular Oxidative Stress**  
*Sandra McFadden*, Biological Sciences - Senior  
*Sydney Bromfield*, Exercise Science - Senior  
Mentor: Dr. Anindya Chanda, Environmental Health Sciences

Fungi synthesize myriads of natural products upon activation of secondary metabolism. Many of these compounds are beneficial to the human kind, while many others like mycotoxins can be life threatening. It is perceived based on several studies that these natural products allowed fungi to survive against their predators, competitors and the adverse environmental conditions during the course of evolution. Here, we show that synthesis of a secondary metabolite, aflatoxin, in a toxic filamentous fungus Aspergillus parasiticus, also modulates the programming of the genes of superoxide dismutase (SOD) family. Using real-time PCR experiments, we demonstrate that the fungus displays significantly different SOD gene expression profiles in secondary metabolism activating (yeast extract sucrose, YES) and non-activating (yeast extract peptone, YEP) growth media. In YES, MnSOD, and FeSOD genes are predominantly expressed in the stationary phase while in YEP, CuZnSOD and MnSOD genes are expressed predominantly during the same time. By gene disruption of the aflatoxin pathway regulatory transcription factor, aflR, we establish that aflatoxin synthesis inhibits the activation of MnSOD, CuZnSOD and FeSOD genes. Based on our findings we propose that secondary metabolism provides fungi with an additional mechanism for scavenging superoxide radicals during oxidative stress that helps prevent cellular damage resulting from SOD over-activity.

**Origin of Primitive Magmas at Buldir Volcano, Aleutian Island Arc, Alaska**  
*David Mailman*, Geological Sciences - Junior  
Mentor: Dr. Gene Yogodzinski, Earth and Ocean Sciences

The goal of the study was to use the minor element abundances in olivine to constrain the primitive magma types that are formed in the subduction zone below Buldir Volcano. Average NiO concentrations in Buldir olivine is higher than in MORB or in primitive Aleutian basalt at forsterite contents above 80% (FO80). This difference is clearest above FO85. The most forsteritic and NiO-rich compositions are observed in olivine phenocrysts in a Buldir andesite with whole-rock SiO2 = 60.5%. Concentrations of CaO are uniformly lower in Buldir olivine (0.08-0.15 wt.%) than in MORB olivine (0.24-0.38 wt%). Olivine phenocrysts in primitive Aleutian basalts have CaO falling between those of MORB and Buldir. Concentrations for MnO are similar in olivine phenocrysts from all sample groups. Lower CaO concentrations in Buldir olivine phenocrysts indicate that primitive Buldir magmas had lower CaO than primitive MORB or primitive basalts from the central and eastern parts of the Aleutian arc. High-NiO olivine may be interpreted to indicate the existence of high-Ni primitive magmas beneath Buldir. However, whole-rock compositions in the western Aleutians, which show a regional pattern of high-MgO at intermediate and high silica, indicate that high-Ni olivine phenocrysts at Buldir are probably a product of enhanced partitioning of Ni into olivine growing in a relatively high silica melt. These data are consistent with prior results indicating that the observed, along-arc increase in SiO2 in primitive Aleutian magmas, reflects the presence of a relatively hot subducting plate but cool mantle wedge beneath the western Aleutian arc.
Evolution of Aeolian Sand Ripple Morphology  
**Rachel Piker**, Marine Science - Senior  
Mentor: Dr. Jean Ellis, Geography

The goal of this research is to analyze field-based data of ripple morphology, wind conditions, and sediment transport. In order to accomplish this, field-based data will be used. Dr. Ellis collected the data in October 2008 in Jericoacoara, Ceara, Brazil, however it has not been analyzed. Seven data sets were obtained, each containing multiple photographs and manual measurements of the evolving bed surface morphology and wind velocity measurements using either three cup or sonic anemometers. The mass flux measurements were taken by using hose-style traps and miniphone, instruments that measure individual sand grain impacts. Basic processing of the data has been completed, such as, conversion of the anemometer data to wind velocity in m/s, georectification of the photographs, weighing the sand from the traps, and converting the miniphone measurements to mass flux measurements. Using Adobe Photoshop, I will estimate ripple length and morphology. I will identify an evolutionary sequence that describes the multiple morphological phases between an initially flat bed and an equilibrium bed. Matlab, a data analysis software, will be used to determine average wind velocity during periods of substantial sand transport, which result in morphology change, and periods of no transport. Matlab will also be used to run models using the data.  

Metagenomic and Polymerase Chain Reaction (PCR) Sequencing Testing Methodologies to Assess Non Point (NPS) Contributions of Fecal Coliforms  
**Rachel Price**, Environmental Science - Senior  
Mentor: Dr. Joe Jones, Environmental Health Sciences

Fecal coliform bacteria is one pollutant that can be dangerous if found in large quantities in our water systems. For this reason, it must be monitored closely to ensure that the waterways do not exceed the standards set by the South Carolina Department of Health and Environmental Control (SCDHEC) and the Environmental Protection Agency (EPA). In the Fall of 2013, twelve water samples were taken by kayak from the Saluda River dam down to the zoo. Those samples were filtered and DNA was extracted. Polymerase chain reactions were performed in order to amplify the fecal coliform bacteria within the samples. The next step is to examine the amplified DNA and determine the concentrations of bacteria at the different locations along the river. By using DNA and PCR for our investigation we have the potential to track where the fecal coliform in the water originated. This is a significant achievement because river systems are not owned by anybody- they are a common. This means that they are available to be used by all. With that being said, according to South Carolina state law, no single person or company can destroy a public good for another. Polluting the river in excess would be considered degrading it. However, for nonpoint source pollution, there is currently no way to trace who is breaking the law. Therefore, no one is held accountable. Hopefully, with research like this there will be a new way to hold people responsible for their waste and pollution.

Variation in H. sanguineus Fecundity and the Influence of Diet  
**Emily Townsend**, Marine Science - Junior  
Mentor: Dr. Blaine Griffen, Biological Sciences

From a metabolic and energetic perspective, when an organism consumes food, only a portion of the total energy ingested is assimilated and available for use by the organism. The amount of energy assimilated is then distributed between energy used for work and growth. Once these minimum energetic requirements have been met, the remaining assimilated energy is then available for reproduction. However, little is known about how reproductive effort is influenced by the type of food that an organism eats. As important aquacultural organisms and marine consumers worldwide, crustaceans are model organisms for examining the link between diet and reproduction. In order to better understand how individual variation in diet impacts reproductive effort, I directly manipulated the type of food given to female individuals of the primarily herbivorous crab species Hemigrapsus sanguineus. Using 11 different dietary treatments that varied between their animal and plant contents, each crab was maintained on a designated diet over the course of 6-7 weeks. Throughout the experiment, crab larvae were filtered and collected for analyses of individual crab reproductive effort. After completion of the experimental feeding phase, the crabs were stored and prepared for dissection for further reproductive analysis. We hypothesized that crabs maintained on a cannibalistic diet would reproduce the most, crabs maintained solely on plant material would be unable to reproduce, and crabs maintained on mixed diets (i.e. combination of plants and/or animals) would produce more than crabs maintained on single-food diets.

Effects of Varying Pigmentation on White Syndrome Severity in Acropora hyacinthus  
**Daniel Utter**, Marine Science - Junior  
Mentor: Dr. Pamela Morris, Marine Science

White syndromes are commonly occurring coral diseases afflicting several genera of corals in tropical reefs. One common manifestation Indo-Pacific white syndrome is induced in the hermatypic tabular coral Acropora hyacinthus by inoculation with the bacteria Vibrio coralliilyticus ATCC BAA-450 (Vc450). In this study, an experimental tank containing green and red A. hyacinthus fragments was inoculated with a pure culture of Vc450 to a final concentration of 106 CFUs/mL tank water. After 90 hours of disease progression, all of the red color morphs exhibited total mortality while the green morphs exhibited at most partial bleaching. A Kruskal-Wallis analysis of variance showed that the red morph was significantly more susceptible to mortality due to white syndrome as induced by Vc450 than the green morph (n = 440, x2 = 72.137, p 0.001). No corals in the control tank exhibited any disease symptoms. These results indicate the presence of an antimicrobial agent or process present in the green morph but not in the red morph.
The Effect of Sleep Deprivation on Glucose Metabolism

**Julian Greer**, Exercise Science - Senior

Mentor: Dr. Xuewen Wang, Exercise Science

A recent U.S. National Sleep Foundation survey showed that about 25% of the population does not get enough sleep during the weekdays due to work demands. Another study showed that 14.8% of the U.S. population, 33.1 million people, suffers from diabetes, one of the most costly and rapidly increasing serious chronic diseases worldwide. With this many new cases of diabetes being diagnosed, it is important to determine what is causing these new diagnoses. Experimental studies in healthy young adults have consistently demonstrated that chronic sleep restriction results in a number of abnormal physiological changes, including increased inflammatory markers and impaired glucose regulation. These physiological changes may be the mechanisms through which chronic sleep curtailment may affect health and longevity. The purpose of this study is to examine the effect of sleep duration on glucose metabolism by observing concentrations of glucose metabolites. Healthy participants, ages 18-25 years, will complete an Oral Glucose Tolerance Test after a sleep-deprived workweek and after a weekend of sufficient sleep. The concentrations of plasma glucose, insulin, glucagon, c-peptide, and adiponectin will be analyzed in order to compare the glucose metabolism after sleep deprivation and sufficient sleep. I anticipate that there will be a significant difference in glucose metabolism after days of sleep deprivation as compared to sufficient sleep. I expect that glucose metabolism will be less efficient during sleep deprivation because previous studies have shown that shortened sleep duration decreases insulin sensitivity. This worsened glucose metabolism may increase an individual’s risk for developing diabetes.

The Effect of Unloading and Irradiation on Skeletal Muscle Protein Turnover

**Matthew Augustine**, Exercise Science - Senior

Mentor: Dr. James Carson, Exercise Science

Background: Short-term space missions cause unique stress to normal physiological processes that organisms would not otherwise encounter. Microgravity and cosmic radiation, such as solar flares, are both experienced during space missions, and can have the potential to disrupt normal regulation of muscle protein turnover. Purpose: Therefore, we investigated the combined effects of simulated microgravity through hind limb unloading and irradiation on the regulation of mouse skeletal muscle protein turnover. Methods: To model short-duration space-flight, C57BL/6 mice (N=12) were subjected to or hindlimb unloading for 5 days. Mice allowed normal cage ambulation served as controls. Within both groups, each mouse received radiation (0.5 Gy X-ray) to the right hindlimb on the third day, the left hindlimb served as the non-irradiated control. Mice were sacrificed on the fifth experimental day. Results: Body weight and gastrocnemius muscle mass decreased with unloading; however there were no additional effects of irradiation. Unloading decreased the phosphorylation of ribosomal protein S6 (rpS6; S235/236), which was not changed by irradiation. Unloading with irradiation increased Akt (T308) phosphorylation when compared to unloading alone. There was no effect of unloading or irradiation on Atrogin-1, a marker of protein degradation. Conclusion: These results demonstrate suppressed muscle protein synthesis signaling may be responsible for muscle atrophy with acute unloading. Additionally, we report that 0.5 Gy X-ray has the potential to alter Akt regulation in unloaded muscle.

Accuracy of a Mobile Device Heart Rate Application for Measuring Resting and Exercise Heart Rate

**Samuel LaMunion**, Exercise and Sports Science - Senior; USC Aiken

**Ashton Celec**, Exercise and Sports Science - Senior; USC Aiken

Mentor: Dr. Brian Parr, Exercise and Sports Science; USC Aiken

Polo is a popular sport, both in the Aiken area and around the world. Despite this popularity, little research on polo players and the physiological demands of playing polo has been done. The physiological demands of any sport or activity can be determined by measuring objective variables such as heart rate (HR) and subjective variables like rating of perceived exertion (RPE). Both HR and RPE are widely used to assess exercise intensity during exercise and for exercise prescription and HR have been shown to be an accurate predictor of energy expenditure during exercise. The purpose of this study is to determine the physiological demands of a polo match by assessing both objectives (HR) and subjective (RPE) measures of intensity during a polo match. It is hypothesized that the HR and RPE data will show that playing in a polo match is considered moderate to vigorous intensity exercise. Subjects will be polo players in the Aiken area. Prior to beginning a match, players will be fitted with a Polar HR monitor which will record HR continuously. Subjects will also report their RPE on the 6-20 scale at the conclusion of each chukker. The HR and RPE data will be used to estimate the relative intensity of playing in the polo match compared to resting and age-predicted maximal HR.

Polo is a popular sport, both in the Aiken area and around the world. Despite this popularity, little research on polo players and the physiological demands of playing polo has been done. The physiological demands of any sport or activity can be determined by measuring objective variables such as heart rate (HR) and subjective variables like rating of perceived exertion (RPE). Both HR and RPE are widely used to assess exercise intensity during exercise and for exercise prescription and HR have been shown to be an accurate predictor of energy expenditure during exercise. The purpose of this study is to determine the physiological demands of a polo match by assessing both objectives (HR) and subjective (RPE) measures of intensity during a polo match. It is hypothesized that the HR and RPE data will show that playing in a polo match is considered moderate to vigorous intensity exercise. Subjects will be polo players in the Aiken area. Prior to beginning a match, players will be fitted with a Polar HR monitor which will record HR continuously. Subjects will also report their RPE on the 6-20 scale at the conclusion of each chukker. The HR and RPE data will be used to estimate the relative intensity of playing in the polo match compared to resting and age-predicted maximal HR.

Accuracy of a Mobile Device Heart Rate Application for Measuring Resting and Exercise Heart Rate

**Samuel LaMunion**, Exercise and Sports Science - Senior; USC Aiken

**Ashton Celec**, Exercise and Sports Science - Senior; USC Aiken

Mentor: Dr. Brian Parr, Exercise and Sports Science; USC Aiken

Polo is a popular sport, both in the Aiken area and around the world. Despite this popularity, little research on polo players and the physiological demands of playing polo has been done. The physiological demands of any sport or activity can be determined by measuring objective variables such as heart rate (HR) and subjective variables like rating of perceived exertion (RPE). Both HR and RPE are widely used to assess exercise intensity during exercise and for exercise prescription and HR have been shown to be an accurate predictor of energy expenditure during exercise. The purpose of this study is to determine the physiological demands of a polo match by assessing both objectives (HR) and subjective (RPE) measures of intensity during a polo match. It is hypothesized that the HR and RPE data will show that playing in a polo match is considered moderate to vigorous intensity exercise. Subjects will be polo players in the Aiken area. Prior to beginning a match, players will be fitted with a Polar HR monitor which will record HR continuously. Subjects will also report their RPE on the 6-20 scale at the conclusion of each chukker. The HR and RPE data will be used to estimate the relative intensity of playing in the polo match compared to resting and age-predicted maximal HR.

Polo is a popular sport, both in the Aiken area and around the world. Despite this popularity, little research on polo players and the physiological demands of playing polo has been done. The physiological demands of any sport or activity can be determined by measuring objective variables such as heart rate (HR) and subjective variables like rating of perceived exertion (RPE). Both HR and RPE are widely used to assess exercise intensity during exercise and for exercise prescription and HR have been shown to be an accurate predictor of energy expenditure during exercise. The purpose of this study is to determine the physiological demands of a polo match by assessing both objectives (HR) and subjective (RPE) measures of intensity during a polo match. It is hypothesized that the HR and RPE data will show that playing in a polo match is considered moderate to vigorous intensity exercise. Subjects will be polo players in the Aiken area. Prior to beginning a match, players will be fitted with a Polar HR monitor which will record HR continuously. Subjects will also report their RPE on the 6-20 scale at the conclusion of each chukker. The HR and RPE data will be used to estimate the relative intensity of playing in the polo match compared to resting and age-predicted maximal HR.

Polo is a popular sport, both in the Aiken area and around the world. Despite this popularity, little research on polo players and the physiological demands of playing polo has been done. The physiological demands of any sport or activity can be determined by measuring objective variables such as heart rate (HR) and subjective variables like rating of perceived exertion (RPE). Both HR and RPE are widely used to assess exercise intensity during exercise and for exercise prescription and HR have been shown to be an accurate predictor of energy expenditure during exercise. The purpose of this study is to determine the physiological demands of a polo match by assessing both objectives (HR) and subjective (RPE) measures of intensity during a polo match. It is hypothesized that the HR and RPE data will show that playing in a polo match is considered moderate to vigorous intensity exercise. Subjects will be polo players in the Aiken area. Prior to beginning a match, players will be fitted with a Polar HR monitor which will record HR continuously. Subjects will also report their RPE on the 6-20 scale at the conclusion of each chukker. The HR and RPE data will be used to estimate the relative intensity of playing in the polo match compared to resting and age-predicted maximal HR.
App did not detect HR during moderate or vigorous exercise so the subjects had to reduce speed, resulting in a value that was significantly lower than the target heart rate range.

**Time to Sodium Plasma Absorption of Two Beverages and One Gel Supplement**

*David Minberg, Athletic Training - Senior*

Mentor: Dr. Toni Torres-McGehee, Physical Education

Sodium is vital in the body to perform many necessary functions. One of the most important of these is the transmission of neural signals in the brain. During endurance athletic events a life threatening condition can develop when sodium levels become very low and normal processes can not be performed. This is known as exertional hyponatremia. The purpose of this study was to see if water, Gatorade, or a combination of a carbohydrate electrolyte gel and water influence the amount of sodium in the blood of exercising individuals. Subjects performed three trials each one week apart. The first one they ran for 90 minutes and drank 2 milliliters of water for each kilogram of body weight every 15 minutes. The level of sodium in their blood was measured every 15 minutes as well as one hour after stopping activity. The second trial they performed the same exercise with Gatorade instead of water. For the third trial they had one serving of "GU" supplement with the same amount of water as trial one. We are still in the process of collecting data, and should be completed by the end of March. Hopefully this study will show us the best ways to hydrate during and after endurance events to prevent illness and injury.

**Exercise Body Temperature and Sleep**

*Susan Noh, Exercise Science - Senior*

Mentor: Dr. Shawn Youngstedt, Exercise Science

One of the most enduring caveats is that physiological arousal elicited by nighttime exercise is liable to disrupt sleep. To test this idea, the purpose of this study is focused on examining the effects of body temperature during and after exercise on sleep insomniacs, for whom hyperarousal is evident. Fifteen sedentary insomniacs will be assessed in a within-subjects design where one night they will exercise moderately and another night they will read, both treatments ending 2 hours before bedtime. It is a widespread belief that elevated body temperatures inhibit sleep, especially in insomniacs. We are examining if the downregulation of body temperature that occurs after exercise helps the onset of sleep or if downregulation is completely inhibited. CoreTemp technology, will be used, which transmits minute-by-minute temperature data throughout the treatment and throughout the night. This temperature data will be input into the database to be analyzed and interpreted, examining associations between changes in temperature and changes in sleep. Results are incomplete as of yet.

**Brain activity predicts change in smoking behavior above and beyond self-report data**

*Philip Riddle, Public Health - Senior*

Mentor: Dr. Roger Newman-Norlund, Exercise Science

Smoking is responsible for more than 480,000 deaths per year in the United States. It is the leading cause of preventable death in the Western world as it increases risk of many chronic diseases such as cancer, heart disease, stroke, and lung diseases. In an effort to better predict changes in smoking behavior in current tobacco users, measurements of the brain’s response to pictorial health warning labels using were collected using functional magnetic resonance imaging (fMRI). Participants were shown health warning labels (HWLs) containing graphic, symbolic, and human suffering images. A statistical model that used ad effectiveness, emotionality, and fMRI data was able to significantly (p 0.05) predict behavioral change (baseline CO minus CO at two-week follow up appointment). Activity in the ventromedial prefrontal cortex (vMPFC), an area previously implicated in health-related research contributing to behavior change, accounted for a significant amount of the variance in behavior above and beyond self-reported HWL ratings. Similar results were found for the amygdala, an area thought to respond to the emotional content of the HWLs. The results of this study offer insights into the optimal design of effective HWLs that could be used to improve the health of hundreds of thousands of people and decrease costs of health care.

**Inflammatory Response to Extended Time in Bed in Older Adults**

*Josephinah Silva-Lopes, Exercise Science - Senior*

Mentor: Dr. Shawn Youngstedt, Exercise Science

It has been recognized that long sleep is associated with mortality and other negative health outcomes. However, the available evidence is based on epidemiological studies. There has been little experimental investigation of the effects of long sleep. Spending more time in bed is correlated with reduced physical activity, which may affect one's fitness, mood, and mental abilities. This experiment is investigating the effects of extending the amount of time in bed on inflammation in older adults. Twenty adults (aged 60-79) will complete each of two 3-week conditions in random order: (1) Time in bed (TIB) extension, in which participants will stay in bed for an extra 2 hours (2) Usual sleep durations, in which participants will follow their normal sleep schedule. The sleep conditions will be separated by a 1-week recovery period. We hypothesize that inflammation will be higher following the sleep extension compared to the normal sleep group. Blood draws will be obtained at the end of each 4 week sleep condition. C-reactive protein (CRP) will be assessed as a measure of inflammation.
Role of IL-6 Signaling on Skeletal Muscle Wasting in Lewis Lung Carcinoma Model of Cachexia

Makiera Simmons, Biological Sciences - Senior
Mentor: Dr. James Carson, Exercise Science

Cachexia is a secondary syndrome observed during the advanced stages of chronic diseases such as cancer, AIDS, COPD. Cachectic patients display a progressive loss of fat and muscle mass triggered by a chronic systemic inflammation. However, sex differences have been recently observed during cachexia development and female sex hormone estrogen is implied to be protective in during cachexia progression. However, despite the differences, chronic inflammation during severe cachexia is comprised of high levels of plasma pro-inflammatory cytokines activated immune cells and an acute phase response, which have an additive effect on muscle degradation in both sexes. Interestingly, a complete inhibition of the immune responses in rodents during cachexia exacerbates muscle degradation due to the uninhibited growth of the tumor. But partial inhibition of systemic inflammation by administration of anti-inflammatory antibodies and inhibitors rescues muscle mass loss. Moreover, our lab recently has shown that skeletal muscle knockout of the IL-6 family receptor gp130 (skm-gp130) in male mice rescued muscle mass loss in the Lewis Lung Carcinoma (LLC) model of cancer cachexia, but the role of skm-gp130 KO in females is still unknown. The purpose of this study was to determine the effect of skm-gp130 KO on cachexia progression in the female LLC mice. 8 week old female mice were introduced into the study post pre - measurements, the mice (N = 4-5/group) were injected with 1X106 LLC cells on the right flank. The mice were closely monitored for the next four weeks and sacrificed to harvest blood and muscle. We report that 4 week of LLC inoculation attenuated body weight loss in the skm-gp130 KO as compared to the WT mice. Fasting glucose levels were elevated in the female mice inoculated with LLC. Interestingly, an effect of genotype is seen, with the skm-gp130 mice having elevated levels of fasting glucose as compared to WT mice, independent of LLC inoculation. Skeletal muscle loss was also attenuated in the gp130 knockout mice with a corresponding decrease in the levels of the degradation protein Atrogin, in the skm-gp130 - LLC mice. Skm-gp130 mice thus attenuate cachexia progression in the LLC model of cancer cachexia in both male and female mice.

Developing an Efficient, Valid, and Reliable Assessment of High School Vocabulary

Sheida Abdi, Psychology - Senior
Mentor: Dr. Suzanne Adlof, Communication Sciences and Disorders

This study tests the utility of a self-rating checklist system for measuring students' vocabulary knowledge, as part of a broader project aimed at developing an effective, individualized web-based platform for vocabulary instruction. Accurately measuring initial vocabulary knowledge is essential for determining the starting point for individualized instruction; a self-rating checklist system may be ideal because it is easily scalable. However, the accuracy and reliability of such a measure is unknown. Our first research question is: (1) How well does a checklist measure predict performance on existing norm-referenced measures of vocabulary? Because students may complete a checklist with good intentions, but over-estimate their word knowledge, our second research question is: (2) Does the use of follow-up questions increase the correlation between scores on checklist and norm-referenced measures? 100 participants will complete the experimental checklist and two norm-referenced vocabulary assessments. The experimental checklist requires students to rate their level of knowledge for each word ranging from high to low knowledge. The checklist includes pseudoword foils to detect random guessing. Half of the participants are randomly assigned to the condition involving follow-up questions for 25-40% of the words rated as known in each band. Data collection is in progress. Planned analyses will test for significant differences between correlations of checklist and norm-referenced measures in the two conditions (i.e., with and without follow up questions). In addition to informing the development of our vocabulary instruction program, these results may be useful to other researchers and practitioners who wish to assess vocabulary knowledge more efficiently.

The Effects of Presentation Method and Phoneme Confusion on Nonword Repetition Task Performance

Spencer Babb, Psychology - Senior
Mentors: Dr. Suzanne Adlof, Communication Sciences and Disorders
Dr. Daniel Fogerty, Communication Sciences and Disorders

Nonword repetition tasks are often recommended for screening children for risk of reading and language impairments, such as dyslexia or specific language impairment. They were initially recommended as unbiased measures of phonological processing that should not be influenced by experience (Dollaghan & Campbell, 1998, see Ben Munson, et. al., 2005). However, perceptual processing abilities of speech segments can impact identification performance, even for nonword sequences of speech sounds (Fogerty, Kewley-Port & Humes, 2012). Task-related factors, such as presentation method are also likely to influence performance, but published assessments of nonword repetition do not take these factors into account. The goal of the current study is to assess the degree to which phoneme confusability, a perceptual factor, and presentation method,
(auditory-only vs. auditory-visual) nonword repetition task scores. Participants include adults recruited from the University of South Carolina and children who are participating in a larger ongoing study of word learning. Data collection is ongoing. We predict that nonwords that contain confusable phonemes will be more difficult than nonwords that contain nonconfusable phonemes. We further predict that nonwords presented via voice recordings will be more difficult than nonwords presented via video. Preliminary results will be discussed with respect to implications for further research and for clinical practice.

**Implicit Prosodic Phrase Boundary Insertion: Evidence from Self-Paced Reading**

**Suzanne Burwell**, Psychology - Senior  
**Mentor:** Dr. Fernanda Ferreira, Psychology  

The mental representations that are constructed during successful language comprehension partially consist of sound-based information. This is the case even when sentences are read silently; thus, we can “hear” sentences as we read them. However, these phonological representations fade from working memory within 2-3 seconds. To compensate, readers divide long sentences into shorter, more manageable sound-based chunks known as prosodic phrases. These prosodic phrases tend to be around 2.7 seconds long, modulated by individual differences between readers in working memory capacity. There is reason to believe that we can observe prosodic chunking by analyzing reading times. Reading time is an indirect measure of cognitive load, as additional cognitive operations often increase reading time. The insertion of a boundary between prosodic phrases may then be observable as a marked increase in reading times per word every 2-3 seconds. Participants’ reading times on a word-by-word self-paced reading task will be recorded and analyzed at 500 ms intervals. These reading times will then be compared to participants’ scores on a working memory task. We predict that 1) there will be a marked increase in reading times per word every 2-3 seconds, and 2) these “spikes” in reading time will occur more frequently for participants with low working memory spans. Data collection is ongoing.

**Identifying the relative contributions of processes and key brain sites in AVI and perceptual fusion**

**Zachary Kolsrud**, Biological Sciences - Senior  
**Mentor:** Dr. Paul Fillmore, Communication Sciences and Disorders  

This study uses behavioral experiments and fMRI to examine the process of audiovisual integration and the activity of brain areas essential to it. Recent studies from the USC Aphasia Lab indicate that the combination of visual and auditory cues is beneficial in aphasia therapy, so a better understanding of audiovisual integration may be useful to future treatment options. In the experiment participants observe a video clip of a person speaking one of three syllables, and their task is to decide whether the auditory and visual stimuli are matching or not. In order to observe the brain activity of both successful and unsuccessful perceptual fusion, the experiment involves masking of either auditory or visual information by adding relevant noise. We will also use eye tracking to compare differences in visual attention between trials with auditory noise and visual noise. On Discovery Day, I will present this information, as well as our preliminary fMRI data.

**Variations in Working Memory Predict Pauses and Disfluencies in Language Production**

**Jeong Hyun Lim**, Psychology - Junior  
**Mentor:** Dr. Fernanda Ferreira, Psychology  

Working memory and language-specific cognitive processing mechanisms cooperate during language comprehension. However, the influence of working memory on language production is less well understood. Speakers use prosodic cues, such as pauses, based on the syntactic organization of the sentence. Perhaps one of the reasons that such prosodic cues indicate syntactic organization is that the speaker is using that time to prepare for the production of the upcoming constituent. We examined the relationship between working memory and language production by testing how working memory span influenced prosodic breaks before and after a syntactically ambiguous relative clause (indicated in CAPS). Participants read sentences such as “The maid of the princess WHO SCRATCHED HERSELF IN PUBLIC was terribly embarrassed” and were then asked to recall them. Then, working memory measures were collected from participants. Data collection is ongoing, but current results indicate that a relationship does exist between working memory and prosodic breaks. Those with larger working memory appear to be more likely to pause prior to the relative clause and less likely to pause after it. Additionally, those with lower working memory produce more disfluent speech (e.g. uhs, ums) during, and after, the relative clause. This pattern suggests that people with greater working memory capacity plan their sentences more effectively: they pause earlier in the sentence in order to prepare for the production of the long remaining constituent. People with smaller working memories do not plan as well and find themselves overloaded with incoming information as they progress through the sentence.

**Standardized Vocabulary Test Scores and African American English Dialect Use**

**Kara Lynch**, Psychology - Senior  
**Mentor:** Dr. Denise Finneran, Communication Sciences and Disorders  

The Peabody Picture Vocabulary Test (PPVT) is a widely used receptive vocabulary test administered to determine if a child has language deficits. Early versions of the PPVT demonstrated cultural and linguistic bias against children who use African American English (AAE). The current fourth version of the PPVT (PPVT-4) was meant to correct for this bias. The project, run by Denise Finneran (PI), is designed to determine to what extent the PPVT-4 exhibits bias against children who use AAE as research has yet to be conducted on the topic. This will be examined by determining if there is a significant relationship between PPVT-4 scores and AAE dialectal features to obtain a dialect density measure (DDM). I am also using the language samples to calculate Number of Different Words (NDW), a dialect neutral vocabulary measure. I will run statistical analyses on these data with the guidance of Dr. Finneran. We expect that there will be a significant positive relationship between PPVT-4 performance and NDW counts. It is anticipated that there will not be a significant relationship between PPVT-4 scores and AAE use. If the PPVT-4 is culturally and linguistically fair, then children...
who use more AAE features would not consistently demonstrate higher or lower PPVT-4 scores. It is also predicted that there will not be a significant relationship between NDW and DDM. These findings have clinical and research significance.

The Role of Acoustics in Garden-Path Processing
Victoria Sharpe, Baccalaureus Artium et Scientiae - Junior
Mentors: Dr. Dirk den Ouden, Communication Sciences and Disorders
Dr. Daniel Fogerty, Communication Sciences and Disorders

The literature on prosody and syntax has shown that natural speech prosody facilitates syntactic processing. Unnatural prosody, then, is expected to decrease speed and accuracy in resolving temporarily ambiguous sentence structures. This study investigated how, and to what extent, two acoustic components of prosody—fundamental frequency (F0) and the speech envelope (E)—affect processing of early-closure garden-path sentences like “While the man hunted the deer ran into the woods.” Signal processing methods degraded either F0 or E in each of 120 sentence stimuli. Participants listened to both natural and acoustically degraded sentences and, for each, performed both a comprehension and a repetition task. Results demonstrated that degrading E consistently affected sentence processing, with more variable effects observed for F0. Interestingly, the effect of acoustic degradation interacted with semantic and syntactic effects of sentence plausibility and verb type. These findings suggest that E plays a greater role, in comparison to F0, in disambiguating syntax. However, use of prosody by listeners may vary based on other cues to sentence interpretation, such as plausibility and context.

Impact of Context Consistency and Number of Exposures on Incidental Vocabulary Acquisition
Kaitlyn Wade, Organizational Leadership - Senior; USC Union
Mentor: Dr. Randy Lowell, Psychology; USC Union

Vocabulary increases throughout adulthood (Long & Shaw, 2000). A likely source of adult acquisition is reading (Nagy et al., 1985), with word acquisition as quickly as within a single exposure in context (Williams & Morris, 2004). In instructional settings, context contributes to acquisition above and beyond dictionary definitions (Fischer, 1994), especially with varied contexts (Bolger et al., 2008). Focusing on natural/incidental reading situations, we examined the role of conceptual consistency of context information on acquisition/memory, as readers encountered novel words once or twice in context. Across two self-paced reading sessions (separated by distractor task), participants read sentence pairs with informative context in sentence one and a known or novel (orthographically legal) target word in sentence two. Context across sessions was conceptually consistent (i.e., supported same intended target word meaning), or conceptually inconsistent (i.e., supported different meanings). Memory tests immediately followed the second reading session (i.e., cued recall, recognition, and multiple-choice meaning selection). Participants completed posttests again the following week. Self-paced reading times were inflated when there was a novel target, especially upon first appearing within inconsistent context, and consistency facilitated cued recall of context. Number of novel word appearances mattered, suggesting significant gains in acquisition during a second exposure. Recognition was superior for novel targets only appearing during the first session. Thus, stronger representations were established for novel words during reading-session one, compared to initial acquisition during potentially inconsistent session two. These data suggest conceptual context consistency influences incidental vocabulary acquisition, and acquisition evolves across multiple encounters with novel words.
Social Anxiety in the FMR1 Premutation: A First Look at Gaze Responses to Simulated Eye Contact

Christina Cantu, Psychology - Sophomore
Mentors: Dr. Jane Roberts, Psychology
Dr. Jessica Klusek, Psychology

Background: 1 in 151 women have premutation alleles on the FMR1 gene[1], the gene that causes fragile X syndrome. Women with the premutation are prone to anxiety, with 52% meeting criteria for an anxiety disorder[2]. Despite links between anxiety and social impairment, the social phenotype of the premutation remains relatively unstudied. Objective: We aimed to examine social phenotypes in the premutation that may be related to anxiety, by recording eye movements in response to direct and averted gaze. We hypothesized that anxiety would relate to longer initial fixations on the eyes. Methods: Preliminary data from five women with the FMR1 premutation were collected. We anticipate collecting data from three more participants by Discovery Day. Participants’ eye movements were tracked as a digitized face opened its eyes and either displayed a direct or averted gaze (see also, Weiser et al.[3] who used this paradigm to investigate social anxiety). Social anxiety was measured with the Liebowitz Social Anxiety Scale (LSAS; Liebowitz et al., 1987). Results: Participants’ initial fixations on the nose and mouth were significantly longer in the direct gaze condition relative to the averted condition. In this preliminary sample, a medium, but non-significant, correlation was detected between shorter initial fixations on the eyes in the direct gaze condition and social anxiety (r=0.51). Conclusion: This research provides preliminary evidence that the gaze behaviors of women with the FMR1 premutation are different in direct and averted gaze conditions, with associations observed between the time spent looking at the eyes and social anxiety.

Association Between Leukocytes and Pain in Pediatric Sickle Cell Disease

Allison Chila, Biological Sciences - Senior
Mentor: Dr. Jeffrey Schatz, Psychology

Sickle cell disease (SCD) is one of the most common genetic disorders in the world. Sickle cell disease occurs due to a mutation in beta hemoglobin, the compound in red blood cells responsible for binding oxygen. This hemoglobin mutation causes red blood cells to form a sickle shape when in a deoxygenated state. The sickling results in vaso-occlusion, which is the major source of complications, pain crisis, and even morbidity in SCD. There is considerable heterogeneity in frequency, duration, intensity, and extent of disability from pain among SCD patients. On average, children need medical attention for five to seven pain episodes per year. Although the immune system has been well understood for many years, it has not traditionally been considered to be involved in the pain experience. In recent years, research has found that several immune markers may be involved in chronic pain. This study aimed to determine if a correlation exists between elevated immune markers and higher frequency, intensity, or duration of pain in SCD patients. This study was conducted through Palmetto Richland Center for Cancer and Blood Disorders. Children completed psychological questionnaires that addressed their pain history, healthcare utilization, coping, and mood. The medical records were reviewed to obtain information regarding white blood cell levels. Currently, SCD patients are given opioid painkillers during pain crises. Correlations between immune markers and incidence of pain crisis could develop alternate pathways to manage SCD pain episodes. This could eventually lead to pain management with immune suppressants rather than opioid drugs.

Effect of reading ability on the neural mechanisms of attention: an electroencephalography study

Kristina Drake, Biomedical Engineering - Senior
Mentor: Dr. Jessica Green, Psychology

Attention is a phenomenon that shapes every experience we have. It involves perception and storage of some sensory information with clarity and vividness, while simultaneously suppressing other, unattended, information. In many disorders, such as dyslexia, autism, and attention deficit disorders, attention is impaired but the neural mechanisms that underlie these deficits are still poorly understood. Here we investigated the relationship between reading ability and neural activity during basic visuospatial attentional processing, as a better understanding of this relationship may allow for earlier detection and more effective remediation of reading difficulties. Previous studies have indicated that dyslexia may be a result of difficulties in orienting attention due to a “sluggish” attention system. We hypothesized that individuals with reading difficulties below the threshold for a dyslexia diagnosis would also demonstrate some level of attention deficit. Dyslexia screening measures were correlated with a number...
of reading behaviors, including reading speed, amount of time spent reading for pleasure, reported enjoyment of reading, and age at which the individual first learned to read. Reading ability scores also correlated with response times and EEG measures in our attention task, particularly when less than a second was given to prepare for an upcoming target. When more time was provided, however, responses for good and poor readers were more similar. This pattern is consistent with the idea that in poor readers the attention system is “sluggish” and thus more time is needed to shift attention to the appropriate location in space.

Exploring Psychological Research
Brian Kean, Marketing - Sophomore
Mentor: Dr. Kate Flory, Psychology

Having been awarded the Exploration Grant by the Honors College in April 2013, I was given the opportunity to discover the mechanics of research in the field of psychology. Under the guidance of Dr. Flory, I worked as an undergraduate research assistant in the USC Parenting and Family Research Center with Dr. Flory’s three year psychology study funded by the US Department of Education. This study focuses on social and academic functioning in school-age children (8-10 years old). More specifically, the research conducted attempts to find the link between social and academic functioning in children, and also attempts to connect how Attention Deficit Hyperactivity Disorder (ADHD) affects these aspects of subjects’ lives. Being a minor in psychology, I desired a hands-on approach to learning about research methods as applied to the field. After going through a two week lab orientation, I was able to begin running participants, recording data, and having a role in everyday lab functions. Going into this process, I never imagined how much work and painstaking detail went into research. I found that psychology research is a meticulous, yet enjoyable process that can teach an individual volumes about the field and the research process. I also took for granted how much is put into protecting participants by keeping all of their information locked up, shredded, coded, and nearly anonymous. Overall, I enjoyed delving into psychological research, and although it’s not something I would like to do for a living, I can now fully appreciate what goes into the studies so readily available to us through the media, databases, and other avenues. Even though research may not be something I will consider as a career option, I will continue to work in Dr. Flory’s lab in the fall to further my experience. For my Discovery Day presentation, I will display some of my experiences in the lab, what I have learned, and how to get involved in research here at USC.

Logo Recognition in Young Adults
Lauren Knapp, Psychology - Junior
Mentor: Dr. Melanie Palomares, Psychology

Brand marketing strategies and information is changing and developing faster than ever. Thus, studying the current trends between consumers and brand recognition is accretive to the further development of marketing. A huge marketing budget is necessary to achieve the recognition rates of organizations such as Apple or Target, but it is important for all companies to have a recognizable symbol (Airey, 2010). Brand identification is especially important in marketing to the Millennial generation; they are the driving force behind the consumer trends because of mass media (Barton, Koslow & Beauchamp, 2014). In this study, we evaluated what factors of logo design are correlated with recognition? We asked students (ages 18-24 years) to name 157 logos and complete a survey about their daily routines, media and consumer habits. The logos were categorized into the following sectors: business and finance, apparel, leisure, food and drink, automotive. We also categorized the logo graphics by content into the following categories: animal, human, stylized/design, object and orthographic. Our results show that college students tended to recognize logos associated with food and drink more often than logos associate with business and finance, which suggest that product or service experience corresponds with recognition. Interestingly, logos with biological or social features were more recognizable than logos that have stylized abstract geometric designs. As logo trends are moving towards abstract designs, our results imply that marketers and graphic designers ought to consider biologically relevant features for effective brand recognition.

Friend Fine, Stranger Danger
Alan Peh, Biological Sciences - Junior
Mentor: Dr. Amit Almor, Psychology

Multitasking has become pervasive and common in our increasingly demanding modern world. An important question is how tasks from different modalities (e.g., talking and driving) interfere with each other. In a previous experiment, Boiteau et al. (2014) showed that different aspects of conversation like speech planning and monitoring placed attentional demands on a concurrently performed visuomotor task, but that these demands were greater when the participant was speaking with a lab confederate as opposed to their friend. The question remains whether this observed difference reflected a general effect of partner intimacy the specific characteristics of the confederate. We hypothesized that increased intimacy between conversational partners are correlated with less attentional demand on the concurrently performed visuomotor task. We recruited 20 participant triads consisting of two friends and one stranger from the Psychology Department Participant Pool. One of the two friends was asked to complete a ball tracking (visuomotor) task while having a conversation with his/her friend simultaneously, and then the stranger (order of conversations was counterbalanced between participants). An intimacy rating scale was also administered after the experiment to assess the participants’ familiarity with their friends. Conversations were coded into five main categories: participant speaking, participant listening, participant preparing to speak, participant speaking simultaneously as partner, and no conversation control—and performance on the visuomotor task during these moments in the conversation was compared across conversations with a friend and a stranger.
The Misuse of Stimulant Medication Among College Students: A Review of the Literature

Kari Benson, Psychology - Junior
Mentor: Dr. Kate Flory, Psychology

Research has indicated that the misuse of stimulant medication among undergraduate students is a prevalent and growing problem. The purpose of this project is to summarize the current research in order to provide information for developing strategies for preventing and reducing misuse and reveal areas that require further investigation. A systematic literature review was conducted and thirty articles that met specific inclusion criteria were analyzed. The current research demonstrated that there are characteristics and psychological variables that differ significantly between misusers and nonusers, including fraternity or sorority membership, symptoms of attention-deficit hyperactivity disorder (ADHD), drug use, and academic performance. The results also indicated that students are mostly misusing for academic reasons, which may demonstrate, along with the results in regards to ADHD, that students may be attempting to self-treat academic difficulties. The most common source for obtaining stimulant medication is peers with prescriptions. This review also discusses other demographic characteristics of misusers, perceived consequences of misuse, and other topics related to misuse. Interpretation of findings may be hindered due to lack of a standard definition of misuse and tool for measuring misuse among those conducting research on the subject. The relationship between stimulant medication misuse and extra-curricular participation, depression, and eating disorders requires further investigation. This review has helped in the development of a survey to be administered to USC students to gain further knowledge on the misuse of stimulant medication.

Identification of the Neuroprotective Estrogen Receptor Subtype used by the Phytoestrogen Equol

Calvin Hu, Biochemistry and Molecular Biology - Junior
Mentor: Dr. Rosemarie Booze, Psychology

HIV-1 is a virus that affects around 40 million people around the globe. The virus is known to infect the central nervous system and cause a variety of neurological disorders. Many people who have HIV-1 virus also have an addiction to drugs of abuse, who often exhibit worse neurocognitive deficits. HIV-1 is known to shed molecular toxins and these are identified and studied. Transactivation of transcription or Tat is a protein that is used for replication by increasing phosphorylation. Previous work in our lab has shown that estradiol and phytoestrogens prevent Tat-mediated neuronal cell death. Equol is a metabolite of the phytoestrogen daidzien and is more effective than daidzien at lower concentrations. There are 2 enantiomers of Equol known as S-Equol and R-Equol. This study determines which estrogen receptor S- and R-Equol act to prevent Tat and cocaine mediated synaptodendritic damage. The three estrogen receptors tested were α, β, and GPR-30. Our hypothesis was that S- and R-Equol are acting through the β-receptor because previous work has shown daidzien and another phytoestrogen, genistein, prevent apoptosis through this receptor. F-puncta structures such as filapodia and spines were manually counted to determine whether there had been damage done to the neuronal cells. By studying the F-actin rich structures through fluorescent microscopy, we found that S-Equol and R-Equol prevent cellular damage through the estrogen β-receptor.

The Effects of Caffeine Absorption and Ingestion on Right Brain Activation: Descriptive Analyses and a Report of Preliminary Findings

Sara Newton, Psychology - Senior; USC Lancaster
Brittany Coleman, USC Lancaster
Justin Wills, Psychology - Sophomore; USC Lancaster
Mentor: Dr. Kate Holland, Psychology; USC Lancaster

Dysregulation of right hemisphere functional cerebral systems have reliably been associated with increased heart rate (HR; Holland et al., 2014). The current research explores the effects of caffeine ingestion as a right hemisphere stressor in individuals with high and low levels of trait anxiety. Moreover, this research utilizes a dual concurrent task setting wherein individuals consuming either 450 mg of caffeine or a placebo are asked to complete a design task, which is conceptualized as a right hemisphere stressor. We predict that diminished capacity of the right hemisphere in high trait anxious individuals will be demonstrated as evidenced through increases in heart rate and increased perseverative errors upon completion of the design task. Group screening is being conducted to identify 60 individuals with high and low levels of trait anxiety as assessed by the State-Trait Anxiety Inventory (STAI). Currently, 261 students have completed group screening to identify 43 participants. Nineteen participants were classified as low anxious and scored less than 37 on the STAI (M=29.94, SD= 3.52), and 24 were classified as high anxious scoring higher than 37 on the STAI (M=45.21, SD= 7.34). All individuals reported moderate amounts of caffeine consumption (M=203.08, SD =97.04). Presentation of preliminary findings at 3 local and 2 international conferences have resulted in 4 abstract publications. We have presented promising preliminary findings including a main effect for HR (F(1, 31)=4.07, p=0.05), and a Drug x Part interaction (F(1, 31) = 3.89, p=0.05). Both findings indicate a diminished capacity of the right hemisphere in processing stress.

Evaluating Cola Brand Preference: Diet Versus Regular

Charlotte Schallenberg, Psychology - Junior
Mentor: Dr. Melanie Palomares, Psychology

Since the invention of cola, the rivalry between Pepsi and Coke has been in existence. Both Pepsi and Coke have a large presence in the South since these products have roots in bordering states, North Carolina and Georgia, respectively. Because cultural influences have an impact on what we eat and drink, we investigated the cola preferences of students at the University of South Carolina. Two groups were created using one hundred and thirty-six 18 to 46 year olds, where one group tasted regular Pepsi and Coke, and the other tasted Diet Pepsi and Diet Coke. Each group also filled out a survey about their preferences. Overall, results showed that most people stated that they preferred Coke products
the Big Five and other assessments. The purpose of this research is to determine the utility of the Big Five. This is important because this and other personality assessments are widely used in a variety of domains, yet have been predominantly developed in the West. Therefore, these tests may not reflect traits found outside of their indigenous culture, or may group traits in a way that is culturally bound. To study these traits, I looked at primary sources on studies of personality traits cross-culturally and studies of indigenous developments of personality traits in non-Western cultures. A preliminary review of the current literature suggests that for it to be considered a universal assessment of personality, the NEO-PI-R may need refinements or additions to its facets.

Conversing with Friends and Strangers: A Sociolinguistic Approach
Karen Shebuski, Psychology - Senior
Mentor: Dr. Amit Almor, Psychology
In our daily lives, we are constantly faced with distractions. Whether it be talking on the phone while driving, or studying while talking, these distractions involve an overlap between language and another task. The aim of our study was to determine the effects of the distraction and familiarity of the conversation partner on the perceived quality of the conversation. Specifically, we asked whether conversing with a distracted partner would affect how the conversation was perceived by the distracted conversant and the non-distracted partner, and whether this perception will be different for conversation partners that are familiar with one another, and ones that are not. In this study, participants engaged in a short conversation with a friend and a stranger. While conversing, participants completed a visuomotor task on a computer. Afterwards, participant, friend, and stranger rated their conversations for naturalness, engagement, distraction, typicality, and interest. We hypothesized that friends and strangers would differ in conversation perception. We also hypothesized that the distracted participants’ perception of the conversation would differ from the perception of both the friends’ and strangers’. In post-experiment assessments in which the participant rated the conversation with a friend and vice versa, the ratings given on perceived naturalness of the conversation were correlated with the perceived amount of engagement from the conversation partner. The length of talk segments between friends and participants was positively correlated with how interesting the conversation was rated. Interestingly, these findings were not replicated in conversations between participants and strangers.

Examining Personality Traits Cross-Culturally
Carly Strohbach, Psychology - Junior
Mentor: Dr. Elizabeth Ravlin, Management
Cross-cultural research has been conducted for about as long as psychology has been a distinct discipline. However, empirically validated personality assessments came onto stage later; are still being refined, and only recently put to the cross-cultural test. The Big Five personality traits are five broad dimensions used to describe human personality. The NEO-PI-R (Costa & McCrae, 1990) is a widely used personality inventory utilized to study these traits. McCrae, Terracciano, et al. have replicated studies using this assessment in 51 cultures and concluded that the Big Five traits are found throughout a range of cultures. However, critics say that the Big Five does not adequately measure all facets of personality. My research examines personality trait theory cross-culturally using results from the Big Five and other assessments. The purpose of this research is to determine the utility of the Big Five. This is important because this and other personality assessments are widely used in a variety of domains, yet have been predominantly developed in the West. Therefore, these tests may not reflect traits found outside of their indigenous culture, or may group traits in a way that is culturally bound. To study these traits, I looked at primary sources on studies of personality traits cross-culturally and studies of indigenous developments of personality traits in non-Western cultures. A preliminary review of the current literature suggests that for it to be considered a universal assessment of personality, the NEO-PI-R may need refinements or additions to its facets.

Correlating Individual Differences in Oculomotor Movement with Working Memory Capacity
Mackenzie Sunday, Baccalaureus Artium et Scientiae - Senior
Mentor: Dr. John Henderson, Psychology
The eye movement system can provide insight into processes that occur in the mind as well as a better understanding of the relationship between quantifiable aspects of eye movements and the more abstract inner workings of the mind. Recently, consistent and reliable individual differences have been found in people’s eye movement behavior. For example, individuals with longer fixation durations for one visual task have longer fixations across all other visual tasks. The effects of exogenous factors like word frequency and visual task on eye movements have been extensively studied. However, the effects of more endogenous factors have yet to be investigated in detail. This study determined if a relationship could be found between individual differences in saccadic eye movements and working memory measures. The eye movements of fifty-three participants were collected from four different viewing tasks using an eye tracker in addition to data from two independent working memory tests. The data showed a mild correlation between one measure of working memory and eye movements during the reading task. However, there was a general lack of co-variation between the two tested processes. These results suggest that the working memory system is not responsible for individual differences in eye movement behavior. More studies are needed to investigate if other higher-level cognitive individual differences measures correlate with oculomotor behavior. This study indicates that stable individual differences in eye movements may be reliant on endogenous features that are independent from other established higher order cognitive measures.

Character Strengths and Their Role in the Teach for America Program

Erin Watson, Psychology - Junior  
Mentors: Dr. Claudia Harzer, Psychology  
Dr. Marco Weber, Psychology

Within the context of my independent study I learned about positive psychology as an area of psychology that focuses on traits and conditions that make life most worth living (e.g., Peterson, 2006). Seligman and Csikszentmihalyi (2000) described three main topics of positive psychology: positive experiences (e.g., satisfaction), positive traits (e.g., character strengths), and positive institutions (e.g., schools). This presentation will mainly focus on character strengths and their role in the context of the “Teach for America” program, which I will participate after my graduation. Teach for America is a program that places college students who have recently graduated into low-quality schools in the United States that are in need of teachers. The college graduates receive intensive training and commit to participating in the program for a minimum of two years. The goal of the program is to solve educational inequality by providing teachers to schools who are in need of them. Empirical research has shown that character strengths play a significant role in education, as can be seen in a study by Weber and Ruch (2012) that demonstrated that students’ character strengths are helpful resources in several different aspects of schooling (e.g., academic self-efficacy, school success). Character strengths also seem to be related to students’ positive classroom behavior (e.g., student is motivated, cooperative etc.). This presentation will offer empirically driven conclusions about how to integrate current knowledge about character strengths and their role in schooling into Teach for America.

Public Health

Exploring obstacles to perinatal care-seeking behavior in women of rural Orissa, India.  
Runjhuun Bhatia, Public Health - Senior  
Sarah Law, Public Health - Senior

Mentor: Dr. Deborah Billings, Women's and Gender Studies

This project resulted from collaboration between USC student organization GlobeMed and the Alternative for Rural Movement (ARM), a non-governmental organization in Orissa, India. Rajendra Rana, the head of ARM, expressed the need to delineate the factors underlying the tendency of rural Orissan women to deliver with unskilled birth attendants as opposed to institutionally. A literature review was conducted to explore possible economic, cultural, and social factors. During five weeks in Orissa, discussions with women's groups, community health workers, and ARM staff members built on the literature review. A preliminary survey and plan for its dissemination were developed. The community based participatory research (CBPR) method was researched and chosen because of its alignment with GlobeMed and ARM’s goals of community empowerment and sustainability. Training for dissemination was scheduled to begin in January 2014, but a cyclone led to concerns about directing ARM’s resources away from the disaster. Plans were postponed until May 2014. Principal findings are the possible factors that could underlie the decisions rural women make including: cultural preferences for delivering with family, power dynamics attached to the traditional birth attendant, cultural meanings attached to birth, lingering mistrust in health care providers due to the sterilization campaigns of the 1970’s, cost, distance, and lack of knowledge. The issue is complex, and the right questions must be asked in order for ARM to solve this problem within its community. Through the project, the investigators strengthened the partnership and provided an avenue for learning for future students of public health at USC.

Identifying Opportunities to Develop Effective HPV and HPV Vaccination Materials at the University of South Carolina  
Rosemary Corriero, Biological Sciences - Senior

Mentors: Dr. Heather Brandt, Health Promotion Education and Behavior  
Dr. Shalanda Bynum, Uniformed Services University of the Health Sciences; USC  
Dr. Jessica Bellinger, Health Services Policy and Management

Promoting vaccination uptake among college students is important to curtail the subsequent burden of HPV-associated diseases, such as genital warts and cervical cancer. Therefore, college students are ideal target in human papillomavirus (HPV) vaccination research given the high incidence of HPV in this population. Purpose: To explore current HPV/HPV vaccination messages on the University of South Carolina’s (USC) campus and identify opportunities to develop health communication materials. Methods: Using information from 21 in-depth interviews conducted in fall 2013, opportunities for materials development for
redistribution of Information to a Low Income Community/
Neighborhood Faced with Environmental Health Risks
Kevin General, Public Health - Senior
Mentor: Dr. Sara Corwin, Health Promotion Education and Behavior

In 2012, high levels of arsenic and lead were discovered in the soils of Edisto Court, a working class community in Columbia, South Carolina. Examining how the potential impacts of these heavy metals were disseminated to the community residents will allow for recommendations for more efficient communication of environmental health risks between media or other authorities and lower socio-economic and ethnic groups. Efficient and accurate flow of information is essential in providing the public with the tools and knowledge necessary to achieve a balance between the environment and the health needs of the community.

Analysis of the Flow of Information to a Low Income Community/
Neighborhood Faced with Environmental Health Risks
Kevin General, Public Health - Senior
Mentor: Dr. Sara Corwin, Health Promotion Education and Behavior

In 2012, high levels of arsenic and lead were discovered in the soils of Edisto Court, a working class community in Columbia, South Carolina. Examining how the potential impacts of these heavy metals were disseminated to the community residents will allow for recommendations for more efficient communication of environmental health risks between media or other authorities and lower socio-economic and ethnic groups. Efficient and accurate flow of information is essential in providing the public with the tools and knowledge necessary to achieve a balance between the environment and the health needs of the community.

Reducing Ventilator Associated Pneumonia at Palmetto Health Children's Hospital
Rebecca Heidemann, Exercise Science - Sophomore
Mentor: Dr. Elizabeth Mack, Palmetto Health Richland Children's Hospital

Falls, obstetrical adverse events, venous thromboembolism, and serious safety events. The HAC we specifically targeted was VAP, which is associated with $51,000 in direct attributable cost and 15-30% direct attributable mortality increase. Our local VAP team's aim was to reduce VAP by 20% and achieve 90% bundle compliance. In order to reduce VAP, we implemented a prevention bundle: head of the patient's bed 30-45° so as to reduce the risk of aspiration, oral antiseptic care every 4 hours, dependent ventilator tubing position, hand hygiene (HH). My area of focus was auditing all-or-none HH compliance; thus, a provider is not compliant unless he/she does adequate HH when entering and exiting the room and dons appropriate isolation gear as appropriate. HH compliance has increased: September '13: 38.38%, October '13: 42.86%, November '13: 52.05%, December and January '13: 60.87%, and February: 57.38%. Greater overall compliance with the VAP bundle has led to a 75% decrease in VAPs at PHCH4 VAPs in 2012, 1 VAP in 2013. Through improvement in process measures, we have decreased VAPs at PHCH.

Quality Control and the Effect on CLABSI
Noran Mohamed, Biological Sciences - Senior
Mentor: Dr. Elizabeth Mack, Palmetto Health Richland Children's Hospital

In October of 2006, the National Association of Children's Hospitals and Related Institutions (NACHRI) launched a quality improvement project focused on central line associated blood stream infections (CLABSI). This project aimed to improve the quality of care and simultaneously lower the rates of infection. This interested me from the beginning because of the focus on patient care and the focus on overlooked details. It is incredible and yet almost obvious in a sense that the importance of being tidy and careful with CVL patients, in fact any patients. It will effectively initiate ecological justice and sustainability into society during periods of environmental risk, a clear and concise method must exist that examines the awareness, perceptions, and concerns of those burdened with the environmental threat. Examining the community/neighborhood’s awareness, perceptions, and concerns about their exposure to potentially health compromising levels of heavy metals will allow for recommendations of sustainable methods to provide Edisto Court and communities of similar demographics with the needed knowledge, tools, and skills when facing these health risks.
Oral hygiene knowledge and practices of adults in rural India

Nina Panvelker, Biological Sciences - Junior
Mentor: Dr. Christine Blake, Health Promotion Education and Behavior

According to the IKP Centre for Technologies in Public Health’s 2011 report, dental diseases affect 50 to 90 percent of people in India with even higher prevalence in rural areas due to lack of resources and knowledge about oral health. This study’s purpose was to evaluate the status of oral health knowledge and practices in the rural villages of Orissa, India to better address the community’s oral health needs.

I administered a previously validated questionnaire on oral health to 99 adults living in the rural villages of Orissa, India with a translator’s help. One questionnaire section focused on their knowledge of oral hygiene while the second focused on their behavior. Topics included results of poor hygiene, proper oral care, teeth cleaning products, and dental care. Associations between knowledge and behavior were examined using SPSS. Knowledge was found to be significantly positively associated with good practices. Only 32% of participants used a toothbrush, but 56% knew the cause of bleeding gums and 100% cleaned the tongue. None knew all the listed methods or products for keeping the mouth healthy, but 53% knew the results of not keeping the mouth clean. While survey participants did not always know the commonly accepted oral hygiene practices, most knew the importance of keeping the mouth clean, and all had some way of cleaning. This suggests that more education about hygiene practices may be necessary, but local practices that may also be effective in maintaining oral health should be better understood and promoted by public health practitioners.

Disparities in the implementation of electronic health records across rural and urban settings

Amanda Stevens, Information Management and Systems - Junior; USC Upstate
Mentor: Dr. Deshia Leonhirth, Informatics; USC Upstate

BACKGROUND: The American Recovery and Reinvestment Act’s Health Information Technology for Economic and Clinical Health (HITECH) provision of 2009 seeks to incentivize providers to adopt and use electronic health records (EHRs) in a meaningful way, including functions related to error reduction and cost containment. Understanding implementation patterns of EHR functionalities across rural and urban locations is important in order to identify possible disparities.

METHODS: The 2010 American Hospital Association Information Technology Supplement was merged with the 2010 Nationwide Inpatient Sample. The final sample included hospitals present in both datasets (n=347). Bivariate analyses using chi-square significance tests were used to determine if level of EHR implementation for five computerized provider order entry (CPOE) and six clinical decision support (CDS) functionalities varied by rural and urban hospital location.

RESULTS: Bivariate analyses revealed significant relationships between level of implementation of four of the five CDS functionalities (clinical guidelines, clinical reminders, drug-allergy alerts, drug-lab interaction alerts, and drug-drug interaction alerts). There were no significant relationships detected for the six CPOE functionalities tested or for the CDS functionality drug dosing support.

CONCLUSION: EHR use, including CPOE and CDS use, has been touted for its potential to improve quality and efficiency. Based on the results of this study, implementation of CPOE functionalities varies significantly across rural and urban settings. Policymakers should consider the disparities in EHR implementation by location for future policies as a tool to improve the disparities in health outcomes that exist across rural and urban locations.

The Philosophy of Chinese Medicine: An Entry Point to Understanding East Asian Medical Philosophy

Travis Stewart, Biomedical Engineering - Senior
Mentor: Dr. Hal French, Religious Studies

There is much to be learned from the Chinese traditional approach to physiology and disease. The Chinese system is focused on the balance and flow of nature through time and tends to focus on the human concept in an integrated manner instead of an iteratively reductionist one. Also, in traditional Chinese medicine, though there is a deep tradition of the use of herbs as pharmacological agents, the treatment of disease and other sub-health states are less heavily oriented toward the use of pharmaceuticals and include richly developed systems such as massage and cuisine that are strongly integrated into the health culture. A couple of philosophical frameworks provide an organizing structure for these diverse systems of health culture: the Book of Change (Yijing) and the Channel-Meridian theory. The Book of Change describes ebbs of change in nature throughout space and the Channel-Meridian theory gives a framework for this change in the human physiology. With this in mind, the integrated quality of Chinese traditional medicine is clear. For all of its merits, however, obstacles towards integrating insights and practices form Chinese traditional medicine persist due to crucial shortcomings. These shortcomings include the lack of a standardization of treatment and absence of a method to control for false negatives or false positives that result from diagnosis and evaluation of treatment effectiveness in Chinese traditional medicine. In contrast, the tradition of empirical experimentation and validation in biomedicine and the related scientific fields has produced powerful insights into the nature of the human body and a reliable framework for scientific discovery. This tradition of experimentation and validation has yielded many effective discoveries, and a similar system must be integrated into the Chinese traditional medical culture for its fullest application in our time.

Medical Experience Academy

Kelsey Williams, Biological Sciences - Senior
Mentor: Ms. LaToya Dodson, Greenville Hospital System; USC MedEx Academy is a program that offers the opportunity to see behind the scenes at Greenville Memorial Hospital. MedEx Academy strives to give the fundamental tools of Research, Experience, and Preparatory work to pre-medical students. There are a plethora of shadowing opportunities in different areas of the hospital such as the Emergency Room and Neonatal Intensive Care Unit. Through the past 5 years I have been a student, mentor, and most recently helped to develop the current curriculum for the program for summer 2014. Not only have I had extensive research experience under the advisement of top researchers in the hospital; but MedEx Academy has helped refine my perspectives on the healthcare field by serving a liaison between the student, medical school, and hospital system. Through this experience I have improved my oral communication as well as built a professional network. Reflecting on MedEx Academy and the services
provided, I have not only seen the complexity of the hospital, but also found my place within healthcare as a physician. MedEx Academy provides a significant opportunity to students wanting to pursue a career in a field that is in high demand. I hope to encourage other students to take advantage of the academy and to realize their full potential within it. I plan to continue in the MedEx Academy as a mentor and use my knowledge to give back to my community as a practicing healthcare professional.

Lean Manufacturing in the United States
Duncan Berry, Management Science - Sophomore
Mentor: Prof. Lawrence Zimmer, Management Science
For this project, my research was focused on the history of lean manufacturing, its application in American manufacturing, and the current status of American manufacturers using lean techniques. Seeing that Toyota, now the world's leading automaker, has utilized these techniques for many decades and has benefitted greatly from the use of lean principles, it begs the question why haven't all manufacturers decided to go lean. This project identifies what lean manufacturing can do to benefit businesses and what exactly is involved in becoming lean. From this research, I have developed a greater knowledge of the ins and outs of how lean manufacturing benefits numerous companies, and have learned that lean starts from a companies' cultural shift instead of a technical one. Through novels, articles, interviews, and field books, I gathered all the information regarding lean manufacturing I could find to help better understand the topic as a whole and see how it can benefit society as well. One basic principle of lean manufacturing that I found early on is that most companies used these principles to accomplish three functions: improve quality, lower costs, and shorten delivery times. However, lean principles are not always the best to use in a manufacturing environment and can sometimes be the incorrect strategy to succeed. For example, with all that being said, creating a culture that embodies lean as a practice to help benefit both the customer and employee. These principles can work for customers and employees in any professional field and entity from hospitals, to universities, and even government to generate a better result.

How do the opinions of younger Taiwanese regarding politics and economics differ from those of the older generation?
Robyn Blanton, International Studies - Sophomore
Mentor: Prof. Kiel Downey, Political Science
Taiwan has always been considered a hotspot in U.S.-China relations. Due to the tension surrounding Taiwan's political status, many believe Taiwan's aspirations to be an independent state will be the spark that ignites the next world conflict. Taiwan's political system, like any other, has its own internal problems, such as corruption, crime, and economic instability. Taiwanese people do not see their homeland as a conflict waiting to happen, and regardless of their stance on the one China policy, internal politics are more important to many political leaders and their constituents than recognition in the international forum. Compared to the older generation; the younger generation is more optimistic and excited for the future of Taiwan, primarily because they think Taiwan will have an opportunity to gain recognition via economic and trade relations if not by diplomatic relations. This documentary is composed of interviews with Taiwanese people from ages 22 to 64 who hold different beliefs and perspectives, but they all recognize the relationship they must keep with China, some more unhappily than others, to ensure economic stability and peace. This documentary concludes that
the younger generation will channel their parents’ fierce opinions over politics and independence to improve their education and influence on the international stage, through economics or diplomacy. This documentary concludes that there is a bright future for Taiwan’s thriving economy and its democracy, which is willing to evolve at the request of its newly globalized citizenry.

Against all odds: the Psychology behind the Czech rebellion against Soviet Occupation

Carl Brzorad, Psychology - Senior
Mentor: Dr. Doyle Stevick, Educational Leadership and Policies
I traveled to Prague to interview political, religious, economic, and academic dissidents who were involved in various ways in the underground movement to end the Soviet occupation of Czechoslovakia. I wanted to know why these individuals were willing to risk so much for so small a probability of success. I hypothesized that high self-efficacy was one of the psychological mechanisms facilitating their rebellious tendencies, but this view altogether failed as an adequate description of the phenomena I observed in Prague. I found little evidence that these individuals put any real thought into the probability that their actions would ultimately enact regime change, and no evidence to indicate that they were particularly confident in their own ability to enact desired change in a particular environment (self-efficacy). I argue that these individuals truly had no choice but to act in the way they did: their strong-held moral convictions prevented them from standing idly by. When imprisonment, assault, or death, and no real change in the status quo, were the likely outcomes of any resistance during Soviet rule, self-efficacy is shown to have less explanatory potential. Rather, I focus on the overarching psychological commonality amongst the politically, socially, and economically diverse Czech dissidence: a sense of obligation, even at penalty of death, to their conception(s) of the moral law.

Gamecock Bio-Soap

Alec Courtright, Environmental Science - Junior
Mentor: Mr. Tom Syfert, Environmental Health & Safety
This project examines one way that individuals can avoid turning previously used vegetable oil into waste. To address this issue in a sustainably and economically beneficial way, a team of students further experimented on a previous project that turned wasted vegetable oil into bio-diesel. They then created a glycerin by-product by creating bio soap with the glycerin. With an initial investment of approximately $500, the team tested multiple soap-making processes and recipes to create a consistent and appealing soap formula. This project also involved creating a marketing and business plan to ensure a return on investment. Gamecock Bio Soap is an economically sustainable business with environmental ideals at the forefront of its mission.
A Comparative Analysis of 127 Countries

Hillary Kierspe, Sociology - Senior; USC Aiken
Mentor: Dr. Christine Wernet, Sociology; USC Aiken

Pro-woman nation states need to be identified, because these states may help diminish traditional gender roles and gender stratification by providing structural opportunities for women (Wang 2004, Wernet et al. 2005). Comparative, country level data on multiple domains, such as female life expectancy, low fertility rates, education levels, the legal status of abortion, the percent of women in public life, female labor force participation, female earning potential, and family leave policies, are gathered from the Population Reference Bureau (2005; 2011; 2013), the Gender Gap Report (2012), and the International Labor Organization (2010). This paper explores the differential access that people in 127 countries have to the aforementioned rights and privileges in order to identify which countries have policies that are the most beneficial for women. These data points will be used to rank pro-woman nation states in a comparative index.

Impact of Media Preferences of Different Musical Artists on Politicians

Justin Long, Fine Arts - Senior; USC Aiken
Mentor: Dr. Spring-Serenity Duvall, Communications; USC Aiken

My research project is on the controversy between Paul Ryan and the band, Rage Against the Machine, during Ryan’s campaign as Vice President in 2012. My research was focused on the links between Paul Ryan and Rage Against the Machine that caused the controversy when Ryan stated that he “liked” the band even though he knew nothing of what the band stood for. In my research I found that Ryan was supporting many of the issues that Rage Against the Machine fought against by using their music as a catalyst to gain support from their listeners.

International Study of Financial Literacy Effects on College Students’ Consumer Behavior

China Thomas, Economics - Senior
Mentor: Dr. Jason Carpenter, Retailing

This study involved research on the consumer behaviors of college students at Universities located in Europe and America; determining how their financial literacy affects their spending habits on food, technology and clothing during this worldwide economic recovery. My research involved the construction of 600, 8 to 10 minute long, surveys. These surveys measured college student’s financial knowledge and their spending habits on food, technology and clothing. Of the 600 surveys, 300 of them were administered in classrooms at USC. The other 300 surveys were given to students attending WU in Germany. I translated the survey from English to German. The surveys administered to the USC students were collected prior to my arrival in Vienna, Austria at the Vienna University of Economics and Business(WU). This process involved thorough collaboration with my mentor, Dr. Jason Carpenter, and also my German Business instructor, Professor Brad Owens. During these times of international economic strain, this project brought self-reflection upon college students of various demographics about their own finances. Students became more aware of budgeting and planning to avoid debt. This study has also been beneficial to the experience that I will need in my future career as a Behavioral Economist; where I will utilize similar methods in collecting data using surveys, statistical reasoning and researching. Inspired by my interest in the economy and the welfare of communities; I believe my research will impact and inspire others to continue to promote financial literacy.
It's Not Good to Hurt Other Friends: Children’s Evaluations of Peer Conflicts

Calli Fletcher, Chemistry - Sophomore
Stephanie Bishop, Early Childhood Education - Junior
Mentor: Dr. Kelly Lynn Mulvey, Educational Studies

Recent research has argued that children perceive between group harm (hurting someone who is not part of your group) as acceptable (Rhodes & Chalik, 2013), counter to prior research indicating that children judge all harm as wrong (Smetana, Jambon, & Ball, 2014). The current study explores young children’s evaluations of intergroup transgressions in two different contexts (novel groups: red and blue team and gender groups: boys and girls) and will compare moral transgressions (hitting and pushing) to conventional transgressions (rolling a baseball and reading a book incorrectly). The aim is to determine if the pattern recently found hold across all types of intergroup conflict. Participants, ages 3 to 8, evaluated one within group transgression and one between group transgression for the moral and conventional domains. It was found that children perceived moral transgressions as worse than conventional transgressions. However, between group moral and conventional transgressions were judged as more acceptable than within group transgressions. This extends prior findings by demonstrating that children see conflicts with someone not part of your group as always more okay than those with someone in your group. The findings will be discussed in terms of the literature on moral development, intergroup relations and peer conflict.

The Real Food Challenge

Elizabeth Gilchrist, History - Sophomore
Mentor: Mr. Seth Guest, Green Quad Community

The University of South Carolina has recently joined the Real Food Challenge (RFC), a national organization with more than 350 participating schools that is striving to bring “real,” meaning local, sustainable, fair, and humane food to campus dining facilities. RFC’s goal is to ensure that 20 percent of the food served on campus will be real by the 2020. This proposal will not only benefit the health and wellness of students, but those at every stage of the food production process. The Real Food Challenge emphasizes the importance of student participation and collaboration amongst universities. The USC branch of the RFC held a strategy conference in the end of February for universities in the Southeast. USC will use the success of other schools to spur its own progress. After building a strong foundation of university supporters, students will present Sodexo, the food service provider at USC, with a commitment of 20 percent real food by 2020. After the commitment is signed, students will work with dining services to create a plan of implementation using methodology created by the national RFC organization. Although the RFC at USC is in its early stages, it has already begun to gain supporters among students, faculty and administration. The movement on campus is still in its first stage of gaining support. For the plan of implementation, connections with academic departments and community organizations with similar goals will better equip students in the formation of a plan.
Experiences in Understanding Columbia’s Homelessness Issue and Project Development

Susan Todd, Psychology - Senior  
Mentor: Dr. Bret Kloos, Psychology

Last April, I was awarded an Honors Exploration Grant to develop a project to combat stereotypes related to Columbia’s homeless population for my senior thesis. I had developed a strong interest for the issue of homelessness in Columbia from volunteering experiences my sophomore and junior year, as well as from the knowledge that I gained in the Honors College class, Homelessness in SC. While developing this project, I spent a great portion of my senior year volunteering with different homeless services and understanding the tensions that exist in this city related to the topic of homelessness. The majority of my experiences come from my service at Trinity Episcopal Cathedral and their free breakfast on Sunday mornings, volunteering with the HUD Point-in-Time count in 2013 and 2014, and from attending Homeless Helping Homeless meetings at the public library. From this involvement, I was able to build valuable relationships with both community members and homeless individuals so that I could better understand the complex issue and how homelessness is addressed. I now have a valuable set of skills in connecting with people in life situations very different from my own. I was able to affect the people that I developed relationships with and, in turn, they affected my worldview. I constantly have my biases challenged and my knowledge expanded. All of these experiences will aid me in my future career in social work. I hope that the perspectives that I have gained will help me to challenge stereotypes through my written thesis.

Teaching English in Rennes, France

Jessie Totten, International Studies - Junior

During the spring semester of 2013, I studied abroad in Rennes, which is the capital of the Brittany region of France. During my study abroad, I lived with a host family and studied at the University of Rennes II. I participated in an intensive and immersive French language program, and thus took all my classes in French. While there, I also had the opportunity to take a course that allowed me to work in an elementary school and help to teach the equivalent of fifth grade students English. Through this course, I studied the way in which the French teach foreign languages and how the French school system works. I was then able to take these lessons and use them to help improve the English of the elementary schools students. I planned lessons on a variety of subjects from pronunciation to the American flag, as well as offered an American perspective on our culture and language. This experience challenged me because I had to explain aspects of the lessons, such as English phrases or grammar exceptions, to the students in French. However, this opportunity was also beneficial for me because it allowed me to better understand effective strategies to teach young students language as well as giving me an opportunity to teach English as a second language. Overall, teaching English in France was an invaluable experience that will continue to shape my understating of teaching foreign languages in the future.

Zooarchaeological Analysis of Faunal Remains from Sites 38CH2105 and 38CH2106, James Island, SC

Laurren Lehman, Anthropology - Senior

Mentor: Dr. Kenneth Kelly, Anthropology

Zooarchaeology is, at the most basic level, the study of animal bones recovered from archaeological sites. To anthropologists, this field has the potential to provide valuable insight into the diets, cultural practices, food procurement strategies, and food distribution systems of historic communities through the examination of the ways in which humans interact with their environments. For my senior thesis, I am currently conducting a zooarchaeological analysis of the faunal remains from two sites located on James Island, South Carolina—sites formally known as 38CH2105 and 38CH2106. Both sites had multiple occupation periods, including a short prehistoric component, an eighteenth and nineteenth century component, and an occupation from the early 20th century. Artifacts recovered during excavation suggest that the inhabitants likely came from a range of heritages, including European, Native American, and African—though their exact identities are unknown. Historical documents suggest that the island was used primarily by European colonists for cattle raising in the 1700s, followed by extended periods of cash crop production under a plantation system. As part of this investigation, the faunal remains were examined with the intent of identifying a variety of characteristics, including taxonomic composition, skeletal part representation, and taphonomy (the processes that have affected the bones over time, such as butchery, burning, decomposition). The objectives of this research aim to provide insight into the identities of the sites’ inhabitants, their diets and food preparation habits, as well as potentially evaluating any change that occurred over time.

Faunal Analysis at Fort Congaree: Animal Processing at a Colonial Fort

Sarah Nowell, Anthropology - Senior

Mentor: Dr. Joanna Casey, Anthropology

Fort Congaree is a site located between the northern edge of Congaree Creek and the Congaree River. It was constructed in the aftermath of the Yemassee War to foster a trade relationship with local Native American groups. While some historic records exist that indicate some of the trade practices and resources allocated to establish the fort, these do not give a complete description of life there. For my senior thesis, I am examining the faunal remains recovered from the fort during the 2011 and 2013 field seasons, including those excavated during the University of South Carolina’s spring semester field school. By examining the faunal remains, or remains of animals consumed, I hope to learn more about dietary or subsistence habits as well as trade. This project is still in progress. This presentation will highlight subjects such as the historic background, the re-discovery of the fort, my methodology, preliminary conclusions and some further observations based upon my analysis and the cultural evidence left by the residents of the fort.
Developmental Stress and Risks of Mortality: The Case of Medieval Plague

_Greg Wehrman_, Anthropology - Senior
Mentor: Dr. Sharon DeWitte, Anthropology

Fluctuating asymmetry (FA) refers to random size or shape differences between bilateral physical features and is associated with developmental stressors like disease, malnutrition, or chemical exposure. This asymmetry often accompanies other stress markers in skeletal remains, like enamel defects. FA is associated with low fertility and higher rates of illness, however no studies have explicitly examined its association with mortality. This project will use samples from two medieval London cemeteries; one contains only victims of the Black Death, and the other is a non-epidemic cemetery. Dental fluctuating asymmetry (DFA) will be measured as random differences in tooth diameter between antimeres, or paired teeth. Measurements of the buccolingual and mesiodistal diameter of paired first molars will be taken and analyzed using a two-way, mixed model ANOVA and levels of DFA will be compared using F-tests to determine whether older groups exhibit lower levels. Individual-level DFA will be analyzed as a covariate acting upon the Gompertz model, which is a parsimonious model of mortality across adulthood, to assess whether higher DFA is associated with elevated risks of mortality. Results pending.

The Significance of Feeling Useful

_Sidney Brown_, Exercise Science - Senior

My time at the University of South Carolina has been filled with educational experiences both inside and outside of the classroom. These have not only prepared me for the real world, but have taught me a lot about myself. One of my more memorable experiences was in the summer of 2012, I interned at a General Surgeon’s office. Following this I was selected to be a Peer Leader for the University of South Carolina for the Fall of 2012 and 2013. While taking a Developmental Psychology class, an assigned research paper opened my eyes and had a significant impact on my career plans. Currently I am completing a practicum at the Free Medical Clinic in Columbia, SC. This practicum, and my previous experiences, while different, share a common goal in the importance of feeling useful. When reflecting on these experiences, I realized that if I enjoyed or disliked the experience it all came down to whether I felt useful or not. From this I learned that in order for me to be happy in my career and I need to be useful to people or I will not be satisfied. My future plan is to continue my education in becoming a Physician Assistant and help people for the rest of my life.

Art Therapy: A Helping Profession

_Jocelyn Fishman_, Psychology - Senior

The past two years at USC have given me ample opportunities to continue my exploration of my future career as an Art Therapist through various internships. The most important and meaningful experiences in that respect have been my internships at the Art and Play Therapy Center of South Carolina, Richland Country Intervention Services, and a research opportunity through A+ Solutions in Cleveland, Ohio. My growing relationships with Lyssa Harvey, Ed. S. and Dr. Karen Cooper–Haber have given me a window into the life of an art therapist and a counselor, respectively. By reaching out to these people and getting involved in the observation of counseling sessions, I have learned a great deal about navigating all that is required in order to comply with the numerous rules and regulations that govern this helping profession. It is my opinion that is all worth the effort, however, because I believe being an art therapist is just that-- a helping profession. I have been able to witness the influence these professionals have on their clients and the community. Through participating in Discovery Day at the University of South Carolina, I hope to highlight these influences by describing the daily activities of these women and displaying some of the incredible work of their clients.
Four Years of Leadership
Katherine Halligan, International Business - Senior
Throughout my experiences at The University of South Carolina over the last four years, I have learned a lot about both my leadership abilities and myself. I am currently a senior and am pursuing degrees in International Business and Global Supply Chain and Operations Management, as well as a minor in Spanish. I am graduating in May 2014 with Leadership Distinction in Professional and Civic Engagement. I have had many opportunities within my collegiate career to lead my peers, including holding the position of Service Chair within my business fraternity, as well as holding three officer/exec positions within my community service sorority. Furthermore, I have had the privilege of working with esteemed USC faculty members and young business students through my past position as a Supplemental Instruction Leader. Although these positions have taught me many valuable lessons, I found the following four components to be essential to leadership: organization, collaboration, understanding, and creativity. Additionally, I have learned the importance of understanding the traits that make each person unique. As stated by Albert Einstein, ‘Everybody is a genius. But if you judge a fish by its ability to climb a tree, it will live its whole life believing that it is stupid.’ I believe that a leader should be focused on the special qualities that make each person unique rather than those that make them the same. While everyone has some kind of commonality, it is more important to understand the traits that make us unique and work through those differences.

Studying Abroad in the Basque Country
Calvin Koon-Stack, English - Senior
As a rising senior Spanish minor who had studied the language for eight years, it seemed a shame to me that I might graduate without encountering the language ‘in the wild.’ And that very much looked to be the case until I decided to study abroad at the University of the Basque Country in Bilbao, Spain, during the fall semester of 2013. I went with the goal of getting as much of a linguistically-immersive experience as possible, but my decision to go to Bilbao, while dictated by price, ultimately provided me with something more. Bilbao is located in the Basque Country, a minority autonomous region within Spain. This location provided me with an outsider’s perspective on mainstream and global culture. I learned firsthand about the importance of cultural dialogue on a macro- and micro-scale, on national and interpersonal levels. Regardless of language, the stories we tell are important to the foundation of cultures. During my time abroad, I learned cultural sensitivity, gained language skills, and returned with a greater appreciation for my own home country.

Summer Camp: An Opportunity for Leadership Development
Calvin Koon-Stack, English - Senior
Summer camp is a core part of the experience of growing up for many Americans. According to the American Camping Association, 11 million children and adults attend camp each year. While summer camp is largely seen as an experience for children—a time for them to have fun, build confidence, and make new friendships—it can also be just as impactful for the adults who work there. Growing up, I never had the opportunity to attend summer camp, but in the summer of 2012, I had the good fortune to work at one. This particular summer camp was an American-style, English immersion camp located on the Adriatic Sea, in Croatia. During my 10 weeks there, I learned important lessons about leadership, and found myself wondering how that experience might be cultivated and contextualized, such that summer camp counselors (often college students) could use their time at camp to work on building marketable workplace skills in a fun and exciting way. The resulting project has involved leadership research and partnering with US camps in order to craft a leadership development program for seasonal staff. Summer camp was vital to my experience, and I hope to increase the impact for others.

A study about EcoReps and their presence on campus
Zil Shah, Biological Sciences - Senior
During the school year of 2012-2013, I joined a Peer Leader organization called the EcoReps. During that year I learned a lot about leadership and how to be an effective communicator. Their goal on campus was to educate and engage students on campus about sustainable living. EcoReps are residents who live on campus in the Residence Halls. During my year at EcoReps we focused on working more with campus dining to improve TOGO options. One project that I helped spearhead was the reduction of paper/plastic bags and a move toward tote bags. I helped write a grant to propose to Residence Hall Association to get funding for tote bags for every student who lives on campus. We also focused on improving recycling awareness in the residence halls. To do this, we made sure that each room had a recycling bin and that they were aware of what could be recycled and what couldn’t. The reason why EcoReps was a significant part of my college career is because it helped me learn how to work on a team and even learn a lot more about recycling. USC has fantastic recycling/composting facilities however the awareness to students isn’t reaching them, that is the main skill I learned from EcoReps. I learned how to engage with students on a topic that is imperative to keeping the world sustainable. For future students, to get them to recycle more and compost more at younger age will ensure that the Earth doesn’t run out of resources.
**Competing to Win: The Process of Competing for a National Fellowships**  
*Davontae Singleton*, English - Junior  
In this presentation, I will talk about my experiences in applying and competing for the Harry S. Truman National Fellowship. This prestigious award is one of the most competitive undergraduate scholarships and is awarded to approximately 60 undergraduate juniors nationwide. I will elaborate on the application and interview process as well as reflect on how this process has helped to make me a stronger candidate and scholar.

**Community Service: Whom Does it Serve?**  
*Alexandra Turgeon*, Biological Sciences - Senior  
My presentation will highlight my collegiate community service, focusing on my work with Amigos del Buen Samaritano, Waverly After School Center, Hospice Care of Tri-County, and more. I will include some of the issues I find relevant to volunteerism as well as what I’ve learned from the experience.

**Sustainable Carolina internship**  
*Isabella West*, Visual Communications - Senior  
Mentor: Ms. Hayley Efland, Office of Sustainability  
In the fall of 2013, I was the Graphic Design intern for Sustainable Carolina. Sustainable Carolina is the leading “green” organization at USC, whose overall goal is to get the campus involved in sustainability initiatives. As a visual communications major, it was a great experience that taught me more about graphic design, working with clients, merging your interests with those of the organization you are working with, and branding. I designed several flyers, some static marketing materials, and their logo. I also was able to learn more about assessment, which is an important tool to help be more successful in communication and outreach, and can help prove that a person or organization is doing a good job. Working for Sustainable Carolina helped me to develop my career aspirations. I have learned that I like working for small businesses and nonprofits, and that I want to help communicate sustainability. My future plans include looking for a job opportunity that will allow me to either help an organization become more sustainable or to work with a “green” organization and promote them through marketing efforts.

**Across The Pond: An Incredible Journey**  
*Adam Burton*, Media Arts - Senior  
Mentor: Dr. Pia Bertucci, Languages, Literatures, and Cultures  
My time abroad was an incredible journey. I experienced many things that I would not have experienced had I stayed in the United States. I learned many things myself, as well as the way I look at others. My presentation will explain why I decided to go abroad, give a few stories of my experiences abroad, and then some reflection on my time spent abroad and how it relates to my life in America. I will also explain how the trip was significant to my life, and what I would like to do in the future with these experiences under my belt. In giving this presentation, I hope to sway others to decide to go abroad and experience other cultures.

**Impact of Teaching Fellows**  
*Ashley Taylor Christopher*, Mathematics - Senior  
Mentor: Mrs. Kimberly Smoak, Instruction and Teacher Education  
As a senior in high school I was chosen to become a Teaching Fellow at the University of South Carolina. The South Carolina Teaching Fellows Program is a scholarship program for high school students who wish to earn a degree in education and teach in South Carolina’s public schools. While serving four years in the program, I have assumed many roles and responsibilities. Two of the most rewarding roles were when I served as vice president and president. Through this presentation, I offer my perspective on the full impact of being a Teaching Fellow. I will discuss how the opportunities and experiences offered by South Carolina Teaching Fellows Program has had a significant impact regarding my approach to leadership, education, professionalism and life in general.

**Barry M. Goldwater Scholarship Experience**  
*Katherine Driscoll*, Biochemistry and Molecular Biology - Sophomore  
*Eric Bringley*, Chemical Engineering - Sophomore  
The Barry M. Goldwater Scholarship was established by Congress in 1986 to honor Senator Barry M. Goldwater. The purpose of the Foundation is to provide a continuing source of highly qualified scientists, mathematicians, and engineers by awarding scholarships to college students who intend to pursue research careers in these fields. Universities are limited to four nominees, making the nomination a distinction of its own. The Goldwater application process is a highly competitive one in which a student's academic history, research background, interviewing skills, and scientific writing is put to the test. Applying for the nomination alone enhanced proposal-writing skills and provided interview practice for the students. Receiving the nomination provided the chance for further review of application materials and an opportunity to receive input from a variety of faculty on the applications. While still awaiting the results of the national scholarship competition, the students have enhanced several professional skills as a result of the application process. The scholarship will cover up to $7500 for each student to continue his or her undergraduate studies over the course of junior
Four Months in Sevilla
Meredith Gazes, Journalism - Senior
The purpose of my Discovery Day presentation is to highlight the main reasons why students should study abroad in Sevilla as well as address common misconceptions that most students think prior to studying abroad. I will present on a poster and utilize power point slides, a survey I will conduct of students, as well as images from my time in Sevilla. I will give basic background of Sevilla in a historical as well as geographical sense, and then go further into analyzing a study abroad experience there.

University 101 Peer Leader: An Experience Like None Other
Emily Hardin, Marine Science - Junior
Mentor: Ms. Tricia Kennedy, University 101 Programs
This past semester, I served as a University 101 Peer Leader. I co-instructed a class of 19 freshmen at the university. The object of this course was to provide incoming students with the skills and resources that they need in order to be successful at the University of South Carolina, as well create a sense of community and belonging. We accomplished this goal through class discussions, interactive activities, guest presentations, and team building exercises. I decided to become a Peer Leader because I wanted to help our incoming students become accustomed to life at this university, and to help them be successful. What I did not expect was that through this experience I would also gain skills that would promote my success, not only within this university, but beyond. I improved my organizational skills, my communication skills, and my public speaking. I also learned how to think about problems and situations in a new way, and how to work with different personalities. The skills that I learned through being a Peer Leader will undoubtedly help me in my future career path. No job can be done solely based on knowledge; it incorporates knowledge, communication, problem-solving, and active engagement. I feel that with the skills I gained during this past semester, I can be successful in any job or situation. My experience as a Peer Leader far surpassed any of my expectations.

International Learning: From South America to Western and Eastern Europe
Doris Hernandez, Interdisciplinary Studies - Senior
As an International Studies and Economics student, I have had the opportunity to spend two semesters abroad. In spring of 2012, I traveled to Buenos Aires, Argentina, where I lived with an Argentine woman in her mid 60s. Through intriguing conversations with my host mother, my courses at Universidad Torcuato Di Tella and Universidad de Buenos Aires, and by engaging with locals I was able to make sense of the turmoil that had encroached the daily lives of Argentines due to high inflation and President Cristina Kirchner’s economic policies. The following spring I traveled to Paris, France through a USC direct exchange with Institute of Political Studies (Sciences Po). Studying at this institution, renowned for its international political science program, allowed me to interact with and learn how to work with students from all over the world. The summer of 2013, I served as a political intern at the U.S. Embassy in Kiev, Ukraine. My experience in Ukraine displayed firsthand the leverage of international economic policy in advancing Western democratic values. Having had the privilege to study and travel out of the country, has reaffirmed my decision to pursue a career with an international institution such as the Organization for Economic Co-operation Development (OECD), or with the U.S. Department of State.

Semester Experience Serving as a University 101 Peer Leader
Katherine Longueville, Psychology - Senior
This past semester I had the opportunity to serve as a University 101 Peer Leader. In my presentation I will share and discuss my experience of what it was like to be a Peer leader as well as valuable tactics that I learned can be used in the classroom to help facilitate learning. Having to be a mentor, leader, and teacher to a group of nineteen freshmen was an informative experience that gave me valuable insight about what it means to lead others. Through much trial and error over the course of my class I learned how to become an effective teacher. I learned which teaching tactics I found to work best while also figuring out what does work. Making sure information was relevant to my student’s lives is just one strategy I used in my classroom. Through Peer Leading I have been able to share my passion about the University of South Carolina to my students and I hope to further demonstrate that passion in my presentation.

Social Structures and the Importance of Government Support
Kelley Pringle, Sociology - Senior
I volunteered in Puriscal, Costa Rica and studied the social problems that the community faces on a regular basis. While the incredible environmental richness of this town is a national treasure, it also brings with it some interesting social and economic challenges, such as an increasing percentage of regional immigration. Costa Rica’s reputation for social stability, along with its free education and universal healthcare, has drawn the attention of international trading partners, as well as immigrants from other Central American countries seeking better lives. As the economy changes, so do traditional social structures, which abandon vulnerable populations and leave them little access to healthcare, education, or social services. While spending time with the community members I was able to learn more about the complexities and importance of government support. My final thoughts included the accessibility of governmental agencies to the community and my recommendations consisted of expanding the construction of government offices to the remote towns in the San Jose province. This trip had a significant impact on the way that I viewed different government and the accessibility of government offices to members of a country. The impact that this trip has on my academic understanding of social stability was invaluable. I was able to gain hands-on experience in a country where immigration rates have seriously altered the population and left natives with little access to government programs while their economic structure continues to change.
Carolina Leadership Initiative: Funding Fosters
Emma Robl, Biological Sciences - Senior
Mentor: Dr. Kirk Randazzo, Carolina Leadership Initiative
Funding Fosters is a year-long initiative that provides the means for off campus students to foster abused and neglected animals from PETS, Inc., a local no-kill shelter. Lack of funds frequently prevents undergraduates from fostering, and PETS, Inc. is currently suffering from debt and lack of space for the every-growing number of desperate animals that get dropped off daily. Funding Fosters will help to alleviate these issues by covering the cost of apartment pet fees and food for the duration of the 2013-2014 academic year. Ten students will have the opportunity to train and socialize an animal in order to increase their adoptability while gaining skills in leadership, communication, and teamwork. Thus far, the program has helped twelve dogs in their adoption while six more remain in foster care.

Professional growth and development through leadership in public relations
Bethany Schifflin, Public Relations - Senior
Mentor: Prof. Lisa Sisk, Journalism and Mass Communications
Public relations is a field that naturally fosters leadership. The very practice centers on establishing communications and relationships with an audience. Entering a field with the potential to influence has encouraged me to seek out opportunities prior to graduation to practice the skills required to become a leader. Beyond my classroom experiences, I have secured internships in the areas of non-profit, corporate and agency public relations, dedicating more than 600 hours. In 2013, I was elected president of the Public Relations Student Society of America (PRSSA), the ultimate outlet to exercise my leadership and practice my skills in the field. In today’s competitive world of public relations, leadership is essential in establishing oneself as a professional. In my experiences, I have found four ways to define leadership in public relations: being knowledgeable across all disciplines, being open to the ever changing nature of the field and having the confidence to use resources in order to adapt, being able to understand different perspectives and needs across industries and cultures, and having the passion for public relations to inspire others. This definition of leadership will continue to serve me as I advance in the field and grow as a professional.

Graduation, Leadership and Science
Makiera Simmons, Biological Sciences - Senior
My graduation with leadership distinction pathway was through Professional and Civic Engagement. My purpose or this presentation is to show examples of how participating in volunteer activities, leadership positions and professional development opportunities helped to enhance my collegiate experiences as a biological sciences major. My key insights were observation, theory, bonds, and concepts that I have studied in the classroom. My purpose for the Graduation with Leadership Distinction presentation is to show how these connections can be made between academic concepts and real world experiences. By serving as the vice president and later president of Alpha Kappa Alpha Sorority, Inc. I was able to share my experiences with planning events and overcoming obstacles. As a part of my civic engagement, I was able to share about my spring break trip to San Jose, Costa Rica in which I volunteered in a free medical clinic. I also was able to complete an internship in collaboration with Palmetto Health Hospital system as well as the University of South Carolina’s School of Medicine. I also shared corresponding examples of my research experiences through the South Carolina Alliance for Minority Participation and the Magellan Scholar Grant though the University’s Office of Undergraduate Research. Overall, these all contributed to my well rounded experience as a Carolinian. I was able to learn skills and ideas in the class room and then apply them in the Richland County and even Costa Rican communities.

University 101- Inside and Out
Katie Strickland, Spanish - Junior
I have been able to compile my University 101 experiences with other on-campus activities in order to produce a deeper understanding of myself and my contribution to the Gamecock family. In my time at Carolina, I have had many wonderful leadership experiences that have shaped who I am. Among these experiences, none of them impacted me as greatly as my University 101 experience. As a freshman, I took the U101 course which is designed to help facilitate the transition from high school to college, provide students with strategies and resources to lead to a successful college career, and to share the history and traditions of the University of South Carolina. My sophomore year, after deciding to pursue a degree in secondary education, I applied to serve as a University 101 Peer Leader. Thankfully, I was accepted and a couple of months later, I was offered a job as an Undergraduate Student Assistant in the University 101 office. The opportunity to be active in the U101 classroom as well as the office has provided me with an invaluable experience that has helped to shape my teaching philosophy and fuel my passion for working and interacting with people. Helping students realize their potential has been the most rewarding aspect of University 101, one of which I hope many others have the chance to experience.
# Index of Presenters

<table>
<thead>
<tr>
<th>Name</th>
<th>Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rebecca Qiu</td>
<td>120</td>
</tr>
<tr>
<td>Haley Rabic</td>
<td>21</td>
</tr>
<tr>
<td>Craig Raffenberg</td>
<td>96</td>
</tr>
<tr>
<td>Philip Riddle</td>
<td>175</td>
</tr>
<tr>
<td>Amie Rischbieter</td>
<td>71</td>
</tr>
<tr>
<td>Rachel Roberts</td>
<td>61</td>
</tr>
<tr>
<td>Angela Ross</td>
<td>102</td>
</tr>
<tr>
<td>Lindsay Rucker</td>
<td>77</td>
</tr>
<tr>
<td>Kelsey Rudeck</td>
<td>50</td>
</tr>
<tr>
<td>Mary Runey</td>
<td>102</td>
</tr>
<tr>
<td>Crystal Ryan</td>
<td>154</td>
</tr>
<tr>
<td>Stephanie Saunders</td>
<td>50</td>
</tr>
<tr>
<td>Chelsea Schafer</td>
<td>49</td>
</tr>
<tr>
<td>Charlotte Schallenberg</td>
<td>187</td>
</tr>
<tr>
<td>Colin Schauffer</td>
<td>34</td>
</tr>
<tr>
<td>Bethany Schifflin</td>
<td>214</td>
</tr>
<tr>
<td>Kintesia Scott</td>
<td>138</td>
</tr>
<tr>
<td>Hannah Selvey</td>
<td>65</td>
</tr>
<tr>
<td>Christine Severin</td>
<td>134</td>
</tr>
<tr>
<td>Zil Shah</td>
<td>209</td>
</tr>
<tr>
<td>Aditya Sharma</td>
<td>90</td>
</tr>
<tr>
<td>Victoria Sharpe</td>
<td>180</td>
</tr>
<tr>
<td>Aubrey Shealy</td>
<td>64</td>
</tr>
<tr>
<td>Karen Shebuski</td>
<td>188</td>
</tr>
<tr>
<td>Aaron Siegel</td>
<td>106</td>
</tr>
<tr>
<td>Josephina Silva-Lopes</td>
<td>175</td>
</tr>
<tr>
<td>Brian Simmons</td>
<td>162</td>
</tr>
<tr>
<td>Makierra Simmons</td>
<td>176, 214</td>
</tr>
<tr>
<td>Will Simons</td>
<td>162</td>
</tr>
<tr>
<td>Davontae Singleton</td>
<td>210</td>
</tr>
<tr>
<td>Joshua Slice</td>
<td>93</td>
</tr>
<tr>
<td>Alison Smetana</td>
<td>111</td>
</tr>
<tr>
<td>Andrew Smith</td>
<td>143</td>
</tr>
<tr>
<td>Dustin Smith</td>
<td>163</td>
</tr>
<tr>
<td>Haley Smith</td>
<td>41</td>
</tr>
<tr>
<td>Carli Smolen</td>
<td>126</td>
</tr>
<tr>
<td>Abigail Snyder</td>
<td>156</td>
</tr>
<tr>
<td>Samruddhi Somani</td>
<td>27, 28</td>
</tr>
<tr>
<td>Yena Song</td>
<td>139</td>
</tr>
<tr>
<td>Kyle Sprow</td>
<td>103</td>
</tr>
<tr>
<td>Johnathan Statopoulos</td>
<td>121</td>
</tr>
<tr>
<td>Charles Staub</td>
<td>166</td>
</tr>
<tr>
<td>Erin Steiner</td>
<td>131</td>
</tr>
<tr>
<td>Amanda Stevens</td>
<td>194</td>
</tr>
<tr>
<td>Travis Stewart</td>
<td>143, 195</td>
</tr>
<tr>
<td>Patrick Stiebinger</td>
<td>28</td>
</tr>
<tr>
<td>Emily Eliza Stil</td>
<td>71</td>
</tr>
<tr>
<td>Holland Stocker</td>
<td>37</td>
</tr>
<tr>
<td>Christopher Stout</td>
<td>82</td>
</tr>
<tr>
<td>Katie Strickland</td>
<td>215</td>
</tr>
<tr>
<td>Carly Strohbach</td>
<td>188</td>
</tr>
<tr>
<td>Ashley Strother</td>
<td>58</td>
</tr>
<tr>
<td>Joseph Studemeyer</td>
<td>72</td>
</tr>
<tr>
<td>Mackenzie Sunday</td>
<td>189</td>
</tr>
<tr>
<td>Charles Taffe</td>
<td>115</td>
</tr>
<tr>
<td>Doyle Tate</td>
<td>25</td>
</tr>
<tr>
<td>Shiva Tavassoli</td>
<td>144</td>
</tr>
<tr>
<td>Mackenzie Taylor</td>
<td>126</td>
</tr>
<tr>
<td>Brittany Taylor</td>
<td>159</td>
</tr>
<tr>
<td>Emily Theus</td>
<td>93</td>
</tr>
<tr>
<td>China Thomas</td>
<td>200</td>
</tr>
<tr>
<td>James Thomas</td>
<td>139</td>
</tr>
<tr>
<td>Jason Titus</td>
<td>97</td>
</tr>
<tr>
<td>Susan Todd</td>
<td>205</td>
</tr>
<tr>
<td>Kaitlyn Torres</td>
<td>82</td>
</tr>
<tr>
<td>Jessie Totten</td>
<td>205</td>
</tr>
<tr>
<td>Emily Townsend</td>
<td>63, 171</td>
</tr>
<tr>
<td>Alyssa Treney</td>
<td>122</td>
</tr>
<tr>
<td>Alexandra Turgeon</td>
<td>210</td>
</tr>
<tr>
<td>Mallory Turner</td>
<td>52</td>
</tr>
<tr>
<td>Daniel Utter</td>
<td>171</td>
</tr>
<tr>
<td>Emma Van Sant</td>
<td>140</td>
</tr>
<tr>
<td>Steven Vanderlip</td>
<td>13</td>
</tr>
<tr>
<td>Lindsay Waddington</td>
<td>144</td>
</tr>
<tr>
<td>Sarah Wadde</td>
<td>180</td>
</tr>
<tr>
<td>Kaitlyn Wainwright</td>
<td>135</td>
</tr>
<tr>
<td>Taylor Wapshott</td>
<td>116</td>
</tr>
<tr>
<td>Erin Watson</td>
<td>190</td>
</tr>
<tr>
<td>Thomas Weaver</td>
<td>167</td>
</tr>
<tr>
<td>Emily Webb</td>
<td>149</td>
</tr>
<tr>
<td>Emily Weeks</td>
<td>127</td>
</tr>
<tr>
<td>Bryan Wehrenberg</td>
<td>83</td>
</tr>
<tr>
<td>Greg Wehrman</td>
<td>206</td>
</tr>
<tr>
<td>Nick Weidner</td>
<td>91</td>
</tr>
<tr>
<td>Colleen Welch</td>
<td>22</td>
</tr>
<tr>
<td>John Wertz</td>
<td>88</td>
</tr>
<tr>
<td>Isabella West</td>
<td>210</td>
</tr>
<tr>
<td>Karl Wiant</td>
<td>97</td>
</tr>
<tr>
<td>Bradley Wiggins</td>
<td>140</td>
</tr>
<tr>
<td>Madeline Willett</td>
<td>51</td>
</tr>
<tr>
<td>Bethany Williams</td>
<td>98</td>
</tr>
<tr>
<td>Kelsey Williams</td>
<td>195</td>
</tr>
<tr>
<td>Sean Wills</td>
<td>44</td>
</tr>
<tr>
<td>Justin Wills</td>
<td>187</td>
</tr>
<tr>
<td>Katherine Witherspoon</td>
<td>155</td>
</tr>
<tr>
<td>Travis Witherspoon</td>
<td>162</td>
</tr>
<tr>
<td>Nichole Witten</td>
<td>156</td>
</tr>
<tr>
<td>Carrie Wolf</td>
<td>18</td>
</tr>
<tr>
<td>Nigel Wolfram</td>
<td>35</td>
</tr>
<tr>
<td>Daniel Wood</td>
<td>112</td>
</tr>
<tr>
<td>Elijah Wright</td>
<td>94</td>
</tr>
<tr>
<td>Andrea Wurzburger</td>
<td>14</td>
</tr>
<tr>
<td>Jiaqian Xu</td>
<td>106</td>
</tr>
<tr>
<td>Amy Yanicak</td>
<td>144</td>
</tr>
<tr>
<td>Elizabeth Yankovsky</td>
<td>98</td>
</tr>
<tr>
<td>Molly Yates</td>
<td>131</td>
</tr>
</tbody>
</table>