Discovery Day
A forum for student ingenuity
2013
Discovery Day 2013
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 Hospitality, Retail, & Sport Management
College of Pharmacy
Arnold School of Public Health
USC Connect

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*

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:15 am</td>
<td>Registration</td>
<td>Lobby (2nd floor)</td>
</tr>
<tr>
<td>9:00 am-11:00 am</td>
<td>Poster Presentations</td>
<td>Ballroom</td>
</tr>
<tr>
<td>9:00 am-11:30 am</td>
<td>Oral &amp; Creative Presentations</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Arts and Social Sciences</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Humanities</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Humanities and Social Sciences I</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Humanities and Social Sciences II</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Psychology and Public Health</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Science, Technology, Engineering, and Mathematics I</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Science, Technology, Engineering, and Mathematics II</td>
<td></td>
</tr>
<tr>
<td>11:30 am-12:15 pm</td>
<td>Research Video Contest</td>
<td>Theatre</td>
</tr>
<tr>
<td>12:30 pm-3:00 pm</td>
<td>Oral &amp; Creative Presentations</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Arts and Social Sciences</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Humanities</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Humanities and Social Sciences I</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Humanities and Social Sciences II</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Psychology and Public Health</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Science, Technology, Engineering, and Mathematics I</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Science, Technology, Engineering, and Mathematics II</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Science, Technology, Engineering, and Mathematics III</td>
<td></td>
</tr>
<tr>
<td>1:00 pm-3:00 pm</td>
<td>Poster Presentations</td>
<td>Ballroom</td>
</tr>
<tr>
<td>3:00 pm-3:30 pm</td>
<td>Reception</td>
<td>Ballroom</td>
</tr>
<tr>
<td>3:30 pm-4:30 pm</td>
<td>Awards Ceremony</td>
<td>Theatre</td>
</tr>
</tbody>
</table>

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

### — Oral and Creative Presentations —

**Morning and Afternoon Sessions**

**Morning Session**
- Arts and Social Sciences ........................................ page 12
- Humanities ............................................................... page 16
- Humanities and Social Sciences I ............................ page 19
- Humanities and Social Sciences II ............................ page 23
- Psychology and Public Health ................................. page 26
- Science, Technology, Engineering, and Mathematics I  page 30
- Science, Technology, Engineering, and Mathematics II page 33
- Social Sciences ......................................................... page 37

**Afternoon Session**
- Arts and Social Sciences ........................................ page 42
- Humanities and Social Sciences I ............................ page 45
- Humanities and Social Sciences II ............................ page 48
- Psychology and Public Health ................................. page 51
- Science, Technology, Engineering, and Mathematics I  page 54
- Science, Technology, Engineering, and Mathematics II page 57
- Science, Technology, Engineering, and Mathematics III page 59
- Social Sciences ......................................................... page 62

### — Poster Presentations —

**Morning and Afternoon Sessions**

**Morning Session**
- Arts and Humanities ........................................ page 66
- Biology and Biomedical Sciences I ........................ page 71
- Biology and Biomedical Sciences II ........................ page 76
- Environmental Sciences I ........................................ page 80
- Environmental Sciences II ....................................... page 84
- Pharmacy & Public Health I .................................... page 88
- Pharmacy & Public Health II ................................... page 92
- Psychology and Communication Sciences ............... page 97
- Psychology and Neuroscience I ............................ page 101
- Psychology and Neuroscience II ............................ page 105
- Science, Technology, Engineering, and Mathematics I page 109
- Science, Technology, Engineering, and Mathematics II page 113
- Social Sciences and Business ................................. page 117
- Social Sciences and Education ............................... page 121
- USC Connect Showcase ........................................ page 125

**Afternoon Session**
- Biology and Biomedical Sciences I ........................ page 129
- Biology and Biomedical Sciences II ........................ page 134
- Computing ............................................................. page 138
- Environmental Sciences I ........................................ page 142
- Environmental Sciences II ....................................... page 146
- Humanities and Social Sciences ............................. page 150
- Pharmacy and Public Health I ............................... page 154
- Pharmacy and Public Health II ............................. page 158
- Psychology and Neuroscience I ............................ page 162
- Psychology and Neuroscience II ............................ page 166
- Science, Technology, Engineering, and Mathematics I page 170
- Science, Technology, Engineering, and Mathematics II page 174
- Social Sciences and Business ................................. page 178
- Social Sciences and Education ............................... page 181
- USC Connect Showcase ........................................ page 186
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 Showcase during the morning and afternoon poster sessions. 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 (CS)
- Global Study (GS)
- Internships (I)
- Peer Leadership (PL)
- Research (R)

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.*
Oral and Creative Presentations

Morning Session
Investigation of Ambiguities in Contemporary Saxophone Repertoire

Evan Clark, Music Performance - Junior
Mentor: Dr. Clifford Leaman, Music

In June of 2012 I traveled to Bordeaux and Paris France to study contemporary saxophone compositions by Edison Denisov and Christian Lauba. These composers have come to influence the present day saxophone repertoire yet implement notational symbols and rhythmic patterns that are unclear and inconsistent. Interpretation of their works vary greatly among performers today. I was able to gain a clearer understanding of the Sonate for Alto Saxophone and Piano by Edison Denisov and Balafon from Neuf Études by Christian Lauba through the investigation of primary sources. I worked directly with saxophonist Jean Marie Londeix who remains the most important living source for Denisov’s Sonate since his death in 1997. Londeix collaborated directly with the composer during the writing of the piece and subsequently gave its premiere. Londeix’s pupils include Marie Bernadette Charrier and Richard Ducros both of whom I collaborated with. Living composer Christian Lauba worked with me as well on his work Balafon. Saxophonist Jean Yves Fourmeau although not a primary source offered his view and understanding of these pieces. I met with each of these musicians where I performed and discussed the ambiguities in question. They offered insight into correct interpretation and performance practice of these works. With a high quality sound recorder I recorded each session for further review and analysis. Additionally I can now apply and disseminate my findings among musicians interested in these works as well as on investigating primary sources to gain a clear understanding of a composer’s intent.

Documenting Theatre Through Photography

Jane Hearn, Theatre - Senior
Mentor: Prof. Robert Richmond, Theatre and Dance

As my South Carolina Honors College Senior Thesis I documented the production process of one of Theatre South Carolina’s main stage productions Boeing Boeing. I wanted to use photography a fairly permanent art form to explore the transience of the theatrical process. One of the great joys of theatre is its fleeting nature but I believe we could benefit from documenting the process as a human experience. The photographs include images of actors in rehearsal as well as students working in the various departments that are involved in a theatrical production: costumes set and lights. I attended weekly rehearsals and regularly visited the different departments to capture what happens behind the scenes. I ultimately plan to exhibit some of the best photographs at the opening night of the next main stage production in April as well as create a book of all the images that will serve as a full document of the process. I hope that this project will help to enhance audience experience of USC productions by highlighting the many weeks of passion and dedication that go into every aspect of the performance. I believe that audience members rarely realize the work that goes in to every detail that is presented to them onstage and I hope that this project will shed some light.

The book itself could be used in future by the theatre department as a tool of recruitment for prospective students.

All Around Us Yet Unseen: The Plight of the Working Poor

Kyndra Johnson, Social Work - Senior
Justice Kindell, Psychology - Senior
Lauren Knottek, Social Work - Senior
Isabel Neven, Social Work - Senior
Logan Steckel, Social Work - Senior
Caitlin Cribbin, Social Work - Junior
Edwina Mack, Social Work - Senior
Charkeishia Moore, Social Work - Senior
Layveleta Laann Walker, Social Work - Senior
Chloe Taylor, Social Work - Sophomore
Mentor: Dr. Susan Parlier, Social Work

In an undergraduate social work class students studied the lived-experiences of people particularly women who work in low wage jobs and still can not pay for their basic needs of housing food clothes and utilities. As part of a service-learning project the students decided to raise people’s awareness about the plight of the working poor. Their research project involved developing a brief survey and administering it to a convenience sample of USC students. The survey asked about attitudes towards the working poor in SC. As a medium to increase awareness the students produced a video as a documentary that reflected the findings from the surveys. The purpose of the video is to reflect on the attitudes of college students and to inform the public about welfare and the plight of the working poor. The study participants varied in employment age and college major: Fifty-eight participants completed the survey. The survey respondents were between the ages of 18 and 24 years. Forty-three were white and 15 were African American. Thirty-seven were female and 24 were male. Of the fifty-eight surveys 19 (32.7%) participants stated the minimum wage incorrectly and 39 (67.2%) thought the federal minimum wage should be raised.

Witnessing Poverty in Buenos Aires and Helping others to want to help

Amanda Maher, Psychology - Senior
Mentor: Dr. Susan Alexander, Honors College

I am often times frustrated by the lack of urgency that many people feel towards social problems poverty and a commitment to improve the quality of living for those less fortunate. Human beings have the incredible skill of compartmentalization which is alluded to in the saying out of sight out of mind. Many people who live comfortably and do not have to witness the poverty or suffering of others in their daily life are not provoked or compelled to commit their time to improving the standard of living for those living without sufficient resources simply because they do not see the urgency in their everyday life. My goal was to make a documentary that would not only highlight poverty and social problems but could serve as a tool to motivate viewers to volunteer their own time to people and places in need. I chose Argentina as my subject of focus for both my research and documentary because of the country’s economic meltdown in 2001. The Argentine economy had been struggling with the inflation of the peso so the government decided to ‘peg’ the U.S. dollar to the peso in order to...
Their intent was twofold: to develop a social outreach network in order to draw in volunteers and to initiate communications within the Coalition as an organization. Since the Coalition is a nonprofit their funds are limited; therefore the work of the students is both prudent and imperative. In order to fulfill their obligation the group participated in the Coalition’s “Point in Time Count” and created external and internal communications. Through working on the project the students intended to educate the statewide community on the prevalence of homelessness and the steps that can be taken to help decrease the predominance.

The Pipe Organ and Synthetic Timbres
David Mettens, Music Composition - Senior
Mentor: Dr. Reginald Bain, Music
The goal of my Magellan project was to write a piece for an electronic instrument played by one or more performers that featured new timbres that I had created using spectral models of sound. I used the resources of the computer music studio at USC to study and manipulate pipe-by-pipe recordings of the Casavant Freres organ at St. George’s Memorial Anglican Church in Oshawa Ontario Canada. I was able to isolate and manipulate the various frequency components that make up a single tone and contribute to our perception of timbre. I ultimately decided that a fixed electronic media would best showcase my work and eliminated the live performance element. The very minute differences between audible and inaudible sound components necessitated that I create a fixed version of the piece in the computer music lab. I primarily created the piece using Reason software and it’s Vocoder tool. The Vocoder allowed me to parse a sound into different groups of frequency components and increase or decrease the intensity of the sounds in that range. Using this tool I replaced certain characteristics of one type of sound with the characteristics of another sound. I created hybrid timbres and also seamless transitions between two completely different timbres. During my research I also found that the change in a sound over time also influences our perception of timbre. I manipulated the onset and decay of different sounds to create new or modified timbres.

Stability Statewide: Working A Creative Strategy for the South Carolina Coalition for the Homeless
Marissa Torgerson, Public Relations - Freshman
Maxine Todd, Undeclared - Freshman
Tyler French, Baccalaureus Artium et Scientiae - Senior
Danya Nayfeh, International Studies - Senior
Benjamin Haggard, Electrical Engineering - Senior
Mentor: Prof. Karen Mallia, Advertising and Public Relations
A group of students in the Communicating for a Cause class developed and carried out a creative strategy to benefit the South Carolina Coalition for the Homeless.
Unia
Jacqueline Ahearn, English - Senior
Mentor: Dr. Nina Levine, English Language and Literature
A year ago I began writing a creative project. The working title is Unia (but subject to change) and it is a dystopian novel set in a future of totalitarian control and feminism gone entirely wrong. The book centers on a young woman living in the supranation of Unia and her awakening to the brutal control her society subjects her to. The project began out of curiosity. As an English and Political Science double major I realized that women were rarely the protagonists of traditional political novels and only slightly more represented in dystopian fiction. In a comparative political theory class we discussed the fall of the nation-state and I began to contemplate the role of women in the new forms of governance (we also discussed feminism in the class bringing the two concepts together in my mind). I decided to write a book where I explored the ways women could affect the future of governing bodies. Writing the novel allowed me to bring together my love of literature with my love of politics. I researched historical methods of mass incarceration, discrimination and dictatorial control and I combined them into a work of fiction about all of those things but also about a coming of age in a society that doesn’t encourage rational thought. To me the project really opened up a wealth of knowledge and debate on feminism totalitarianism government technology even interpersonal relationships. I hope to see it further a dialogue about all of these things and more.

When The West Dies
Austin Blaze, English - Senior
Mentor: Dr. Debra Rae Cohen, English Language and Literature
I grew up in California but it wasn’t until I left that I began to fully understand it. Living outside the state I became aware of the fact that the rest of the country largely defines California according to hyper-romanticized notions of a western paradise. “When The West Dies” is a collection of stories that examines these cultural myths and expectations weighing them against realities of contemporary life in this admittedly unique state. Marking the limit of western expansion playing a pivotal role in the counterculture of the 1960s functioning as the hub of the film music and technology industries this state boasts a vibrant history economy and culture. But as a consequence of California’s dynamic and influential nature the state is often made out to be much more than it actually is; it is often romanticized often demonized but rarely humanized. Because of these fairy-tale accounts individual realities of its residents are obscured. In reality many of those born into the myth begin to question its legitimacy; many of those who immigrate as a result of these myths of utopian grandeur watch this façade crumble around them and wonder why they came in the first place. It is this sense of demystification that “When The West Dies” strives to convey: the historical cultural and psychological let-down that inevitably results from mythologically grand expectations. The characters in this collection vary in age origin and experience. But all of their stories in one way or another embody the death of romantically skewed conceptions of California.

Mirroring mourning: the politics that paint a family portrait
Elhaam Borhanian, English - Senior
Mentor: Dr. Nina Levine, English Language and Literature
In Shakespeare’s tragedy Hamlet Hamlet struggles with remembering his father as he contemplates murdering the uncle Claudius who killed him. As he reflects on heeding the requests of his father he murders Polonius father to Ophelia and Laertes. By the end of Hamlet the murder all father-like figures leads to the death of all in the family. For my senior thesis I examined how the political instability of Denmark magnifies the Danish family dynamic by analyzing the language in the play and drawing parallels between Hamlet Laertes and Ophelia on how they mourned their fathers. This examination included an analysis of the political stability of Denmark and the social expectations of the Danes that incurred the plot of Hamlet. Shakespeare provides a close look at how exactly fathers should be mourned in Hamlet by reflecting Hamlet’s way of grieving on Ophelia and Laertes with the visits of old king Hamlet’s spirits to serve as a reminder of children’s duties to their parents. I found that ambition and matters of the state redefine family roles after the old king’s passing which further propels the plot with the murder of all father figures in the play. The intent of this study was to offer an in-depth look at how the roles within the family shifted after the death of old king Hamlet and to provide insight on Hamlet’s behavior and reasoning for not immediately fulfilling the wishes of his father to kill Claudius.

“Literally” Speaking: Language Prescriptivism and Ideology
Kendra Calhoun, English - Senior
Mentor: Dr. Elaine Chun, English Language and Literature
Despite thorough research on the systematic nature of language change and young speakers as its innovators many older speakers (and some young) still criticize “youth speech” as meaningless or ignorant and equate language change with language degradation. In recent popular media writers bloggers and linguists who uphold prescriptively ‘correct’ forms of English have criticized how some English speakers especially youth use the word ‘literally’ not as the adverbial form of ‘literal’ but as an intensifier: My senior thesis thus explores both the usage of ‘literally’ and ideologies about its usage. First I am developing a detailed linguistic description of grammatical and pragmatic functions of ‘literally’ based on the analysis of language data collected from online social media newspapers and television. Second through the analysis of online surveys and personal interviews with youth and adult participants I will also explore how social factors like age and education influence language ideologies namely perceptions of innovative uses—and users—of ‘literally’ and beliefs about their own language use. By comparing how linguistic reality and perceptions differ I aim to better understand how language ideology and change influence each other. Thus far my research reveals that ‘literally’ is in the process of changing from a lexical to a grammatical function; it still primarily modifies verbs but has expanded to nominal adjectival prepositional and hyperbolic/metaphorical phrases. It also suggests that regardless of age most speakers who have not adopted ‘literally’ as an intensifier view this use as incorrect because it contradicts the word’s original meaning.
**Thinking vs. Feeling: Evaluating a feelings theory of emotions**  
*Laura Thorp*, English - Senior  
Mentor: Dr. Matthew Kisner, Philosophy  
This paper is a philosophical discussion and critical evaluation of Jesse Prinz’s theory of emotions found in his publication Gut Reactions: A Perceptual Theory of Emotions. In this work Prinz claims that a perceptual (or "feelings") theory of human emotions can accurately represent the true nature of emotions without having to appeal to a necessary cognitive element of the emotions. In this paper I focus on the most important part of Prinz’s argument: how a perceptual theory can account for the intentional aspect of emotions (that emotions tend to be directed toward one particular thing person event etc.). I begin with a thorough explanation of Prinz’s argument starting with his overall reasoning for supporting a perceptual theory (as opposed to a cognitive theory) then focusing on the details of his argument to account for the intentionality of emotions. In this argument Prinz introduces the concepts of formal and particular objects elicitation files and core relational themes all of which I define and explicate before moving into my objections to his argument. My response to Prinz’s argument is that it cannot accurately represent the true nature of emotions without having a necessary cognitive element. This is demonstrated through several examples and accompanying arguments that deal with irrational fears the necessity of judgments in relation to emotions and the continuous nature (as opposed to episodic) nature of emotions. My conclusion is that Prinz’s theory is not an accurate theory of emotions and I favor a cognitive theory instead.

**Historic Site Preservation: Pon Pon Chapel of Ease**  
*Sabrina W. Driggers*, History - Sophomore; USC Salkehatchie  
Mentor: Dr. Sarah Miller, History; USC Salkehatchie  
Pon Pon Chapel of Ease located in Jacksonboro South Carolina served as the center of religious social and political life for the people of St. Bartholomew’s Parish through the 1700s. After several fires the church was not rebuilt after 1832 leaving behind what you see today. I have researched the uses and history of this beautiful site consulted with experts in historic preservation and engineers and developed a preservation/restoration plan. The chapel is owned by the Colleton County Historical and Preservation Society (CCHAPS). This community organization depends upon the work of volunteers and my research with the help of the Magellan Scholar grant and my mentor Dr. Sarah E. Miller will allow them to continue their preservation efforts at the site. Pon Pon is an endangered historic site. As a Colleton County native the chapel is a backdrop of my childhood. I am thrilled to be a part of preserving a site that is so near to my own heart and to an entire community. Not only is Pon Pon Chapel of Ease a place where families worshiped but this is a place where a community was shaped. I will use my experience from this project to further my goal of graduating from the University of South Carolina with a Master's Degree in History and go on to help preserve other important historical and cultural sites throughout South Carolina.

**TED: Spreading Ideas and Sparking Conversation Around the World**  
*Nicole Hornung*, Public Relations - Sophomore  
Mentor: Dr. Armen Shaomian, Sport and Entertainment Management  
I have always been one to dream big. This past summer I decided I wanted to do something huge. I wanted to produce my very own TEDx event. Now I wasn’t exactly sure what this entailed so being the Capricorn I am I did a lot of research before diving in. I spoke with the TEDx organizer at Ohio State University who encouraged me to reach out to my local TEDx event. I met with the TEDx organizers for Columbia and they offered me the opportunity to shadow them. Eagerly I jumped at the opportunity. I was immediately cleared from any doubts and knew that this is what I wanted to bring to my university. Students and faculty are doing amazing things and I need to bring it to light! I started a student organization called TEDx Students and began planning for the very first ever TEDxUofSouthCarolina. As I mentioned earlier I like to do things big. I learned that in order to host an event with more than 100 people one is required to attend one of the main TED conferences. It was on my bucket list but I had never looked into it until now. From February 25th-March 1st I attended TEDActive in Palm Springs California. The week was filled with inspiring conversations with incredible people. I share what I learned that week with my university and hope to have the opportunity to promote conversations and ideas on my campus.
Discovery Day 2013 Oral Presentations

Repression of Equality: The Struggle for Civil Rights through the 1960s and 70s

*Jacob Kaufman-Waldron*, Political Science - Junior

Mentor: Dr. Patricia Sullivan, History

The events of the early 1960s shine bright in the historical spotlight. My research fills in where the spotlight dims charting the continued struggle for equality through the late 1960s and early 70s. We researched the layered origins of racial inequality to analyze the challenge to the political social and economic order from the margins: political societal and racial. From material provided by Dr. Sullivan and my own research I produced literature summaries to gain a greater understanding of the context and formation of the struggle. Through research interviews discussions with Dr. Sullivan and historical analysis I have established linking themes and conclusions in my work. Principally my research revealed the numerous and gaping disparities between alleged equality and the harsh reality for many African Americans past and present. Specifically I found systemic government neglect and fear of minorities and urban poor. This trend is emblematic of the larger experience of blacks as a dominated people within the American empire illustrating the global nature of the struggle for civil rights and the threat posed to the status quo by adequately addressing inequality. The active role of American federal state and local governments in deepening racial and economic inequality undermines the principles of democracy and the public mythology of the Civil Rights Movement. Understanding the continuing inequities in American society and their historical origins is essential in defeating destructive prejudices and racial bias equalizing opportunity and treatment under the law for minorities and progressing and maintaining a democratic state.

The Hidden Faith: Catholic Persecution in Early South Carolina

*Matthew Kuhn*, Religious Studies - Senior

Mentor: Dr. Katja Vehlow, Religious Studies

Catholics in Colonial South Carolina were fundamentally excluded from the free practice of religion in the colonial era. Despite a few vestiges from sparse Spanish colonization the English colony of Charleston quickly took measures to exclude Catholics from practicing their faith. While this has led some authors to dismiss the Catholic presence in early South Carolina as non-existent in reality there are numerous examples of a repressed Catholic minority. These examples include Protestant efforts to stamp out Native Americans taught by Spanish missionaries strong anti Catholic sentiment inhumane treatment of French Acadian refugees the Stono slave rebellion and religiously intolerant Legislation. In response Roman Catholics were forced to convert seek violent means of opposition flee or revert to an uncharacteristic form of crypto-practice in the face of persecution. While Catholicism would later become legalized one can learn much about earlier attitudes towards this faith by examining strong anti Catholic sentiment in the ensuing decades. The focus of this project is to document the numerous forms of hostility towards Roman Catholicism in early South Carolina and examine a besieged faith in a region often identified with religious tolerance during the Colonial era.

Archiving the History of Saint George

*Christine Rice*, Liberal Studies - Senior; USC Salkehatchie

Mentor: Dr. Sarah Miller, History; USC Salkehatchie

During the Fall Semester 2012 I interned at Town Hall for the Mayor of Saint George South Carolina. My internship entailed transcribing digitally photographing and building a database to archive the original Town Council minutes dating back to the 1870s. Along with creating a searchable database I built a web page to allow the public to view and research these documents. Once the public learned about what I was doing for the town private citizens began approaching me with questions about their personal documents and what I could do with them. Learning that many people in the town have their family documents some dating back to the 1700s inspired me to take my internship to the next level. With the help of the Upper Dorchester County Historical Society a county archives and history center is in the planning stages. This center will digitally archive historical documents pertaining to Dorchester County. The center will provide research assistance and material pertaining to genealogical research as well as other historical research pertaining to Dorchester County.

Future Trial Lawyers of America: Empowering Youth Through Advocacy Education

*Devon Thurman*, Baccalaureus Artium et Scientiae - Junior

Mentors: Dr. Kirk Randazzo, Carolina Leadership Initiative

Ms. Sarah Johnston, Carolina Leadership Initiative

During my year serving as president of the Mock Trial Team at the University of South Carolina I have witnessed firsthand the powerful impact of mock trial on my peers. Expanding on my desire to promote advocacy skills among undergraduate students I developed a high school outreach program Future Trial Lawyers of America. My goal with this project was twofold. First I envisioned a system of student coaching and workshops which would give high school students access to college mock trial and careers in the legal profession. Second I intended for this mentoring program to teach students the communication skills that will serve them in every aspect of their personal and professional lives. With the invaluable guidance and support of the Carolina Leadership Initiative (CLI) I had the opportunity to achieve both of these objectives and more by hosting Alicia Hawley of Mock Trial Academy – a trial advocacy conference where practicing trial lawyers from around the country instruct high school students in the art of trial advocacy – for a weekend workshop. With the help of CLI I was able to provide ten high school students with full scholarships to participate in a weekend of informative seminars and interactive exercises at the USC School of Law. Moreover the invaluable relationships I formed with the students provided me with an opportunity to recruit for the university and foster interest in legal studies.
**Misconceptions of Islamic Dress**  
*Kelsey Waninger*, Anthropology - Senior  
Mentor: Dr. Reenea Harrison, Retailing

The myths about the hijab have generated a modern day form of Orientalism a type of othering that objectifies women who cover and deems them as oppressed exotic and possibly threatening. The biggest misconception surrounding the hijab is that it is forced onto Muslim women or rather they have no choice in the matter of wearing it or not. The truth is that Muslim women have a variety of reasons for wearing the hijab and these decision stem from each woman’s personal background. In my research I walk through the history of the hijab and its impact on Muslim women from different backgrounds and societies. Using interviews with real women and scholarly articles I discuss the evolution of the hijab in Eastern and Western society and the influence media and post-9/11 Western society has had on non-Muslim views of covering. I also discuss the role of Muslim feminists in the issue of covering and women’s rights. Women’s veiling is important to the question of women’s rights because it represents freedom of choice. In particular the ability to choose whether to veil or not in accordance with the traditional Muslim feminist’s interpretation of Islamic faith and morality is at the very heart of what Islam represents to Muslim feminists: the basic Koranic ethic of the sovereign right of both women and men as human beings who have the freedom of self-determination.

**Using demographics and estimates of homeless subgroups to identify possible educational interventions**  
*Travis Byrd*, History - Junior  
Mentor: Dr. Bret Kloos, Psychology

AIMS: To investigate differences between different demographic groups (income age gender etc.) in regards to their estimation of the prevalence of homelessness. METHODS: Survey data were collected in 2010 and 2011 through phone surveys of over 400 Richland County residents. Among other questions this survey asked respondents to estimate what percentage of the homeless population belonged to various groups (single adult males single adult female families children domestic Violence Survivors Mentally Ill Alcoholics drug addicts and HIV positive) and asked for demographic information about the respondents. Planned comparisons of demographic group estimates were assessed for accuracy with a Point-in-Time count of homeless individuals in the Richland County area conducted at the same time as the phone survey. The demographics of the survey respondents were similar to demographic data released of Richland County with the exception that women were significantly over-represented. RESULTS: Estimates of prevalence among various sub-groups of the homeless population varied greatly with respondent's demographics. African-Americans women lower income individuals and individuals who had been homeless previously reported higher percentages for most homeless sub-populations than their counterparts. Compared to Pit Count statistics these individuals’ perceptions were also further from the real estimates than their counterparts. There was one notable exception to this trend; respondents who had not been homeless overestimated the percentage of homeless people who had drug or alcohol problems. Conclusion: Knowing where these differences in perception lie can allow us more accurately disseminate information in the form of educational intervention to different group and then target solutions.

**Developing Math Lybrinth**  
*Kenyunah Bryant*, Psychology - Senior  
Mentor: Dr. Kendra Ogletree-Cusaac, Psychology

In the move from elementary to middle school mathematics students experience major changes in school structure general level of difficulty in material work expectations and instructional materials and approaches. Research shows that students in general suffer a significant decline in academic achievement in the transition form elementary to middle or to junior high school. The purpose of this study is to develop a program to provide curriculum support build math maintenance skills and improve students math skills. This program is developed using the common core standards for grades 5 -12 as well as individual states standards teacher survey data student survey data and student outcomes.
The Denial of Education for Some Yugoslavian Women
Merita Gillard, International Studies - Senior
Mentor: Dr. Todd Shaw, Political Science
With a high illiteracy number among the women who were born and raised during Josip Broz Tito’s regime it is important to examine how much the regime’s political reforms and the customary laws were the contributing factors. With my research I hope to provide evidence that both the regime’s political reforms as well as the ethnic and regional customary laws were contributing factors to large illiteracy numbers amongst the female population. In order to better understand the contemporary educational and professional problems amongst female citizens of the newborn countries of former Yugoslavia one needs to understand the root of the illiteracy problem. By understanding the contributing factors one can make conclusions how far the female population has come in the past decades and how much further the reforms need to change in order to eliminate illiteracy amongst the female population. Furthermore providing evidence that supports the hypothesis that Tito’s Socialist Federalist regime knowingly implemented policies (or failed to do so) in certain regions in order to prevent the education of their female citizens one can examine how such a systemic move has paralyzed the newborn countries by leaving them with only a half-way-educated population. I plan to do my research by examining the history of all different ethnic groups that were living in the Balkans before the time of Yugoslavia and Tito’s regime. For this research I will be relying heavily on the University of South Carolina’s library and media center. Furthermore I plan to conduct interviews with educators during Tito’s time and a few women who benefited from his educational policies as well as a few women who were left behind and remain illiterate to this day. In future I hope to be able to expand my research to archives in former Yugoslavian regions and gather more supporting evidence.

Exploring Literacy Through Photography Methodology as a Tool for Culturally Relevant Pedagogy
Tiffany Livingston, Early Childhood Education - Senior
Mentor: Dr. Elizabeth Powers-Costello, Instruction and Teacher Education
The underlying rationale for engaging in this study stems from the work of scholars who focus on understanding and meeting the needs of diverse children and families. Ladson-Billings (1995) asserts “We need to know much more about the practice of successful teachers of African American and other students who have been poorly served by our schools” (1995 p. 163). Moll González and Amanti (2005) found that the educational process can be greatly enhanced when teachers learn about their students’ everyday lived contexts and the strengths that they bring to school. Moll et al. (2005) assert existing classroom practices underestimate and constrain what Latino and other children are able to display intellectually (p. 5). In addition this study employs methodologies developed by Ewald (2001) and field tested by Ewald Hyde & Lord (2012). This work is also connected to the research of USC professors Drs. Powers-Costello and Lopez-Roberton who engage in research and service with diverse teachers children and families. The primary research question is “Can Literacy Through Photography (LTP) methodology be used to help teachers understand and meet the needs of culturally diverse learners?” Data was collected using both quantitative and qualitative methodologies. Findings indicate that participating children: a) enjoyed this process b) increased in motivation for reading writing public speaking and academic subjects c) increased in academic skill level and d) enhanced family involvement. Implications include suggestions for effective practices for educators working with diverse learners in a variety of educational contexts.

After-School Programs Raise High School Graduation Rates in Children with low SES
Hannah Milks, Psychology - Senior
Mentor: Dr. Kendra Ogletree-Cusaac, Psychology
In general an after-school program can be thought of as childcare for families that cannot retrieve their child at the time of his/her dismissal from school. This literature review aims to understand how the early attendance of at-risk low Socioeconomic Status (SES) youth in after-school programs influences their academic experiences. This study also aims to understand how the implementation of three dimensions such as healthy eating habits adequate exercise habits and classroom participation could possibly raise their high school graduation rates. A review of past and current models of after-school programs and their successes and failures was conducted in order to understand the issues with measuring programs’ success. Reviews of longitudinal studies showing why high school graduation rates are low for children raised in low SES provide insights to the risk factors they face. The protective factors and implications of the three dimensions mentioned above will also be summarized and compared to Maslow’s Hierarchy of Needs. After-school programs are found to have the ability to effect young children’s lifetime academic careers and by implementing at the least the three dimensions previously mentioned high school graduation rates of low SES children can be improved significantly.

Confronting the Gender Binary in SEC Housing: What Options do Transgender Students Have?
Greg Pieczynski, Geography - Senior
Mentor: Dr. Wally Peters, Mechanical Engineering
What style residence halls are available for transgender students at SEC schools? Do universities have policies regarding transgender students? This study takes the perspective of a transgender student searching for on-campus housing in the Southeastern Conference (SEC) and addresses the questions above. Current SEC housing policies will be examined along with examples of transgender housing policies available at other colleges to propose new policies. The goal is to bring attention to SEC housing policies and ignite a spark for progressive change to occur.
Holistic Gaming
David Corso, Biological Sciences - Senior
Mentors: Dr. Scott Decker, Psychology
Prof. Simon Tarr, Film and Media Studies
Video games are versatile in their form and function and multiple studies have
demonstrated the effects of video games on various levels. Whether they're
training doctors or offsetting Alzheimer's disease video games can exercise both
mental and physical features train specific skills for a number of jobs educate
players about events and phenomenon in our world research and understand
natural human processes and they can be designed for a number of other
purposes. Holistic gaming is the thorough analysis of physical physiological
psychological and cognitive effects produced by video game play and from this
research it designs games that facilitate education research healthcare and human
development. Holistic gaming works to understand the relationship between
humans and video games and by understanding video game elements and
processes game engineers can design unique experiences that facilitate a plethora
of problems phenomena and people.

Visual Search in Volumetric Medical Images: An Eye Tracking Study of
Radiologists’ Behavior
Leila Heidari, Baccalaureus Artium et Scientiae - Junior
Mentors: Dr. Trafton Drew, Brigham and Women’s Hospital Harvard Medical School
Dr. Jeremy Wolfe, Brigham and Women’s Hospital Harvard Medical School
I completed an internship through the Summer Research Program at the NSF
Center for Excellence in Learning in Education Science and Technology in Boston.
I worked within the Brigham and Women’s Hospital Visual Attention Lab which
is under the direction of principal investigator Dr. Jeremy Wolfe. My main tasks
for this internship centered on analyzing a data set from an experiment directed by
Dr. Trafton Drew my mentor and a postdoctoral fellow. In this experiment 24
radiologists searched through five chest computed tomography scans for lung	nodules while their eye movements were tracked. Visual search in volumetric
medical images is a difficult yet very important task since screening reduces lung
cancer mortality. In this study the average hit rate was 55.28% and we would
like to try to find ways to increase this detection rate. The research questions for
this project include the following. What characteristics of lung nodules influence
rate of detection? What types of errors are made? What makes a good searcher/
radiologist? To address these questions we examined relationships between the
variables through statistical analyses and software such as Microsoft Excel and
Matlab. We found that nodule size affects detection and that eye movements
can provide us with important information how radiologists search for nodules.
Additionally radiologists’ past experiences and backgrounds affects performance.
Furthermore radiologists use different search techniques and specifically the
“drilling” search technique was more effective than “scanning.” Future directions
for this research include applying this work to improve screenings and education
in training radiologists.

An Investigation of Social Networks and Public Health Efforts in Ghana’s
Central Region
Megan Brown, Public Health - Senior
Mentor: Dr. Melinda Forthofer, Epidemiology and Biostatistics
In the summer of 2012 I traveled to Cape Coast Ghana where I was an intern for
a local public health NGO called Health Protection and Environmental Sanitation
(HEPENS). While there I conducted observational research on the relationship
between social networks and health outcomes in the rural villages of Ghana’s
Central region. As a part of my efforts I helped HEPENS to develop strategies
to improve their outreach efforts by maximizing existing social resources. By
participating in weekly women’s health groups I became familiar with their
shared community experiences such as mealtimes market days soccer matches
church and factory work. I also worked with a local school to develop pilot
and evaluate a nutrition education program for children that included not only
the children but also teachers and parents. Social networks are a vital tool for
spreading messages in areas where technological capacity is limited. Lessons
learned from this experience about the influence of social networks on health
programming and health in general can improve health promotion efforts both
abroad and here at home. This experience was funded in part with a Journeyman
Exploration Scholar Grant from the South Carolina Honors College.
Examining Barriers to Hospice Care Utilization in Columbia South Carolina

Emily Kirton, Biological Sciences - Senior
Mentor: Dr. Mindi Spencer, Health Promotion Education and Behavior

Hospice care is an important yet underutilized resource in the United States. In 2005 only a third of deaths in the United States occurred in a hospice setting and patients had an average stay of less than a month. More than 33% of all hospice stays lasted less than a week even though Medicare covers hospice stays for up to six months. South Carolina has about 60 hospice organizations that serve less than 16000 individuals. The purpose of this project is to explore the barriers that patients' families and physicians face when making decisions about utilizing hospice care. To examine these barriers five qualitative interviews will be conducted in Columbia SC: three with the families of hospice patients one with a hospice nurse and one with a hospice physician. Participants will be recruited by advertising the study and through personal contacts at Palmetto Health Hospice. Interviews will be recorded and transcribed and the data will be analyzed using NVivo software to determine the specific issues that families and health care practitioners face when choosing or referring hospice. The final project will include a brochure of information concerning hospice care and the lessons learned through these interviews which would serve as a resource for prospective hospice patients and their families. Hospice is important as it not only helps the patients but also the patients' families by reducing their burdens of caregiving. Breaking down the barriers that exist between providers and patients is vital for the maximum utilization of hospice care.

Phonological Processing Executive Function and Reading Comprehension in Adolescents with Fragile X Syndrome and Autism

Elizabeth Messman, Psychology - Senior
Mentor: Dr. Jane Roberts, Psychology

The relationship between phonological processing executive functioning and literacy development has been well documented in typically developing children but no studies have examined this potential relationship in adolescents and young adults with fragile X syndrome (FXS) or autism spectrum disorders (ASD). Given that many individuals with fragile X syndrome and autism experience significant receptive and expressive language delays understanding the developmental trajectory of phonological processing skills and executive functioning in this population may help facilitate the design of educational programs or interventions to promote literacy development. Though literacy may not be attainable for everyone affected by FXS or autism a basic reading and writing ability may help some individuals become more independent. Having a complete understanding of phonological processing and executive functioning in adolescents and adults with autism and FXS can allow educators and therapists to customize treatments to the relative strengths within each. The current study will specifically examine literacy assessment findings concerning phonological memory executive functioning and reading comprehension in adolescents and young adults with fragile X syndrome and idiopathic autism. After completion of participant assessments preliminary data will be analyzed using descriptive statistics and T-tests. We hypothesize that scores on tests of phonological memory and executive functioning will be positively related to reading comprehension ability in both males with FXS and autism.

HIV/AIDS Controversies within the African American Demographic

Talashia Tucker, Public Health - Senior
Mentor: Dr. Cheryl Armstead, Psychology

HIV/AIDS is an epidemic that affects millions of people worldwide. Currently the face of HIV/AIDS is changing. Health care professionals of every variety are dedicated to researching this health crisis that is still on the rise. No longer can this disease be stereotyped as primarily affecting homosexuals and drug users. My research proposal aims to investigate the underlying causes of the rise of the infection in heterosexual African American women and to promote education on this information to prevent new infections. My research presentation aims to raise awareness about the risks and causes of HIV/AIDS contracted by African American women through heterosexual contact. My methods for understanding the trend of high rates among heterosexual women were to use peer reviewed articles through various disciplines in correlation with CDC statistic from 2007-2010. Using the Department of Health and Environmental Control (DHEC) was essential to showing examples from South Carolina as a platform a highly populated demographic of African Americans. The results from my literary review were to gain background knowledge about HIV/AIDS in the United States among African American's especially among African American women. The highlight was that for AA women HIV/AIDS were distortional compared to other ethnic backgrounds.
Liquid Argon Detector Simulation

Tyler Alion, Physics - Junior
Mentor: Dr. Sanjib Mishra, Physics and Astronomy

For decades particle physics has been significantly interested in the transition of the muon neutrino to the electron neutrino as well as the antiparticle transition. The Liquid Argon (LAr) detector offers the highest precision in measuring electron neutrino appearance and is thus a critical technology to develop. Fermilab is continuously developing and optimizing the geometric configuration or design of this detector in order to reach the optimized balance between physics ability engineering reality cost and time. Throughout this development it is critical to have a framework of code to support generation simulation and display of particle interactions in LAr so that options can berationally considered before construction and once constructed it is critical for the framework to also support reconstruction so that the data gives meaning. I have written and will continue to develop the code describing two LAr detector geometries and the code interface between these and neutrino interaction simulation.

National Fellowships: Barry Goldwater and Udall Scholarship Competitions

Drew DeLorenzo, Marine Science - Junior
Mentor: Ms. Jennifer Bess, Fellowships & Scholar Programs

As a double major in Marine Science and Biochemistry & Molecular Biology with aspirations to go into conservation genetics the Barry Goldwater and Udall Scholarship competitions were both 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 they fit my dual-focused career plan. I worked with USC’s Office of Fellowships and Scholar Program for the past two years to complete my application materials and through successes and disappointments the application process has been critical to furthering my academic leadership and service roles. The essays that I crafted 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. Additionally I received other benefits such as practice with live interviews and being able to become better connected with faculty members across campus. I encourage everyone to apply for a national fellowship and whatever the end result of your application process you will come out an improved individual.

The Goldwater Application Experience

Cole Franks, Mathematics - Senior
Daniel Grier, Mathematics - Senior
Mentor: Ms. Jennifer Bess, Fellowships & Scholar Programs

The presenters will discuss the process of applying for the Goldwater Scholarship a national fellowship which funds research for a semester of the applicant’s junior or senior year. The presenters will briefly mention their own mathematical research projects (Games on partially ordered sets and Graph labelings with distance conditions) for which they earned the scholarship and afterwards address the benefits of the award and advice for applying for the scholarship. In addition we will describe the process of applying for the Goldwater while abroad.

Protective role of adiponectin in chronic inflammation-induced colon cancer

Julian Greer, Exercise Science - Junior
Mentor: Dr. Raja Fayad, Exercise Science

BACKGROUND: Adiponectin (APN) is a hormone secreted by adipocytes that has been found to play a protective role in chronic inflammation induced colon cancer (CICC). Goblet cells produce mucus that acts as a protective barrier from toxins and gut bacteria inside the colon. Adiponectin administration has been shown to decrease intestinal tumors in APNKO/APCMIN/+ mice.

PURPOSE: The primary objective of this study is to determine the effect of APN administration on intestinal tumors. METHODS: We bred APN knockout (KO) x APCMIN/+ mice who develop intestinal tumors spontaneously. Adiponectin was administered to both APCMIN/+ and APNKO/APCMIN/+ and were divided into 6 treatment groups: 1) C57B1/6 wild type (WT) (n=10); 2) APNKO (n=10); 3) APCMIN/+ (n=10); 4) APNKO/APCMIN/+ (n=10); 5) APCMIN/+ + APN (n=6); 6) APNKO x APCMIN/++APN (n=6). Mice were observed for diarrhea, stool hemoccult, and weight loss during the length of the study and were sacrificed on day 112. Tissues were collected from the tumor and non-tumor area of the colon and small intestine for genomic and proteomic studies including Western Blot, ELISA, immunohistochemistry, cytokine profiling, goblet cell staining and immunofluorescence.

RESULTS: We found that mice that were administered adiponectin had a reduced clinical manifestation of symptoms and histopathological scoring associated with CICC. Reduction in the tumor number was also observed with adiponectin administration. CONCLUSION: APN acts as a tumor suppressor by maintaining the goblet cell viability that maintains mucus production.

Fe isotope fractionation during reduction of Fe(III) to Fe(II)

Catherine Hodierne, Marine Science - Senior
Mentor: Dr. Seth John, Earth and Ocean Sciences

Iron is an important nutrient for life in the ocean where low Fe concentrations often limit the growth of marine phytoplankton. If order for these phytoplankton to acquire Fe from seawater Fe(III) is most often reduced to Fe(II) prior to uptake either at the cell surface or in the water column. Here the natural reduction of Fe(III) to Fe(II) in the oceans is achieved in the lab with three very different sorts of experiments. Each of these three Fe reduction pathways has a very different isotope effect leading to Fe(II) with dramatically different isotopic ratios. First exposing Fe(III) bound to an organic ligand to direct sunlight leads to photochemical reduction of Fe(III) to Fe(II) by ligand-to-metal charge transfer. Positive delta56Fe values as high as +1.53 ‰ result from this method of reduction indicating a positive isotope effect. Secondly iron can be chemically reduced from Fe(III) to Fe(II) using a reducing agent such as hydroxylamine hydrochloride. Chemical reduction of Fe(III)-EDTA with hydroxylamine hydrochloride has an isotope effect of delta56Fe = -3.61 ‰. Thirdly iron can be reduced from Fe(III) to Fe(II) electrochemically by applying a voltage to a rotating disk electrode. By controlling the effects of electric potential (voltage) and mass transport
(diffusion) both a negative and a positive isotope effect can be simulated. Iron reduction is an important process that impacts the bioavailability of iron for phytoplankton. Understanding how iron isotopes fractionate when Fe(III) is reduced will lead to a greater understanding of iron cycling in the ocean.

Evidence of Genetic Variation and Adaptive Phenotypic Plasticity in Two California Invasive Annual Grasses

Shana Woodward, Biology - Senior; USC Aiken
Mentor: Dr. Andrew Dyer, Biology/Geology; USC Aiken
California is a climatically diverse state and has a large number of invasive species dominating its ecosystems. Many annual grass species have invaded in the past 200 years and have become locally adapted since then. These invasive species are often phenotypically plastic and can therefore establish in a wide range of environmental conditions. We asked whether there is a trade-off between local adaptation and phenotypic plasticity in two species of invasive annual grasses. That is as the species became more adapted to local conditions is their ability to respond plasticly reduced. We collected six populations of two species of widely-distributed annual grasses from southern to northern California across a ten-fold rainfall gradient. Preliminary data showed genetic differences in flowering time of one of the species. Therefore we initiated a multi-factor experiment on both species to test for genetic differences between the populations and to test the range of plastic response within the populations. We looked for among and between population responses to both soil quality and resource availability. Plants were grown under greenhouse conditions with 15 replicates of all treatments. We predict that populations at the extremes of the rainfall gradient will be more genetically distinct and less phenotypically plastic than populations collected from the more climatically moderate areas.

Investigating the function of AIL7 in Arabidopsis flower development

Caitlin Boling, Biological Sciences - Senior
Mentor: Dr. Beth Krizek, Biological Sciences
Flower development is a complex process dependent on the activities of meristems. The inflorescence meristem gives rise to floral meristems around its periphery. These floral meristems initiate floral organ primordia at precise positions in four concentric whorls that subsequently differentiate into sepals, petals, stamens, or carpels. Members of the AINTEGUMENTA-LIKE/PLETHORA (AIL/PLT) family play important roles in several aspects of flower development. While mutations in AIL7 have no phenotypic consequence, ant ail7 double mutant flowers exhibit floral organ fusion, reduced petal initiation, and defects in carpel fusion. This phenotype is more severe than that found in another mutants. AIL7 expression is normally restricted to the central floral stem cells in young flowers. We have investigated the phenotypic effects of misexpressing AIL7 in a broader domain using an ethanol inducible system LFY:AlcR/AlcA:gAIL7-3'. Ethanol treatment activates AlcR, which then binds to the AlcA promoter and stimulates transcription of AIL7. After ethanol treatment of LFY:AlcR/AlcA:gAIL7-3', we find alterations in flower development that include the production of mosaic floral organs, reductions in the number of petals, and double flowers. SEM analyses show that the pattern of outer whorl floral organ initiation is altered. Real time RT-PCR has confirmed that AIL7 mRNA levels are ~120 times higher in ethanol treated as compared to mock treated inflorescences eight hours after treatment. These results indicate that increased expression of AIL7 throughout young flower primordia affects both organ initiation and organ identity.

The Future of Coastal Upwelling in Marine Ecosystems

Riley Brady, Marine Science - Freshman
Mentor: Dr. Ryan Rykaczewski, Biological Sciences
Coastal upwelling zones are areas where surface winds force deep cold nutrient-rich waters toward the surface replacing warm nutrient-depleted waters. These areas commonly found along the eastern boundaries of subtropical ocean basins are critical to the productivity of large commercial fish populations. These zones cover less than 1% of the total ocean area but are responsible for more than 25% of the global fish catch. The response of the upwelling process to future global warming remains uncertain. A decades-old hypothesis proposed by Andrew Bakun in 1990 suggests that the intensity of alongshore wind stress on the ocean surface will increase with future warming thus enhancing coastal upwelling. The effects of intensified upwelling on the marine ecosystem are uncertain but potentially significant. Alongshore winds result from a strong atmospheric pressure gradient between the continental land mass and the adjacent ocean. Bakun suggests that this gradient will intensify with anthropogenic warming due to enhanced heating of the land mass relative to the ocean. Using output from twenty-five coupled atmosphere-ocean general circulation models produced in association with the Intergovernmental Panel on Climate Change I examined each
Genome-Wide Association Mapping on Grain Pigmentation in Sorghum

Zach Brenton, Political Science - Senior
Mentor: Dr. Stephen Kresovich, Biological Sciences

Sorghum, an African grain crop that serves as a staple food for 500 million people, shows promise as a valuable source of dietary antioxidants. Coloration of the pericarp, the outer seed coat of the grain, is caused by the presence of pigments. This pigmentation has been shown to have an association with the creation of flavonoids which have antioxidant and disease resistance properties. I have characterized the diversity in the pigmentation of 404 sorghum accessions from a global sorghum diversity panel by categorizing the grain into four color groups: white, brown, red, and yellow. There were 176 accessions with white, 149 with brown, 49 with red, and 30 with yellow. I will use Genome-Wide Association Mapping to find genes affecting natural variation in grain pigmentation by comparing 265,000 publically-released Single Nucleotide Polymorphisms from each of these 404 lines. Two genes controlling yellow pigmentation (Y1) and another controlling red (R1) have been mapped on Chromosome 1 and Chromosome 3, respectively. The genomic mapping techniques will be validated by mapping the two known genes while looking for novel genes that affect pigmentation. These results add to the understanding of the genetics that influence grain quality in an important cereal crop and can be used to make improvements in cultivar development.

Eco-Rep Programming: Higher Education Peer-to-Peer Outreach for Sustainable Initiatives

Rebecca Marasco, Sociology - Senior
Mentor: Dr. Christine Witkowski, Sociology

The Magellan Scholar grant provided research and exploration of three established Eco-Rep programs in the United States. I applied the sociological imagination to better understand how social political and cultural factors influence the success of student learning and organizational structures. Research is specially on Eco-Rep programs regarding environmental values as a peer-to-peer outreach program. At the University of Vermont, Tufts University, and the University of South Carolina, I conducted multiple interviews with individuals involved with Eco-Rep programs. I gained insight from the minds of Project Coordinators, Directors, and Eco-Rep themselves. I found common objectives in each program that formed a foreseeable pattern to developing a successful program. Tufts University represented success in designing a thoughtful program. Their mission established the root of their campus culture to complement motivators that work into spreading the word of environmental stewardship and sustainability. Research at the University of Vermont was extremely motivating and revealed successful methods to establish a plan of action for their program. The University of Vermont demonstrated inspiring perseverance for leadership from the students and how they work with Eco-Rep staff to communicate and collaborate initiatives cross campus. The University of South Carolina presented crucial findings for evaluation of a program a third component of a successful program. The University of South Carolina EcoReps and staff recently went through a transitive period that reflected on the mission of the program if they were meeting that mission and what successes could be built from that foundation. I collected invaluable qualitative data from each program. As an EcoRep for the University of South Carolina, I plan to share and apply these findings to continue the growing success of the USC EcoReps and the Carolina community culture to recognize the importance of addressing environmental and social justice issues the great Columbia area faces today.

Southeastern EcoReps Conference 2013

Rebecca Marasco, Sociology - Senior
Mentors: Dr. Kirk Randazzo, Carolina Leadership Initiative, Ms. Sarah Johnston, Carolina Leadership Initiative

The Southeastern EcoReps Conference (SEC) was composed of eighty-five students and faculty advisers from 16 schools in the region. The SEC planning committee invited special out-of-state guests such as Christina Erickson from Champlain College in Vermont and local heroes such as Larry Cook, the University’s recycling coordinator. The weekend conferences’ momentum was maintained within the West Quad’s Learning Center, an excellent space to share ideas and promote the building’s LEED certification. Planned by EcoReps, the conference facilitated workshops and open space community development. Student and adviser attendees from their respected programs were able to discuss ideas as well as strengths and challenges with peers from other sustainability organizations. The conference provided an excellent opportunity for all attendees to grow in their leadership skills by effectively communicating environmental sustainability initiatives on campus.

Ernest F. Hollings Scholarship

Erin McParland, Marine Science - Senior
Tristan Lawson, Marine Science - Senior

Mentors: Ms. Jennifer Bess, Fellows & Scholar Programs

As marine science majors, the presenters both decided to pursue the National Oceanic Atmospheric Administration’s Ernest F. Hollings Scholarship. The Hollings Scholarship is a national fellowship that promotes increased training and experience in marine and atmospheric sciences. Successful applicants are awarded academic assistance for both junior and senior year and also a 10-week full-time internship at any NOAA facility in the country and U.S. territories. Both fellows attended a week-long event in Washington D.C. where they learned about the different disciplines of NOAA including ocean sciences, marine biology, meteorology, and storm tracking. The following summer, both fellows completed an internship at the Coral Reef and Ecosystem Division in Honolulu, Hawaii. The other fellow completed an internship at Northwest Fisheries Science Center in Seattle. At the end of the summer, both fellows returned to Washington D.C. to present their summer research to scientists and policy makers located in the D.C. headquarters. Along with the official benefits of the scholarship, both fellows have had the opportunity to meet Dr. Jane Lubchenco, the former Director of NOAA and also Senator Ernest F. Hollings, for whom the scholarship was named. Through the process of completing the application and working with the
Office of Fellowship and Scholarships at USC both applicants began developing their future plans as sophomores. Such early planning in their undergraduate career certainly had an impact on their preparation for post-graduate plans. One fellow will be starting their PhD in marine science at the University of Southern California in Los Angeles and the other fellow will be starting medical school at MUSC in Charleston next Fall. We hope our presentation at Discovery Day will: 1. Promote greater knowledge of the Hollings Scholarship as well as other national fellowships with which the OFSP can help students and 2. Discuss the process of self-discovery that is associated with applying for a national fellowship that will help with future plans.

**Social Sciences**

**Women in Executive Office: A Case Study of Liberia and Ghana**

Janet Abena Serwah Amparbeng, International Studies - Senior  
Mentor: Dr. Lee Walker, Political Science  
I researched how women are elected into office and why there has never been a female president in Ghana. Having always been interested in women leaders and how women come into power I started my research with one country that I know most very well: Ghana. I am a Ghanaian American I was born in the US but both of my parents are Ghanaian. I compared the case of Ghana and Liberia to explore how women come into executive office. Liberia has the first female president in Africa Ellen Shirleaf-Johnson while Ghana was the first African country to gain independence from colonial rule. To conduct this research I examined the electoral results for the 2008 Ghana parliamentary elections and the 2005 Liberian House election. I found that Liberia has a significantly larger number of effective numbers of political parties at the electoral district level. One the other hand Ghana is closer to a two party system where the elected officials whom are most successful male or female are connected to one of the major parties. Based on these results Ghana’s two party system has a better chance of electing a female president over Liberia’s multiparty system because in Ghana the party endorsement of a candidate betters guarantees their win in party safe districts. For Ghana to elect a female president there are two options: either the two main parties endorse a female candidate or a female leader must build a stronger third party and become elected through popularity.

**Managing Olympic Stadium Accessibility: A case study of the 2012 London Olympic Games**

Michael Finnegan, Sport and Entertainment Management - Senior  
Mentor: Dr. John Grady, Sport and Entertainment Management  
As a Magellan Scholar I was granted the opportunity to travel to London for the first week of the 2012 Olympic Games. While there I was conducting research on the managerial aspects of stadium accessibility for spectators with disabilities. Results indicate that stadium managers should focus on identifying barriers to accessibility at different stages of the event experience and find innovative solutions to overcome these barriers. Additionally a mega sport event like the Olympics creates new opportunities to implement best practices in stadium accessibility on a global scale. Using a customized approach to accessibility like was used at London 2012 created additional opportunities to use these innovative solutions. This customized approach was implemented using a holistic journey sequence; that is by focusing on accessibility as the trip from when one steps out of the door until one is safely home from the event. This includes everything such as transportation parking entering the stadium in-stadia issues exiting the stadium and returning home. The customized approach looks at each individual’s needs on a personal level rather than a “one size fits all” model. By using this approach managers are able to provide a better experience for disabled spectators while also providing a safer environment for everyone involved.
including having better evacuation and contingency plans prepared. Because of the enormous scale of the event and the vast number of venues and resources available the London 2012 model was able to provide a good example of how successful an event can be when it comes to managing stadium accessibility for spectators with disabilities.

**New Perspectives on the Global IFRS Implementation Process**

**Tomas Greizinger**, Business Administration - Senior; USC Aiken  
Mentor: Dr. David Harrison, Accounting; USC Aiken  
The purpose of this research was to provide an analysis of potential hardships associated with the ongoing International Financial Reporting Standards (IFRS) and United States’ Generally Accepted Accounting Principles (U.S. GAAP) convergence. The convergence of the U.S. GAAP and the IFRS has been a widely discussed topic in the accounting industry worldwide in the past few years. IFRS are gradually becoming the worldwide standard used by publicly traded companies for preparation of their financial statements. After being developed by the International Accounting Standards Board (IASB) these standards gained greater importance and legitimacy in January 1, 2005 after which all European Union (EU) listed companies were required to follow the IFRS while preparing their consolidated financial statements. Even though all 25 EU member countries converted successfully not all of the countries welcomed the changes and there were many questions that needed to be answered about the benefits of this process. There are some people who argue that countries that do not follow IFRS yet (such as the United States) have a huge influence on important decisions made by IASB while there is not enough attention paid to the European perspective. My goal was to use the experience of IFRS implementation by the European Union (EU) especially my home country Slovakia. The U.S. has not yet set the date by which companies will be required to use IFRS if at all. However by looking at how the EU managed this process a few years ago the U.S. can learn many valuable lessons.

**Firm’s Internationalization and the Adoption of CSR Practices**

**Andrew Kovtun**, International Business - Sophomore  
Mentors: Dr. Tatiana Kostova, International Business  
Dr. Valentina Marano, International Business  
Under the guidance of Dr. Tatiana Kostova and her PhD student Valentina Marano I have explored the question of whether global exposure reflected in foreign trade and investment strategies of Multinational Corporations (MNCs) affect their decision to engage in Corporate Social Responsibility (CSR) practices (i.e. a firm’s social environmental and community-oriented initiatives). This project is part of a multi-year research program on the diffusion of CSR practices among MNCs carried out by my faculty mentors at the Moore School of Business. While much of the theoretical development is being done by my faculty advisors I have contributed by conducting a major portion of the empirical work and literature review. After an initial period of training I developed a large database of the global imports and exports of a large sample of U.S. corporations. Then I have reviewed the existing literature exploring the relationship between firm’s internationalization and adoption of CSR practices. I am currently finalizing a journal article on this topic to be soon submitted to the Journal for the Global Business and Community (JGBC) a peer-reviewed online journal for CUIBE the Consortium for Undergraduate International Business Education. The initial results of this work show the importance of a firm’s ties to business partners located in countries with more stringent CSR requirements. Overall this project has helped me develop new knowledge of data manipulation techniques in Excel and gain experience with building and maintaining a database. It has also helped me improve my understanding of cutting edge international business research.

**Chinese Investments in Sub-Saharan Africa: An Exploration of New Business Models**

**Debra Miller**, International Business - Senior  
Mentor: Dr. Lite Nartey, International Business  
This project will serve to enhance the current understanding of business models by exploring the competitive strategy employed by Chinese investors in sub-Saharan Africa. We seek to do this by: (1) Identifying examples of Chinese investments in sub-Saharan Africa and exploring the details of the ownership structure, bids investments and social activities of these projects (2) Using this information to determine strategic factors that comprise a competitive advantage of the Chinese investors over Western (i.e. American Canadian Brazilian and European) investors. We plan to develop and disseminate a deeper understanding of the often enigmatic or misunderstood African environment. This will help us to form conjectures about how the investors have gained this advantage and how they operate in the dynamic and uncertain African business environment. This work is particularly important for two reasons: (1) By understanding the Chinese investment models we can begin to draw hypotheses on how firms can modify existing business models to operate in a continuously globalizing environment (2) The outcomes of these Chinese investment models may provide insight into other means to address the perennial lack of development on the African continent. Therefore this project has significance for business scholars, business practitioners and development agencies and specialists and policy makers. We hope to inspire in others an enthusiasm for evaluating Western business practices to more effectively compete on the African continent.

**Examining the Role of Location in Youth Perception of Turkey’s European Union Accession Process**

**Hannah Miller**, Economics - Senior  
Mentor: Dr. Amy Mills, Geography  
This research is the culmination of three years of immersion in literature and conversation. Through interviews in Istanbul and Vienna with Turkish students I am able to argue that Turkey’s entrance into the European Union cannot take place without each side addressing the limitations of their own social political cultural and legal identities. I assess how each view the EU and Turkey as entities as well as what obstacles must be confronted before a full scale integration process can be considered complete. The process of changing identities is accomplished through both top-down reforms and bottom-up trends. I examine the roles of the EU and Turkish government under AKP in this process as well as localized perceptions of the effectiveness of such initiatives. Additionally the
nature of Turkish identity formation must be considered within and without an AKP monopoly on the process. While Turkish youth are overwhelmingly apathetic regarding the accession process they have a largely untapped role to play in defining new European and Turkish identities. My subjects grappled with the implications of a Turkish accession on their own identities as well as perceived threats to overall Turkishness and Europeanness. By accounting for location in differences in perceptions of obstacles to integration I piece together a youth vision of Turkey’s future.
A Portrait of South Carolina
Jeremy Aaron, Visual Communications - Senior
Lee Walker, Visual Communications - Senior
Mentor: Prof. Denise McGill, Visual Communications
Jeremy Aaron and Lee Walker both visual communications students in the School of Journalism and Mass Communications were awarded Magellan grant to conduct a environmental portrait project around the state of South Carolina in fall 2012. They created portraits to show the richness of the state’s scenery and the diversity of its people. The final product of the project was a exhibition held through January and February 2013 at the the Tapp’s Art Center in Columbia.

My Journey to Perugia Italy: 4 Months of Refuge
Jessica Blosch, Criminology and Criminal Justice - Junior
Mentor: Mrs. Rachel Hardison, Study Abroad
I would like to share my study abroad experience along with the Italian sociology case-study I participated in. I chose to study abroad in the small town of Perugia, Italy which is located on top of a mountain, halfway between Rome and Florence. I studied at The Umbra Institute for four months during the 2011 Fall semester, and took 16 credit hours including Honors Italian, International Business and Marketing, and a sociology class called Contemporary Italy. This Contemporary Italy class gave me the opportunity to interact with a local Italian family the entire semester. We were welcomed to them with open arms, and conducted a case study of interviews to explore exactly how they live and function in the Italian society. Our family (the Tacconis’) were unique because of their multicultural status. The father was Italian, while the mother was from Brazil, so it was extra special to see how a woman from outside the Italian culture adapted to Italian life, and choose how to take care of her family. We then presented our experience and findings in a public ceremony. I met many very wonderful people; some of which have stayed as life-long connections. My time in Perugia was a long-time dream come true with many adventures, and every obstacle I was forced to overcome to get there was worth it.

Tunes for Troopers: Enhancing the Lives of Veterans Through Music
Ashley Cook, Music Performance - Junior
Mentor: Dr. Rebecca Nagel, Music
Beginning in September of 2012 my chamber music group Garnet Winds has been performing for the residents of the Dorn VA Hospital bringing music to their community. My goal is to expand the outreach that we started last April at the hospital with a visiting chamber group from New York called the Declassified. My aim is to bring an improved quality of life to the residents of the hospital through music. Each month since September my group has performed thirty-minute chamber music programs for the residents of the hospital in its Community Living Center. The Center is the transformed nursing home wing of the VA. We perform for the residents in one of their “neighborhoods”. We perform many different styles of music ranging from classical standards to lighter pops to an armed forces medley. In our concert last month we even introduced a guest artist who plays saxophone. The impact of live music on the residents is immediate. Those who meander into the room before our performance with solemn looks on their faces leave with a smile and a better attitude. Each month we have new residents as well as our “regulars” which proves to my group that we are making a difference. This project funded through the Leadership Scholars Program has shown me the benefits and rewards of musical outreach to the surrounding community and engaging with people from all walks of life.

Kagitaba: The Keys to Opportunity
Olivia Keyes, Film and Media Studies - Senior
Mentor: Ms. Jennifer Bess, Fellowships & Scholar Programs
During my second stay in Japan my host mother endowed me with a “proper” Japanese surname Kagitaba which means “a bunch of keys.” Not until further reflection after returning to the States did I realize that this name was also the perfect way to describe my experiences abroad. My two summer programs to Japan were funded through two different National Fellowships the NSEP Boren Award and the Critical Language Scholarship Program which made my travels possible. Both the Study Abroad Office and The Office of Fellowships and Scholar Programs provided ample guidance and encouragement during the application process and this presentation explains the opportunities available in these offices. I will be presenting my travels in a documentary entitled “Kagitaba: The keys to opportunity” which will provide commentary about the application process and personal reflections about my study abroad during the summers of 2010 and 2011.

Homelessness Advocacy
Ari Lindenbaum, Music - Junior
Mentor: Dr. Bret Kloos, Psychology
This project is based on advocacy to build community understanding in order to address homelessness and question the stereotypes and stigma associated with homelessness. Over the past year and a half I have worked with the local organization Homeless Helping the Homeless to help create an advocacy project for people to understand the lives of people who are homeless. Homeless Helping the Homeless is a grassroots effort made up of people who are homeless and advocates who have weekly meetings in order to figure out ways to educate people about homelessness. The advocacy project has been to speak with audiences in order to engage them in dialogues about homelessness. Our main audiences have been college students in community service projects and social justice events as well as church groups. At the presentations I share recorded interviews that I have done with people who are homeless and members from Homeless Helping the Homeless share their life experiences. Hopefully these presentations will help people think about what being homeless means and allow them to listen with an open mind.
A Poet a Potter and a Slave: What David Drake Can Teach Us  
*Brianna Arnone*, English - Senior; USC Aiken  
*Jennifer Gilmore*, English - Junior; USC Aiken  
Mentor: Dr. Tom Mack, English; USC Aiken

The main goal of this project is to view the life works and legacy of David Drake from a variety of academic lenses including language arts history art and geology and develop an integrated interdisciplinary curriculum unit for use by middle school teachers. The completed curriculum unit will be stored in a “travelling trunk” available for check out by educators in all the counties currently served by the Center for Excellence in Middle-level Interdisciplinary Strategies for Teaching (CE-MIST). The final result of the project will serve a practical purpose by giving back to the community. It has been proven that students’ success rate is greater when relating the subject material to something they are familiar with; therefore we chose to research a famous local figure that lived and worked in the same area where the students live. We first researched as much information as possible about the target subject ordering copies of the applicable texts for the trunk. Using this literature we compiled a middle school curriculum including lesson plans and activities. Finally we assembled all the parts of the interdisciplinary curriculum unit or “travelling trunk” and present the finished product to the Ruth Patrick Science Education Center for dissemination. While we had the privilege of learning more about David Drake the end result will also allow middle school classes across 11 counties in South Carolina and Georgia to engage in the same enlightening experience.

The Etymology of English Pronoun  
*Axton Crolley*, Linguistics - Senior  
Mentor: Dr. Scott Gwara, English Language and Literature

For my senior thesis I researched the origin of the English pronoun she with the help of a Magellan Research Grant. The Old English (OE) feminine pronoun heo is strikingly different from our modern she and accordingly the development of she-like forms ca. 1200 has long puzzled historians of the English language. Previous scholarship acted on the assumption that the earliest attestation was found in The Peterborough Chronicle from the late 12th century. Using resources from the Thomas Cooper Library however I found an overlooked attestation a century earlier in the little-discussed Will of Siflæd. The new chronology proposed by my research changes our understanding of she and seriously affects previous explanations of its origin. I propose that she developed around the year 1000 and comes from the OE feminine demonstrative pronoun seo. I have been accepted to present my research at the Duke/Chapel Hill 13th Annual North Carolina Colloquium in Medieval and Early Modern Studies.

Settling Saluda County: Who is my neighbor?  
*Mary Short*, Fine Arts - Senior; USC Aiken  
Mentors: Prof. Alexia Helsley, History; USC Aiken  
Prof. Keith Pierce, Visual and Performing Arts; USC Aiken

The purpose of this video project is to show the link between the world views of the early settlers of Saluda County and their contributions to the state’s history. The incomers’ cultural and Judeo-Christian religious views were at odds not only with the native Indian population but at times with themselves. Using visual material from archival as well as contemporary sources I photographed and shot video for a dramatic narrative. This video also showcases the countryside and historical buildings of Saluda County as well as the people from Saluda who have played important roles in state and national history.
Burns and Britain's First African Voter
Joseph DuRant, English - Sophomore
Mentor: Dr. Patrick Scott, University Libraries
Recently the Scottish poet Robert Burns's response to slavery has been discussed chiefly with reference to his own letters and poems. Burns is widely recognized as progressive in his political views but he had little or no firsthand knowledge of Africans; he planned to work in the West Indies as a plantation overseer until the success of his first book allowed him to stay in Scotland. This year with an SCHC Exploration grant I have been working with Dr. Patrick Scott on an edition of letters written to Burns and noticed in a letter from Agnes M'Lehose ("Clarinda") her suggestion that Burns should read the letters of Ignatius Sancho (1729-1780) an African brought to England as a slave who gained his freedom became known as a playwright and musician and was the first African to vote in British parliamentary elections. His letters modeled on those of Laurence Sterne attracted much contemporary admiration and USC's Irvin Department has a first edition (1782). Through a discussion of Sancho and comparison of Sancho Burns and Clarinda as letter-writers this paper raises new questions about Burns's attitudes to slavery and the role of sensibility in his explicit writings on the topic.

Transmission of Young-Earth Creationist Ideas in Modern America
Kitra Monnier, Psychology - Junior
Mentor: Dr. Katja Vehlow, Religious Studies
In modern America there are many differing ideas about the creation of the universe. Debates rage between the different factions of belief. Each side attempts to promote their beliefs to others and to self-promote and support their ideas within their own community as well. One major creation theory in America is young-Earth creationism. This theory which is supported by the groups belief in the inerrancy of the bible believes that the world is around 6000 years old and that the six “days” of creation as accounted in Genesis are literal 24 hour days. There seems to be three major forms in which young-Earth creationists transmit their ideas and theories of creation to the public. These three forms are The Creation Museum in public school science textbooks featuring creationism in addition or instead of evolutionary theories and lastly in religious homeschooling where parents are more readily able to choose the type of curriculum taught. These three methods of transmitting information vary significantly and have differing degrees of effectiveness. This essay will attempt to document the different strategies that young-Earth creationists use and their effects on both their community of believers and to those who hold different views on creation.

'I-M-sew-sorry': The Modern History of Trappist Sign Language
Gerald Gardner, International Business - Senior
Mentor: Dr. James Cutsinger, Religious Studies
For over a thousand years certain orders of Christian monks have relied on specially designed sign languages to communicate needed information with one another. Monastic sign languages as they are called are examples of systems of communication more technically known as professional sign lexicons limited groups of hand gestures used in association with certain occupations. As sawmill and factory workers required signs amidst the noise monks required them amidst the silence. Trappist Sign Language the only MSL to ever arrive on North American shores had seen a drastic decline in use this century. Traveling to the three oldest Trappist monasteries in the country I interviewed monks young and old to identify the factors that contributed to the near-disappearance of the language and to search for any remaining instances of use. In doing so I determined that each community had a unique relationship to the language centered on three important variables: tolerance of language creativity variation in the age of speakers and speaker attitudes toward the language. Though the reforms implemented after the Second Vatican Council are frequently cited as the cause of the language's decline these aspects of the language environment had a significant impact on its trajectory in each community. This study informs us about what truly affects the continued survival of a language and thus holds importance for the numerous endangered minority languages around the world. Furthermore it documents for posterity the rise and fall of a unique language practice that would otherwise fade into obscurity.
Humanities & Social Sciences II

How Well Do Science Freshmen Understand Source Citation?  
**Brittany Cheeks**, Education Secondary Level - Senior; USC Aiken  
Mentor: Dr. Michelle Vieyra, Biology/Geology; USC Aiken  

Students entering college may resort to acts of plagiarism for a variety of reasons including an overall lack of understanding and the pressure to complete work in their courses. Studies show that science engineering and technology courses may have the highest occurrence of plagiarism compared to other courses because of the heavy workload perceptions of laboratory reports as somehow different from other types of writing and difficulty with reading and writing in a new genre. First semester and senior science majors at USC Columbia and USC Aiken were asked to complete an online survey within the first two weeks of classes as part of their introductory biology lab. This survey consisted of demographic scaled and opened questions and a skill assessment to gauge the student’s understanding of proper citation and paraphrasing techniques. Over 1000 students completed the survey. Preliminary data suggests that freshmen do not have a full grasp of how to properly cite sources nor do they recognize instances of plagiarism or academic dishonesty as well as science students do in their senior year. It is likely that many of the instances of plagiarism observed in the freshman classroom are due to lack of understanding rather than intentional dishonesty. Time must be taken to properly instruct these students in source citation skills.

Dancing Beyond Borders: China Dance & Women  
**Sheimaliz Glover**, International Business - Junior  
Mentors: Dr. David Hudgens, International Business  
Dr. Jennifer Reynolds, Anthropology  

Dance has been seen by artists performers and researchers alike as a universal means for the reflection of a society of history and ideals. Anthropologists investigate dance and other forms of human movement because they view this “phenomenon as a fruitful vehicle for understanding a society in which dance is produced performed and contested” (Dance in the Field Buckland 2001 p 491). By observing the art of dance and by practicing it I am able to understand not only its individual significance to the dancer and union of dancers but also its impact on the community in which it is presented. During my study abroad in Hong Kong China I engaged in ethnographic research as I joined a collegiate Chinese Dance team The Chinese University Dance Society for the purpose of understanding the means through which Chinese youth dance and how it reveals the changing roles of women in society. This dance team consisted of about 50 students of which 60 percent were female as we performed both traditional and modern forms of dance to include: dragon dance Hip Hop and contemporary. Through this experience I conducted several interviews in Mandarin Chinese and English with my teammates and local female dance artists recorded video attended dance forums and conferences as well as participated in several dance productions and competitions. In doing so I not only gained insight into the universality of dance in its expression of individuality simultaneously in community but also culturally particular premises and synergies of guanxi (relationships) that drive the interactions between dancers themselves and the audience and ultimately men and women in Chinese society.

The Reality of Reality TV and The Hunger Games  
**Rachael Lackner**, Broadcast Journalism - Freshman  
Mentor: Mrs. Brandi Ballard, English Language and Literature  

My research essay explores the connections between reality television and Suzanne Collins’ The Hunger Games. I go into depth on how reality stars and the characters in The Hunger Games handle being under the limelight how concerned they are with appearance the similarities between the productions and how real our reality shows and the show depicted in the novel are.

LGBT Focused Alternative Winter Break to Washington D.C.  
**Doyle Tate**, Psychology - Sophomore  
Mentor: Mrs. Althea Counts, TRIO  

This year USC launched its first ever Alternative Winter Break trip in Washington D.C. focused not only on service but on advocacy for the LGBT community. For the service component we volunteered at Food & Friends which is the only organization in the Washington DC area providing specialized nutritious meals groceries nutrition counseling and friendship to people living with HIV/AIDS cancer and other life-challenging illnesses. For our advocacy component of the trip we traveled to many LGBT and human rights non-profit organizations such as the Human Rights Campaign Amnesty International Parents Families and Friends of Lesbians and Gays National Center for Transgender Equality Gay and Lesbian Victory Fund etc. and we interviewed them on what we could do as students to incorporate advocacy into our lives at USC and beyond. I applied and got accepted to go on this trip because I have the need to make the world a better place and I want to bring the lessons and experiences from this trip back to USC and Columbia to make a real difference both on campus and society as a whole. I discovered that anyone can make a difference as long as they are willing to put forth the work and have a passion burning within them and that is the impact of this trip on myself and the USC community because this “burning passion” tends to spread like wildfire igniting the flames of inspiration within people’s hearts.

Illiteracy in Appalachia: Ignorance and Poverty or Cultural Phenomenon?  
**Laura Thorp**, English - Senior  
Mentor: Dr. Leon Jackson, English Language and Literature  

The issue of illiteracy is a rising problem in the US and it is hard to ignore. The most extreme rates of illiteracy are found in the Southeast region of the US and I sought to investigate the reason for this. I have always been concerned with the issue of illiteracy and ways to eradicate it. I even hope to one day start a non-profit organization that combats illiteracy by providing after-school opportunities for students to produce creative pieces of writing allowing them to take control of their own literacy practices. I wanted to research why exactly illiteracy rates were so elevated in the Southeastern US to discover if it was just a regional phenomenon or if it was something built into the literacy practices that led to a devaluation of literacy as a whole. I focused on the Appalachian Mountain region because the rate of illiteracy (particularly adult illiteracy) is exceptionally...
high in this region soaring above the national average and even the average rate for the rest of the Southeastern region. I explored some of the most often used explanations for illiteracy in this region: the fact that the area is extremely isolated the area is poor the inhabitants are simply ignorant etc. I found that these explanations are not accurate to explain the high rate of illiteracy in Appalachia; source of the problem is actually a cultural phenomenon that results from a gendered division of labor and a high valuation of pure subsistence.

I Waddle to Class: Continuing Your Education Through Unplanned Pregnancy
Bonite Thrower, English - Senior
Mentor: Dr. Mary Waters, Women's and Gender Studies
Unplanned pregnancy in college is a critical shift to sudden decisions for a young woman. Because pregnancy is normally a firm situation either one is pregnant or not pregnant women are forced to make a decision of aborting putting the child up for adoption or keeping the child. If the young woman decided to keep her child she may be swayed to drop out of her university or take a year off which lowers her chances of returning to get her degree. For my senior thesis I researched the resources that the University of South Carolina offers in this special case for a student. Educational institutions benefit society to aid this special case. If this woman is able to graduate then her intelligence is not wasted and her chances of getting a job to be independent and to raise her child increases significantly. The second part of this research will be to examine three other universities in the Southeast to compare how they handle such a critical circumstance. Finally the data from the research of the University of South Carolina and other nearby universities will aid in the expansion and further use of this research such as: parenting programs parenting seminars group sessions scholarships and et cetera. This research will demonstrate the services offered to cater to women's need who wish to graduate and how education institutions are responding to this matter to make sure this is achieved.

Project O.N.E.
Candra Chaissson, Public Health - Senior
Mentors: Dr. Kirk Randazzo, Carolina Leadership Initiative  
Ms. Sarah Johnston, Carolina Leadership Initiative
Project O.N.E will provide community sports tournaments for children and adults. Sport tournaments will promote fitness and health awareness within the Gonzales Gardens community. The project will sponsor children’s sports camps in the summer as well which will teach the fundamentals of sports and proper technique. I want to influence and inspire others to accomplish feats and challenges that they believe may not have been possible through Project O.N.E’s tournaments. Project O.N.E will benefit the community I am a part of through teamwork effective communication and individual growth which will lead others ethically and morally and inspire others to be leaders within their own communities and throughout the world.

Ethnographic and Policy Studies of Metabolic Disorders in South India
Eeshwar Chandrasekar, Baccalaureus Artium et Scientiae - Senior
Mentor: Dr. David Simmons, Anthropology & Health Promotion, Education and Behavior
The global burden of non-communicable diseases (NCDs) is enormous with a toll of 35 million deaths annually. This constitutes roughly 60% of total deaths and of this number 80% occur in lower and lower-middle income countries. Diabetes is one of the four major NCDs globally and four in five people with diabetes now live in developing countries. Access to health care support is varied widely in the regions and one in 10 diagnosed cases remains untreated. India is a particularly unique case as it has one of the world’s largest diabetic populations of 50.8 million people and the onset of diabetes is roughly at 35 years of age roughly 10 years ahead of occurrence in the West. This project employs two approaches to study metabolic disorders in the South Indian city of Chennai. The first an anthropological approach looks to elicit patients explanatory models surrounding diabetes and to understand the conditions in the local and cultural context through a series of semi-structured interviews. The second focus is a study of the current diabetes policies enacted by the Government of Tamil Nadu and exploring opportunities to generate more effective or new intervention policies to reach the target population. Through developing effective and locally-tailored interventions rates of diabetes in the region can be reduced.

Neurofeedback: An Experimental Investigation of Changing Brain Functions
Mary Blair-Delling, Psychology - Senior
Mentor: Dr. Scott Decker, Psychology
Neurofeedback (NF) uses electroencephalography (EEG) to monitor cortical activity by placing small electrodes on the scalp, that detect very small electrical currents (brain waves) that are then amplified and recorded with the use of a computer. By providing specific feedback of brain activation, individuals gain increasing levels of control in changing brain activity using conscious effort. The goal of this investigation is to compare case studies of individuals receiving NF to other individuals receiving “sham,” or fake, NF. Initial case studies were
Chapter 1: Introduction

Inconclusive due to methodological limitations. However, several lessons were learned that led to better comparisons with subsequent case studies, which included college students with ADHD in NF and sham conditions. Barkley’s Current Symptoms Scale and the Barrat Impulsivity Scale were administered to all participants to document symptomatology. Additionally, an initial EEG recording to look for matches from the participants’ brain activity to the hypothesized brain regions associated with Attention Deficits and Executive Function Problems was conducted. Collection of pre-test measures from the CPT-II and the Woodcock Johnson Measures of Cognitive Abilities, completion of 10 sessions of NF or sham NF, and collecting post-test measures was the final phase. Results provide some support to suggest Z-score loreta NF can change measured brain functioning, primarily by reducing abnormal brain functions toward normality. The preliminary support for the use of NF warrants subsequent studies with larger sample sizes.

Chapter 2: Exploring Solutions for Clean Drinking Water in Haiti

Haiti is a mountainous region that has undergone extensive deforestation due to poor sustainable agricultural practices and excessive logging. About two-thirds of the people are unemployed and about one-third of them live in poverty. Haiti has experienced severe instability in the political economic and medical spectrum. One major cause of poor human health is water sanitation. Poor water sanitation causes maternal mortality and high mortality in children under the age of five years old. Here I discuss how the lack of water sanitation facilities in Haiti has exacerbated the spread of infectious disease across the country and suggest potential solutions for minimizing infection rates via innovative technologies that focus on water purification systems.

Chapter 3: Sweet Tooth or Artificial Sweetener Craving: Replacing Sugar with Artificial Sweeteners

In America today there is great concern about obesity. In an attempt to balance a busy daily life with a healthy diet consumers are now relying on artificial sweeteners to help them make a small step to a better lifestyle. With this notion in mind there is the question of whether artificial sweeteners are healthy. The purpose of my research is to review current literature that discusses the effects of artificial sweeteners on weight and caloric compensation and considers some hypotheses regarding the reasons for weight gain. A review of literature led to the conclusion that artificial sweeteners can be 100-13000 times sweeter than sucrose and that sucrose consumers who used artificial sweeteners daily could build a tolerance level towards them. After a tolerance level is set consumers would be at a greater risk to pursue sugar cravings which would increase their caloric intake of sugar itself leading them to obesity. In addition it was found in two studies that when rats were fed the artificial sweeteners saccharin and acesulfame potassium they gained more weight than rats that were fed glucose. Overall it was found that consumers need to be cautious when consuming artificial sweeteners.

Chapter 4: Primary Determinants of Body Weight Change in a Population of Young Adults

Mentor: Dr. Gregory Hand, Exercise Science

INTRODUCTION: The prevalence of obesity has increased over the last 4 decades with little clear evidence for a specific cause. Based on thermodynamics it is commonly believed that the general cause is that people are in a chronic state of positive energy balance- consuming more calories than they are expending over time. No large clinical studies have measured the three components of energy balance (intake expenditure and stores). METHODS: Recruitment: 400 men and women between the ages of 21-35 years will be recruited and followed over a one year period with measurements at baseline and then quarterly. They will complete laboratory measures including BMI body fatness and waist circumference. Resting metabolic rate (RMR) and fitness will be measured on all participants at baseline. Energy Expenditure and Energy Intake Measures: Quarterly participants will wear an accelerometer for 10 consecutive days and complete 3 random 24-hour dietary recalls. Analyses: Correlational analysis will be used to describe the relationships among the 1-year weight change and predicted determinants. The second objective of my study is to use general linear regression modeling to determine the interaction of variables that prove to be associated with weight change. SIGNIFICANCE: Obesity-related conditions result in over 400000 deaths per year in the US with an economic impact of almost $123 billion per year. However the determinants of obesity and weight gain are not well understood. The purpose of the Energy Balance Study is to provide very precise measurements that will facilitate informed policy development to address the obesity epidemic.

Chapter 5: Simile and Metaphor and Ease of Comprehension and Readability: A Self-Paced Reading Study

Mentor: Dr. Amit Almor, Psychology

As recently as 2012 figurative language comprehension is a topic that is being debated and discussed. After Shibata et al. published their fMRI work the theory that the brain processes some elements of figurative language differently really gained a new life. Using the E-Prime software participants were measured on their reading/comprehension speeds of metaphors and similes. They were asked to decide whether or not a following statement was logically connected to the meaning of the figurative language. This reading/decision time was measured and after both of those measurements there was the final dependent measure of accuracy which simply measures how many of these sentences were judged correctly for meaning. These results were then run through a pair-wise t-test to test for significance. There was a main effect of sentence type in that the metaphor condition was consistantly read faster than its simile counterparts. There was not a main effect however of accuracy in that both the metaphorical sentences were judged on average with about the same amount of accuracy as the simile sentences. Despite the results of this test being largely non-significant the fact that there was a main effect of one of the conditions gives reason to believe that with further testing given more time and test subjects that there are large strides to be made in this field.

Acknowledgments

Discover Day 2013 Oral Presentations 52
Phenolic Acids Alter Amyloid-Beta Oligomerization in Alzheimer’s Disease Pathogenesis
John Clegg, Biomedical Engineering - Junior
Mentor: Dr. Melissa Moss, Chemical Engineering
Alzheimer’s disease (AD) is the 6th leading killer in the US and affects 1 in 8 older Americans. A key characteristic of AD is the accumulation of amyloid plaques caused by the aggregation of amyloid-β protein (Aβ). Recently, Aβ oligomeric aggregates are proposed to be involved in AD pathogenesis. In previous experiments, phenolic acids from coconut oil acted as inhibitors of Aβ aggregation. This study investigated the size and hydrophobicity of oligomers formed in the presence of gallic acid, cinnamic acid, and caffeic acid, the three most successful aggregation inhibitors. Inhibition of oligomer formation was assessed by incubating Aβ1-42 with a 10-fold excess of compound and diluting from organic solvent into aqueous buffer. Oligomers were separated by size using SDS-PAGE with Western Blotting and were analyzed in the range of 10-250 kDa. ANS, a naphthaline based compound that undergoes a conformational change and corresponding blue shift in fluorescence when it binds to a hydrophobic region was employed to characterize oligomer hydrophobicity. Gallic acid and cinnamic acid demonstrated the ability to reduce the formation of high molecular weight oligomers while increasing the prevalence of low molecular weight oligomers. Oligomers formed in the presence of gallic acid or caffeic acid were more hydrophilic, whereas oligomers formed in the presence of cinnamic acid were more hydrophobic. Gallic acid demonstrates promise as a potential therapeutic agent for the treatment of AD by inhibiting monomer aggregation and decreasing oligomer size.

The presence of glyphosate-resistance weed seeds in commercial potting soils
Katherine Layne, Biology - Senior; USC Aiken
Mentor: Dr. Andrew Dyer, Biology/Geology; USC Aiken
The emergence of glyphosate-resistant weeds is an increasing problem for farmers and landowners across the country. Weeds can become resistant to glyphosate (Roundup®) either by natural selection for a mutation conferring resistance or by acquiring a crop transgene for reduced glyphosate translocation. Once weed populations become resistant their movement across the landscape into non-resistant populations a very real additional concern. One potential mechanism for the unintentional movement of glyphosate-resistant weeds is through the commercial potting soil industry. These products are packaged at large production facilities distributed throughout the region and sold at a large number of retail outlets. The products are marketed with the assumption that they are weed-free but we have grown and identified nearly 100 species from the most common brands of low-quality inexpensive potting soils and topsoils. In this experiment eight different brands of these low-quality inexpensive soils ($2.50/40# bag) were tested for the presence of weed species. Four brands contained sufficient numbers of weeds to be tested for glyphosate-resistance. Fifty-nine plants of eight different species were sprayed with 2% glyphosate and then observed. Although most plants died quickly individual plants of several species either died slowly or not at all. This experiment suggests that commercial suppliers of low-quality inexpensive topsoils and potting soils may be responsible for spreading glyphosate-resistant genotypes of common weed species into areas where they did not previously exist. The movement of these plants poses a potential threat to agriculture in those areas.

Discovering the Autophagy signaling pathway in HER2+/Neu Breast Cancer Stem cells
Taylor Mueller, Biological Sciences - Junior
Mentor: Dr. Hexin Chen, Biological Sciences
Autophagy is a poorly understood cell-survival mechanism that can be used by cancer cells to survive chemotherapy. Our goal is to focus specifically on the involvement of protein p38 in the autophagic process. It remains unclear whether inactivation or activation of p38 will lead to autophagy in HER2+ cancer cells. We have been using the p38 specific knockdown drug SB203580 to test whether elements downstream are expressed. These tests are done by incubating the cells with SB203580 then doing western blots to test expression of Autophagy markers such as Beclin-1 LC3-A and LC3-B. In the upcoming weeks we will probe also for Akt mTOR and JNK proteins which are possible downstream elements of p38. These tests will allow us to create a signaling pathway specific for HER2+ breast cancer cells and will be the first signaling pathway created for this cell type.

Ping and Pong ORF 1 Domain Swapping to Determine the Role of DNA Binding and Nuclear Localization in mPing Transposition
Giselle Outten, Biology - Senior; USC Aiken
Mentor: Dr. Nathan Hancock, Biology/Geology; USC Aiken
Ping and Pong are DNA transposable elements that can move around in the genome. Understanding the mechanisms that control transposon behavior is important for understanding how transposons contribute to genome evolution. A deletion of the Ping element mPing is miniature inverted repeat transposable element that can be mobilized by both the Ping and Pong elements. Although the Ping and Pong elements are very similar the Pong element is much better at mobilizing mPing in a yeast transposition assay. Our goal is to determine the basis for this difference by constructing Ping/Pong domain swapped mutants using the USER® method and assessing their activity using a yeast transposition assay. Our hypothesis is that most of the difference in activity is due to the ORF1 protein because it has less sequence homology between Ping and Pong. The N-terminal half of both Ping and Pong ORF1 contain a conserved Myb-like domain that is thought to have DNA binding functions. For the C-terminal half however only the Pong ORF1 contains a predicted nuclear localization signal domain. Thus the first construct contains the N-terminal half of Ping ORF1 with the C-terminal half of Pong ORF1 and the second construct contains the opposite. By recombining these domains we hope to determine their relative importance for transposition activity.
Determining Transposition Promoting Regions Based on Recombinant mPing and mPong Constructs

Kristian Pickrel, Biology - Senior; USC Aiken
Mentor: Dr. Nathan Hancock, Biology/Geology; USC Aiken

In rice Ping Pong and mPing are naturally active DNA transposable elements. These elements are of scientific importance because they are able to insert preferentially near genes and can be used as a mutagenesis tool to facilitate gene discovery in the genomes of crop species and research model plants. In addition mPing has been shown to have extremely high activity and copy number. Our overall goal is to determine what makes mPing so successful in comparison to a similarly constructed mPong element. We used a yeast transposition assay to characterize the transposition rate of different mPing and mPong-based constructs. We hypothesized that by using different combinations of mPing and mPong we will be able to determine which region promotes transposition. We tested constructs in which the sub-TIR regions were exchanged from mPing and mPong and also constructs which combined portions of mPing and mPong together. Both sets of results lead us to believe that neither the sub-TIR regions nor the 3’ half of mPing is promoting transposition. By narrowing down the regions of the mPing element which promote transposition rates it will be possible that we will be able to understand transposition behavior and improve mutagenesis tools.

The effects of various promoters on mPing transposition in Arabidopsis

Keifer Richardson, Biology - Senior; USC Aiken
Mentor: Dr. Nathan Hancock, Biology/Geology; USC Aiken

DNA transposable elements are segments of DNA that can move within a genome through a cut and paste mechanism. My research project is focused on the miniature inverted repeat transposable element known as mPing. This transposable element was originally discovered in rice but when this element and the mobilization genes (ORF1 and Transposase) are transferred into Arabidopsis thaliana it transposese. However no germinal (heritable) mPing insertions have been detected in Arabidopsis. The goal of my research is to determine the effects of different promoters sequence of DNA that drives gene expression on mPing transposition in A. thaliana. Our hypothesis is that different promoters will lead to different levels of transposition and hopefully some will lead to germinal transposition. To test the effects of promoters on transposition two Transposase expression plasmids were produced one containing the APETALA3 promoter and the other containing a RPS5A promoter. A. thaliana was then transformed with these newly engineered constructs in order to get the DNA into the genome. The T2 generations of these transgenic plants were harvested and examined for varying levels of transposition using a GFP reporter gene. These experiments indicated that the APETALA3 promoter shows increased transposition levels compared to the RPS5A promoter in A. thaliana. Efforts to determine if any of these transposition events result in heritable mutations are underway. The knowledge we gain will lead to a better understanding of how mPing can be used as a mutagenesis tool.

Science, Technology, Engineering, and Mathematics II

Rock Paper Scissors Lizard Spock

Robbie Bacon, Mechanical Engineering - Sophomore; USC Salkehatchie
Ibrahima Seck, Nursing - Sophomore; USC Salkehatchie
Mentor: Dr. Wei-Kai Lai, Mathematics; USC Salkehatchie

The classical Rock-Paper-Scissors game is revisited. We use payoff matrix and expected value to analyze the winning strategy of this game. We also examine several of its variations like Rock-Paper-Scissors-Well and Rock-Paper-Scissors-Lizard-Spock. Other potential additional weapons are also discussed.

Inexpensive Radiation Detectors through Contact Engineering

Chris Bevirt, Electrical Engineering - Junior
Mentor: Dr. Krishna Mandal, Electrical Engineering

CZT (CdZnTe) gamma radiation detectors are presently the best candidate for room temperature operation in order to identify nuclear materials for military, medical, and commercial applications. CZT crystals are usually grown by Bridgman methods, and the yield of “detector quality” material is typically 5%. The rejected material usually has a resistivity that is too low to make efficient and high resolution detectors. The low yield is the major contributor to the high expense of CZT detectors. At USC, we have developed a novel CZT processing technology for the first time which has demonstrated excellent detector performance on rejected quality material that represents ≥90% of single crystals from a typical crystal growth run. This has reduced the cost of the CZT crystal and made an in-road for detector instruments more widely available to emergency and forensic personnel. Our innovative approach for achieving this goal was a new type of high barrier bandgap-engineered electrical contact designed to reduce the leakage current to a very low level. The improved CZT radiation detectors are inexpensive and highly efficient, and offered substantial performance advantages over existing gamma ray detectors. The spectrometer will be very useful to emergency workers, customs officials, border-protection personnel, and coast guard staff for detecting illicit radioactive sources. In addition to these applications, there is a large government and private market for medical imaging instrumentation to replace simple survey meters for locating lost or spilled radiation sources in research institutions, hospitals, and in nuclear power plants.

Graph Labeling and The Delta Squared Conjecture

Cole Franks, Mathematics - Junior
Mentor: Dr. Jerrold Griggs, Mathematics

An L(2,1)-labeling of a graph is a labeling of its vertices with numbers such that adjacent vertices receive labels differing by at least two and those at distance two receive different labels. This problem is motivated by the Channel Assignment Problem in which a network of transmitters must be arranged to avoid interference. Jerrold Griggs and Roger Yeh posed the problem in 1992 and conjectured that any graph can always be labeled with the integers from zero to the square of the graph’s maximum degree. We will discuss previous results.
Proof (Almost) Without Words: Conic Sections
Philip Kearse, Nursing - Sophomore; USC Salkehatchie
Mentor: Dr. Wei-Kai Lai, Mathematics; USC Salkehatchie
The traditional definition of a conic section in geometry is a curve obtained as the intersection of a cone with a plane. In this talk I will use Dandelin spheres to show that the curves obtained in this definition are equivalent to the ones introduced in our Calculus class: in a plane the set of points that are equidistant from the directrix and the focus is a parabola the set of points that has a constant sum of the distances between the point and two foci is an ellipse and the set of points that has a constant difference of the distances between the point and two foci is a hyperbola.

Creating Maplets for Biological Mathematics
William Timmons, Physics - Sophomore; USC Lancaster
Mentor: Dr. Shemsi Alhaddad, Mathematics; USC Lancaster
The goal of this project is to create simple user-friendly Maplet applications which USC students enrolled in biological mathematics courses may use to strengthen or evaluate their skills in the subject. Maplets are applets using the computer algebra system Maple. Students using the programs will be provided with questions concerning population dynamics and assessed on the accuracy of their responses. All Maplets are designed using conventional Maple programming and/or the Maplet Builder feature. A general code template may be designed to hasten and simplify the programming of future applications. Funding for this project was provided through the USC STEPs to STEM program.

Graphene Based Hazardous Gas Sensors
James Tolson, Electrical Engineering - Junior
Mentor: Dr. Goutam Koley, Electrical Engineering
The overall goal of this research is to develop graphene based highly sensitive sensor devices for hazardous gas detection. To attain this overall goal the process steps involved are: (i) synthesis of graphene using chemical vapor deposition (ii) fabrication of graphene film based sensors and (iii) characterization of the sensor’s ability to detect hazardous gases. At the current stage of the project we have successfully optimized the synthesis of graphene and have Raman Spectroscopy characterization results to verify the quality of our samples. These sensor devices are strongly relevant to the NASA core mission and NASA has a multitude of programs on sensor development utilizing a variety of materials including carbon nanostructures such as carbon nanotubes and graphene.

Developing Techniques for Identifying Horizontally Transferred Genes As Well As Prophage Sequences in Prokaryote Genomes
Alexis Burns, Biomedical Engineering - Senior
Mentor: Dr. John Rose, Biomedical Engineering
This experiment will attempt to ameliorate existing genomic island prediction programs by specifying a new technique to identify clusters of horizontally transferred genes also known as genomic islands (GIs). Bacteriophages are viruses that implant genetic material into bacteria which is how GIs are transferred into bacterial genomes. We have observed and established repeating pairs and triplets of amino acids in genomes of bacteriophages and plan to create an algorithm for searching a genome and identifying amino acids that code for proteins. From this algorithm a C++ program will be constructed to carry out the steps for the identification of horizontally transferred genes. This experiment will produce a novel method of identifying horizontally transferred genes by searching the bacteriophage genome for amino acids. The end result will be the composition of a C++ program to employ this new method.

The Sedimentary Structure of a Course Grained Point Bar as Resolved by GPR Congaree River Valley SC
Patrick Duff, Geophysics - Senior
Mentor: Dr. Camelia Knapp, Earth and Ocean Sciences
Flood plain deposition within incised alluvial valleys is widely recognized as complex and is controlled by a myriad of factors among them grade gradient volume and flashiness of discharge channel sinuosity bed load/suspended load ratio and channel morphology. As a result of the dynamic nature of the processes that drive alluvial valley deposition floodplain deposits are often characterized by abrupt lateral and vertical discontinuities in facies. The complex geometries and stacking patterns of flood plain deposits represent a significant obstacle to refining and correctly applying the Incised Valley Fill Model one of the most utilized depositional models in hydrocarbon exploration. As the major reservoir target in hydrocarbon systems involving incised alluvial valleys predicting the occurrence of point bar deposits in the subsurface as well as understanding their internal structure and relationship to other flood plain deposits remains a topic of active research. A series of Ground Penetrating Radar (GPR) lines were acquired to investigate the internal structure of a coarse grained point bar deposit as well as to serve as an experiment in the application of GPR technology to sedimentological and stratigraphic research. Strike and dip oriented GPR reflection lines as well as a common midpoint survey were collected in 50 and 100MHz on Point Bar Number Two (PB2) Congaree River Valley South Carolina. PB2 is located approximately 11 km south of Columbia SC; it is a coarse grained arkosic sand body containing semi-saturated sediments and the water table. The resulting data were processed depth converted and interpreted using a radar stratigraphic approach. The processed and interpreted radar sections resolve a variety of bedform types and scales as well as dipping interfaces that may be
accretion surfaces. Stratigraphic units are differentiable in section with an abrupt change in radar velocity observed. Furthermore given the deposit’s lack of fine grain sediments it is confirmed as a suitable reservoir target. These radar sections also demonstrate how radar energy behaves in unconsolidated sedimentary deposits that contain significant differences in pore space saturation and the water table. The results shed light on the depositional character of the Congaree River Valley including patterns in discharge and channel morphology as well as suggest a broad role for GPR technology in sedimentological and stratigraphic investigations.

**Effectiveness of an automated computer recognizer in isolating Hyla cinerea breeding calls.**

**Elliott Gibbs**, Biology - Senior; USC Upstate

Mentor: Dr. Melissa Pilgrim, Natural Sciences & Engineering; USC Upstate

Two common techniques for monitoring anurans that take advantage of male breeding behavior are call surveys and Automated Recording Systems (ARSs). In an effort to reduce the time necessary to manually listen to ARS recordings for species of interest we worked on developing an automated computer recognizer for anuran call detection. Specifically our study objective was to build a recognizer for Hyla cinerea (Green Treefrog) that improved on the accuracy of the recognizer developed for H. cinerea by Waddle et al. 2009. We used individual treefrog recordings and ARS breeding chorus recordings to build and test an automated recognizer in Song Scope. Sound Scope identified 42 files as containing H. cinerea calls. We visually inspected the spectrograms of the 42 files identifying 36 as true positives and 6 as false positives. Overall Sound Scope missed 14 files with calling H. cinerea resulting in a false negative rate of 33%. Our true positive rate and false positive rates were similar to those of Waddle et al. 2009; however our false negative rate was 13% lower than Waddle et al. (2009) which indicated that our recognizer was more effective at detecting H. cinerea calls from ARS sound files.

**The Effect of Survey Protocol on Anuran Detection in the Piedmont Region of South Carolina**

**Adrian Hayes**, Biology - Senior; USC Upstate

Mentor: Dr. Melissa Pilgrim, Natural Sciences & Engineering; USC Upstate

Our research investigates the North American Amphibian Monitoring Program’s minimal survey requirements and sequential route structure on anuran detection probabilities in the Piedmont of South Carolina. We used automated recording systems (ARS) during one NAAMP sampling window to assess the amount of sampling effort necessary to detect each species once and evaluate the effect of survey time on anuran detection probabilities. We detected the occurrence of seven anurans during our study and observed interspecific variation in detection probabilities with 4 of the 7 species having detection probabilities under 0.5. In addition survey time impacted the detectability of our species. Specifically Anaxyrus fowleri Hyla chrysoscelis and Hyla cinerea tended to call closer to sunset while Acris crepitans Lithobates catesbeianus and Lithobates clamitans tended to call further from sunset. The influence of time on anuran detectability was most pronounced for A. fowleri and H. cinerea where simply reversing the sequence of a route at least doubled the sampling effort necessary to detect the species. In closing our study revealed biases associated with the NAAMP protocol that could impact its effectiveness as an anuran inventory and monitoring program.

**Synthesis of Dendrimer-derived Fe nanocomposites in aqueous solution: Effect of pH and Dialysis**

**Christina Papadimitriou**, Chemical Engineering - Junior

Mentor: Dr. Michael Amiridis, Chemical Engineering

Unlike conventional preparation techniques, the dendrimer based preparation approach is focused on a rational design of nanoparticles in solution and on their subsequent delivery onto the surface of solid supports. Poly(amidoamine) (PAMAM) dendrimers have recently attracted a lot of attention because these macromolecules can complex metal cations in solution and trap colloidal nanoparticles formed after the reduction step. Such metal/dendrimer nanocomposites can be used as precursors for the synthesis of supported metal nanoparticles with novel morphologies and catalytic properties. Hydroxyl terminated generation four (G4OH) PAMAM dendrimers were mixed with iron precursor solutions at different molar ratios to promote the complexation process. Our specific objective was to determine the effect of the complexation time, nominal Fe/G4OH ratio, and dialysis conditions on the strength of Fe-dendrimer interactions. The Fe3+/G4OH complexation was monitored by UV-vis, changes in the solution pH, and the concentration response to dialysis. The results show that the Fe3+/G4OH complexation quickly comes to equilibrium and, even under acidic conditions, approximately 90% of Fe3+ is strongly bound to the dendrimer at that point. This result suggests that the amide groups of the G4OH dendrimer participate in complexation, given that all tertiary amines are fully protonated under the acidic conditions used. UV-vis, Atomic Absorption Spectroscopy (AAS) and Scanning Transmission Electron Microscopy (STEM) were used to monitor changes in concentration, structure and size of the monometallic nanoparticles during each step of the synthesis.
Social Sciences

Expanding Scientific Leadership through Carolina Science Outreach

**Connor Bain**, Computer Science - Sophomore

**Kali Esancy**, Biological Sciences - Senior

Mentors: Dr. Edward Munn Sanchez, Honors College

Dr. Kirk Randazzo, Political Science

Carolina Science Outreach (CSO) is an entirely student-run initiative to help promote scientific literacy in South Carolina. CSO currently offers a variety of presentations addressing topics in areas such as physics, chemistry, biology, environmental sustainability, engineering, and computing. With the help of the Carolina Leadership Initiative, we have made incredible progress in not only expanding the impact of CSO in the community but also in ensuring its sustainability as a service organization at USC. We have recruited over 40 new and enthusiastic members and established a clear and effective leadership structure to make CSO as efficient as possible. This year alone, we expect to reach over 2000 South Carolinians from ages 5 to 100 with our presentations and events. With the help of a local businessman we’re currently developing an Agricultural and Scientific Learning Center in Lexington County, SC. By partnering with the Duke TIPS program, we are able to offer an on-campus mini-course for middle and high school students. And by working with the USC Mathematics Department, Athletics Department, and Department of Physics and Astronomy, we brought Dr. Alan M. Nathan, one of the world’s foremost experts on the physics of baseball to campus for a series of events. Carolina Science Outreach provides an opportunity for STEM majors to both share their passion for science and develop the skills necessary to become the next generation of scientific leaders.

The 2012 French Presidential elections in the context of the European debt crisis

**Paul Jansch**, European Studies - Senior

Mentor: Dr. Jeff Persels, Languages Literatures and Cultures

The European Union and the objectives of European integration have been put into question since the Great Recession of 2009 and the following debt crisis in Europe. For years these economic crises have resisted the best efforts of both European and national leaders on the continent. In the spring of 2012, ten candidates representing a variety of political persuasions campaigned for presidency in France. While the voters elected socialist challenger François Hollande over the incumbent Nicolas Sarkozy, this research will not focus on the results of the election. The project will instead address the rhetoric used by the candidates and the media. It asks in what ways can we see the European debt crisis reflected in the 2012 French Presidential Elections? This project looks to the manifestos of the political parties platforms of the candidates newspaper articles, editorials, along with electronic media and television to see how the candidates addressed the pressing European question. The conclusions will first be descriptive, explaining the context of the election, the history of the nuanced European Union response to the debt crisis and the platforms of all ten presidential candidates. Second, this project will address how the candidates and media addressed or failed to address the different parts of the European debt crisis in public debate.

Framing Internal Struggle: How the New York Times Depicted the Controversy Between the SCLC and SNCC

**Christopher Johnson**, Communications - Junior; USC Upstate

Mentor: Dr. David Wallace, Fine Arts & Communication Studies; USC Upstate

During the Civil Rights Movement, several African-American organizations emerged that contributed to the fight for social equality. Two of the main organizations were the Southern Christian Leadership Conference (SCLC) and the Student Nonviolent Coordinating Committee (SNCC). SNCC was originally designed with the intent of being an extension of the SCLC. However, some members of SNCC demanded to be recognized as a separate entity, which created friction. Around the mid-sixties, the situation grew more intense as SNCC began transitioning away from nonviolent protest to a new Black Power mentality.

Despite Dr. King’s best efforts, he was unable to keep the press at bay about the philosophical dispute taking place between the two organizations. In the present study, a content analysis was conducted of 30 New York Times articles to determine how this dispute was framed for the public. The results show the journalists who wrote the articles surrounding this issue used words that were confrontational perhaps perpetuating the debate further. Moreover, the larger narrative portrays Dr. King as a protagonist against a younger, deviant Stokely Carmichael as these two were the premier representatives of their respective ideologies. Symbolically, it suggests there was a generational clash of ideas about the direction of the movement.

Vote: Brothers and Sisters are Running to the Polls

**Roger Michael**, Political Science - Junior; USC Upstate

Mentor: Mr. Gabe Clever, Student Success Center; USC Upstate

Voting is an important aspect of today's society. Many ex-slaves and African Americans during the 1900's fought for African Americans to have the right to vote and their battles and struggles are being taken for granted. It is important that we find ways to get this race to become more involved in voting. This research paper identifies reasons why African Americans do not vote and proposes ways to get them to vote. The research looks at generational teachings on the importance of voting in the African American community. It also explores how religion socio-economic status and other factors impact how the black community's views on voting. Finally, it addresses what we can do to continue to make their attitudes to change.

Washington Media Scholars Foundation Media Planning Case Competition

**Christopher Molony**, Advertising - Senior

**Elizabeth Pugh**, Sport and Entertainment Management - Senior

Mentor: Dr. Glenda Alvarado, Advertising and Public Relations

This foundation runs an annual competition in which students nationwide develop media-buying plans for a fictitious case. The first round we had to make allocations on behalf of the Pacific City Cultural Association to increase donations and cross-venue visits of their various offerings while demonstrating an...
understanding of media buying and its terminology. Upon successful completion of the first round we were presented with the case which challenged us to raise public awareness and support for the Central Coast Waterfront Renewal Coalition, one part of which was a new baseball stadium for the Central Coast Seabirds. We were presented with a variety of information and had to decide our target audience and the best media to use to reach them in order to gain support. As an advertising major this competition was introduced in Chris’ Media Analysis class. We elected to participate because it seemed like a fun challenging task that would provide us with experiences that could not be attained by sitting in a classroom. We have learned much that can be applied to our future careers - like ask questions. Why does our client want to do this? What are the exact goals? In more specific terms of the industry we have learned that cheap forms of media are not always the best despite what the numbers may say. The oral presentation will showcase the analysis of the project: audience and media purchased as well as a brief overview of media buying and what was learned throughout this project.

**Effects of Government Pension Expenditures on State Economic Growth**

*Samruddhi Somani, Economics - Junior*

*Mentor: Dr. William Hauk, Economics*

According to modern economics government expenditures constitute some portion of Gross State Product (GSP) and affect economic growth. For this project funded by an Explorer Grant from the South Carolina Honors College I analyzed the effects of government pensions a form of government expenditures on economic growth for all fifty states from 1993-2010. I collected state expenditure data from United States Census Bureau documents and used economic growth data my mentor had previously collected. Using data on individual states provides a better estimate of this relationship than federal data as it allows us to use more data. We analyze fifty governments instead of just one. I performed this analysis using STATA statistical software. The nature of the data require the use of panel data techniques such as adjustments for state and year fixed effects which ensure that the inherent differences among states and among years does not affect estimates for the effects of pension expenditures. As of submission I am still analyzing the data and I do not have the results. The results of this project will allow us to estimate the extent to which pensions affect economic growth which may inform our decisions on how to improve economic growth an ever-present goal that becomes even more important in periods of slow growth such as the one the United States is currently weathering.
**The Development of Baseball in Columbia South Carolina**

*Kaci Barfield*, History - Senior

Mentor: Dr. Lana Burgess, McKissick Museum

For my senior thesis I researched and wrote about the early development of baseball in the city of Columbia. I was initially interested in it because it is a topic that hasn't been written about much and I believed (partly due to my background in history) that the development of baseball was likely influenced heavily by the social political and economic atmosphere of the city over time. I decided to focus on the status of baseball in the city during the time of Reconstruction which I then discovered was actually the time period during which baseball began to be played in the city. Drawing heavily from items in the Columbia Daily Phoenix a Reconstruction-era newspaper that has been digitized as part of the Chronicling America project I was able to present the narrative of the formation of baseball teams in the city and the rise of the popularity of the sport. I was excited to learn that not only did the social economic and political atmosphere of that period influence the development of baseball but that the presence of the federal troops in the city as part of Reconstruction was directly responsible for bringing baseball to the city.

---

**The Creative Process of Costume Designing in Theatre**

*Elizabeth Coffin*, Theatre - Senior

Mentor: Prof. Lisa Martin-Stuart, Theatre and Dance

My experiences in the Department of Theatre at USC have been a wonderful journey spanning all four years of my college career. I began by volunteering to work in the costume shop. Then I fulfilled a theatre practical lab credit there before moving on to be an undergraduate assistant. In the meantime I started costume designing shows in the Lab Theatre. I worked with student directors as well as faculty directors slowly working my way up. The conclusion and reward of my dedication was the opportunity to design costumes for *The Importance of Being Earnest* on Theatre South Carolina’s Main Stage last fall. A job usually reserved for graduate students and faculty it gave me the chance to practically apply everything I have been learning for three years. I was prepared by my design projects in the Lab as well as the classes I have taken—from patterning clothes millinery and jewelry-making to costume history and studio art. My process of designing costumes for *The Importance of Being Earnest* took my foundation and built on it so much more by putting it in a practical framework of artistic collaboration. I had to work actively with the director and the other designers as well as with the costume shop staff in order to bring it all together. The product is something I am quite proud of. The process was a capstone experience that integrated research professional communication and practical skills culminating in a tangible contribution to a collaborative piece of art.

---

**Dennis and Dennis Architects: Architecture and Culture in Macon Georgia**

*Maggie Discher*, Art History - Senior

Mentor: Dr. Lydia Brandt, Art

For both my Honors thesis and a summer 2012 Magellan grant I am investigating the cultural and architectural histories of six major buildings in downtown Macon Georgia by the long-running local firm of Dennis and Dennis. Though the firm produced many recognizable public and private buildings during their long career no one has thoroughly examined the extent of their influence in Macon. My research comes from the firm’s private archives the records of The Macon Telegraph and the Historical Room at the Washington Memorial Library. Relying on this variety of primary sources my project assesses both internal evaluations of the firm’s work as well as the public perceptions of these buildings over time. The products of this research combine architectural histories of each building with analysis of the unique cultural impact that the firm and their buildings have had on the city.

---

**‘What Hast Thou Done?’: Intertextuality and Performative Agency in Titus Andronicus**

*Kaelie Giffel*, English - Senior

Mentor: Dr. Esther Richey, English Language and Literature

Titus Andronicus is a tragedy that is continually dismissed by scholars as violent and unoriginal. Based on its relation to the classical texts that it mentions explicitly Titus Andronicus is just a flat reinterpretation of stories that have come before and thus has never been afforded an honest assessment of its power. This assumption is based solely on the fact that the interpretation of the play comes from either a literary evaluation of it or from a purely theatrical review. I carefully considered both elements however and a combination of the performative aspect of the play as well as the language create a play that is much more sophisticated than it has previously been given credit for. The language the characters use the actions they engage in are informed by thousands of years of intentions. These intentions these words can skew the actions as well as the viewpoint of the characters which lends itself to the warped reality that Shakespeare constructs around his characters. The nightmarish world is a clash of intertexts and utterances which explodes in violence and gore. What happens when we become disconnected from what we say? How do words inform our actions and vice versa? Ultimately this is what Titus Andronicus seeks to address in the violence and reinterpretation of classical texts it engages.

---

**EC Comics: Social Problems Controversy and Censorship**

*Harvey Jessup*, English - Junior

Mentor: Dr. Qiana Whitted, English Language and Literature

Comics occupy a unique cultural space with regards to advancing public understanding of social and political issues particularly among adolescents during the height of their popularity in the 1950s. Publisher EC Comics (Entertaining Comics Group) was especially controversial not just for the explicit content of its horror and science fiction comics but also for the ways in which these escapist stories were grounded in the realities of civil rights struggle the Cold War and anti-communist sentiment and the post-WWII suburbanization of America. In
assisting Dr. Whitted with her book project on EC Comics for the Comics Culture series from Rutgers University Press this project will investigated how writers and artists used the distinctive EC Comics “style” to address critical social issues such as: racial ethnic and religious marginalization; domestic troubles within American homes; and broad morality tales and philosophical questions. We completed this task in two main ways: one in my learning about the methods of cultural studies scholarship by reading some key texts in the genre; two completing a week-long excursion to the Library of Congress in Washington DC where I did substantial research on those comics compiling a useful data set featuring critical analysis of every story as well as more mundane information that Dr. Whitted will use to further her work. We learned that not only did EC Comics address social issue in their stories but also used letters to the editor to create communities of critical fans engaged in issues of justice.

The Popularity of Revisionist Qing Dynasty Dramas in Contemporary China
Han Lin, Physics - Junior
Mentor: Dr. Krista Van Fleit Hang, Languages Literatures and Cultures
Last Summer I was given the Magellan Scholar Grant to investigate the popularity of revisionist Qing dynasty dramas in China during the late 1990s. The goal of the research was to understand whether the influence and popularity of these revisionist Qing dynasty dramas particularly the TV series Yongzheng Dynasty were the results of social discontent and a general public outcry for the rampant moral decay in the post reform era of the early 1980s and late 1990s. It was achieved through three processes. First by research and investigation into the connection between common explanation of popularity as result of corruption within contemporary Chinese society and the general appreciation and interest in the past within Chinese culture second research into the public perception on societal and social changes of the post reform era during the late 1990s and third the public perception of early Qing dynasty emperors particularly Emperor Yongzheng. The third component was achieved partially through visiting the Forbidden City imperial history museums and tombs of Qing Dynasty Emperors in Beijing China. The objective of the trip to Beijing was for a greater understanding of public representation of Qing dynasty emperors and a better understanding of the achievements of these great emperors whose deeds and style of governance were so praised and often portrayed by TV dramas in China.

The American shoujo: A cultural fusion of gender representations through globalization
Olivia Keyes, Film and Media Studies - Senior
Mentor: Prof. Courtnie Wolfgang, Art
The shoujo – the little woman - is a character which both inspires and baffles the modern American audience. She is strong independent adventurous and typically without a romantic interest. The Japanese equivalent to the Huck Finn this androgynous asexual shoujo has dominated Japanese storytelling traditions since the early 12th century. However these unique female characters have only recently emerged in our own American mainstream culture as demonstrated by the rise in popularity of films such as Brave as well as the TV show The Legend of Korra. But why is this happening now? The effects of globalization and cultural fusion are both causes especially in the cinema tradition where Hollywood positioned itself as the “global vernacular” in the mid-1900s. But history’s exclusion of earlier cultural exchanges between Japanese and American cultures (as far back as the 1850s) leaves out an important aspect of the development of the shoujo as well as understanding the current evolution of gender roles in both societies. Unlike its Western counterpart the androgyinous body has a long-standing place in Japanese culture even breaking the idea itself into two separate words: ryousei (both sexes) or chusei (inbetween sexes). From the first recorded androgyous character Inari Okami in the late 5th century to Miyazaki Hayao’s San from Princess Mononoke these gender ambiguous characters have been able to break through Japan’s strict gender roles. Invoking a sense of “otherness” these characters exist outside of its society’s norms often in an imagined Western world as is the case in most of Miyazaki’s films. The process by which these characters codify their androgyne is through a number of different techniques the most prevalent of which is “gender-layering” a method of crossing a character’s gender identity multiple times. This paper explores the creation of these shoujo characters and the means by which they have propagated into American mainstream culture.

A Counterfeit Essay: “No Other Hope” a Sermon on the Book of Joshua in the Style of Jonathan Edwards
Erik Lybeck, English - Senior
Mentor: Dr. James Cutsinger, Religious Studies
To fulfill my senior thesis requirements for both the Honors College and my English degree I chose to complete an exercise in rhetorical style and exegesis. I have interpreted the book of Joshua in four essays—one for each of the four levels of meaning laid out by classical sources such as Dante Alighieri St. Thomas Aquinas and Augustine of Dacia namely literal allegorical moral and anagogical. In an effort to combine my interests in biblical levels of meaning and the interplay between language and understanding I wrote each of these four essays in the style of a particular author who I felt was representative of each approach attempting to recreate their syntax diction structure idioms and arguments if they were to write a piece about Joshua. In preparing to write this essay a moral interpretation written as a sermon by the 18th century Calvinist theologian and preacher Jonathan Edwards I analyzed over a dozen sermons and read scholarly pieces on distinctive features of Edwards’s homiletics. It is my hope that this project will help readers understand the varied subtle and above all rational ways that Scripture has been understood historically contrary to the modern dichotomy between fundamentalism and complete skepticism that is presented to the Western world by televangelists and proselytizing atheists alike.
Biology & Biomedical Sciences I

The Role of the Nitric Oxide Pathway on AV Canal EMT
Lauren Allen, Chemistry - Senior
Mentor: Dr. Jay Potts, Cell Biology and Anatomy
One of the most common birth defects in humans is congenital heart defects which are normally caused from specific morphological defects and in particular abnormalities which occur during formation and development of the cardiac septa and valves. During the development of the heart the endocardial cushions transform into the cardiac septa and valves. The central event in formation of the endocardial cushions is the epithelial-mesenchymal transformation (EMT) of the endocardial cells localized in the atrioventricular canal (AVC) and outflow tract (OT). The endocardial cushions of the AVC will form the tricuspid and bicuspid valves whereas the cushions in the OT will form the aortic and pulmonary valves. How this EMT process is regulated is vital to proper cardiac development. It is thought that nitric oxide (NO) and reactive oxygen species (ROS) act as intracellular second messengers activate signaling cascades involved in cardiac cushion and formation. To investigate the role of NO and ROS in the developing AVC specific NO pathway inhibitors and donors were examined for their role in controlling AVC growth and EMT. LNAME an inhibitor of NO and SNAP an NO donor were used to treat isolated AVCs. LNAME showed a 24% decrease in growth in contrast to SNAP which showed a 21% increase. This relationship continued through 72 hours of treatment. Finally LNAME showed a 64% increase in the number of mesenchymal cells produced as compared to a 19.4% decrease in the SNAP treated AVCs.

Optimizing Multifunctional Nanogel for Cancer-Targeted Drug Delivery
Benjamin Brummel, Biomedical Engineering - Senior
Mentor: Dr. Peisheng Xu, Pharmaceutical and Biomedical Sciences
Cancer targeted drug delivery systems present a promising alternative to conventional chemotherapy. Nanoparticles formed from amphiphilic polymers have been used to successfully encapsulate paclitaxel (PTX) and other hydrophobic anti-cancer drugs. In order to increase the effectiveness of PTX there must be a high drug loading efficiency inside the nanoparticles the particles must be around 200nm in diameter and the drug must be released slowly before nanoparticles reaching cancer cells. To achieve these ends a poly[(2-(pyridin-2-yl)dithiacyl)] (PDA)-co-[poly(ethylene glycol) (PEG)] polymer capsule was modified with various length of thiol end capped hydrocarbons and tested with different drug feeding ratios. It was shown that polymer modified with a longer side chain had a slower release profile than the unmodified PDA-PEG. It was also shown that nanoparticles exhibited a higher loading efficiency (~60%) at 5% drug/polymer feeding ratio than particles with 10% or 20% feeding ratios (20% loading efficiency).

A Goodly Golden Chain: Arthur as Allegory in The Faerie Queene
Ashlynn Wittchow, English - Senior
Mentor: Dr. David Miller, English Language and Literature
Written as an Honors College Senior Thesis my research attempts to understand Spenser’s controversial political commentary in The Faerie Queene framing an analysis in the context of King Arthur’s rich literary genealogy. Inspired by a Maymester study abroad experience in London my research is the culmination of two years of travel textual analysis and historical research. Furthermore my research contributes to an understanding of English literature as an interwoven conversation across the centuries. The Arthurian figure found in The Faerie Queene admittedly bares little resemblance to his medieval predecessor. Most episodes find their literary roots embedded deep within other Classical traditions. However Arthur exists at the very center of the poem’s allegorical structure a “goodly golden chayne” linking the virtues of Spenser’s allegory on multiple levels (l.ix.1). Middle English romance attempts to frame Arthur as larger than life. He is capable of defeating scores of enemies singlehandedly and unifying the lands of Albion. However Arthur dies at the Battle of Camlann with Camelot left in ruin. Prophesying his return is just as problematic. Either Arthur awaits return at Avalon or his bones rest at the monastery in Glastonbury. The Tudor’s nationalistic connection with Camelot was in reality a double-edged sword. Yes one might associate Elizabeth with the magnificence of King Arthur. Conversely the knowledge of Camelot’s ruin hangs like an ever-present cloud in The Faerie Queene. As emphasized in Spenser’s prophetic chronicles Elizabeth’s reign could similarly end in ruin.
Identifying the transcription promoter of the WRAP53 gene: a regulator of the p53 tumor suppressor gene

**Shravya Budidi**, Biological Sciences - Senior

Mentor: Dr. David Reisman, Biological Sciences

The p53 tumor suppressor gene is associated with DNA repair and cell apoptosis. When DNA damage occurs p53 is induced and the expression of the gene increases leading to the events that arrest the cell cycle or cause cell apoptosis. Recently WRAP53 has been identified to regulate the p53 gene. A natural p53 antisense transcript that interacts with the 5'UTR of p53 WRAP53 controls p53 induction upon DNA damage. As it overlaps the first exon on the p53 gene WRAP53 is arranged to run in the opposite orientation and its promoter lies in the intron of the p53 gene; an exclusive characteristic of the WRAP53. We hypothesize that if we clone the promoter region of the WRAP53 and introduce it into human U2OS cell line; we will be able to further study the effects of cell damage and p53 regulation. We successfully cloned the promoter region of WRAP53. We PCR amplified our target DNA from human T98G cells and then cloned it into the TOPO vector. We then cloned the positive promoter into the pGL3 luciferase reporter construct and confirmed our results with restriction digest. Transfections were performed using 5x10^4 human U2OS cells. Following the transfections the cells were lysed and assayed for luciferase activity. Our results indicate that we successfully cloned the WRAP53 transcriptional promoter. We are currently studying the DNA damage response in the U2OS cells to determine the WRAP53 promoter response to DNA damage. This project can potentially contribute new information to cancer research and drug-therapy.

Exploring the Interaction of PERK with PACT an Activator of PKR

**Kali Esancy**, Biological Sciences - Senior

Mentor: Dr. Rekha Patel, Biological Sciences

Responding appropriately to stress is important in maintaining the health of individual cells as well as the larger organism. One crucial response to stress is the inhibition of translation (protein synthesis), which is accomplished by the phosphorylation of eIF2α. Two of the known kinases of eIF2α are PKR (which traditionally phosphorylates eIF2α in response to viral stress) and PERK (which phosphorylates eIF2α in response to stress in the endoplasmic reticulum, or ER). A potential link between these two proteins is PACT; the cellular activator of PKR in response to ER stress. PACT activates PKR's kinase activity by direct interaction in response to oxidative and ER stress. Although both PACT-PKR and PERK are activated by the same stress conditions and both lead to downstream inhibition of protein synthesis, no research has been done thus far as to whether PACT interacts with PERK as it does with PKR. This project aims to elucidate the interaction (if any) between PACT and PERK by using a yeast two-hybrid assay. A kinase-null construct of murine PERK (mPERK K618R) was generated and cloned into pGEMT Easy, a vector with a several multiple cloning sites. I am currently in the process of subcloning this construct into two additional vectors (pGBK7T7 and pGADT7) for use in the yeast two-hybrid assay. Determining whether these proteins interact will help provide a more complete characterization of the ER stress response, especially important as chronic ER stress has been implicated in many neurodegenerative diseases, diabetes, and metabolic syndromes.

Performance enhancing drug impact on ovarian steroid hormone biosynthesis

**William Forgach**, Exercise Science - Senior

Mentor: Dr. Holly LaVoie, Cell Biology and Anatomy

Anabolic steroid hormones are widely used as performance-enhancing drugs. Women who take anabolic steroids can experience irregular menstrual cycles and infertility which can result from altered feedback that affects pituitary gonadotropin secretion and/or by directly affecting the ovarian production of natural steroid hormones (estrogen and progesterone). Our goal was to determine if the performance-enhancing drugs Superdrol Dihydrotestosterone (DHT) Mesterolone Trenbolone and the natural steroid hormone progesterone (given exogenously) directly impact progesterone (P4) production by human ovarian luteinized granulosa cells (hGC). Our goal was to determine if the performance-enhancing drugs Superdrol Dihydrotestosterone (DHT) Mesterolone Trenbolone and the natural steroid hormone progesterone (given exogenously) directly impact progesterone (P4) production by human ovarian luteinized granulosa cells (hGC). We successfully cloned the promoter region of WRAP53. We PCR amplified our target DNA from human T98G cells and then cloned it into the TOPO vector. We then cloned the positive promoter into the pGL3 luciferase reporter construct and confirmed our results with restriction digest. Transfections were performed using 5x10^4 human U2OS cells. Following the transfections the cells were lysed and assayed for luciferase activity. Our results indicate that we successfully cloned the WRAP53 transcriptional promoter. We are currently studying the DNA damage response in the U2OS cells to determine the WRAP53 promoter response to DNA damage. This project can potentially contribute new information to cancer research and drug-therapy.

Varied Ischemic Preconditioning Protocols to Enhance Engraftment and Differentiation of Adipose-Derived Stem Cells

**Brandon Hanna**, Biomedical Engineering - Senior

Mentor: Dr. James Blanchette, Chemical Engineering

Stem cell therapy is one of the most promising techniques to treat a defect in an organ. But it’s efficiency and efficacy is limited due to the low survival of transplanted cells in the target tissue. Therefore strategies to enhance cell survival are important for their engraftment and differentiation. Ischemic preconditioning (IPC) is a suggested strategy to provide multiple responses that could be favorable to protect against a lethal environment when they are transplanted. In this study we aimed to test different IPC protocols wherein we place the ADSCs at specific higher or lower oxygen concentrations in-vitro as compared to the levels present at the transplantation site which would stimulate expression of proteins that would prevent hypoxia and cytokine-induced apoptosis at the tissue injury site. To do this Adipose-derived Stem Cells (ADSCs) were seeded on 6-well plates and experienced 1% 2% and 20% (control) IPC conditions for up to 96 hours of preconditioning. Stemness and apoptosis was measured via flow cytometry and western blotting was performed for multiple markers including apoptotic and hypoxia-inducible factor (HIF). Osteogenic differentiation was also performed over a 28 day period at the conditions and later used to measure alkaline.
Building a repressor knot: Functional roles for palindromic elements in gene regulation in E. coli
Priyanka Patel, Biological Sciences - Sophomore
Mentor: Dr. 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 suggested that YqjI regulates transcription of the adjacent target genes by inducing or stabilizing DNA bends/loops in order to block access of the RNA polymerase enzyme to the target promoters. Several repetitive extragenic palindromic (REP) elements are found in the yqjH-yqjI intergenic region between the two promoters and may help facilitate this hypothetical DNA bending process. Beta-galactosidase assays conducted on promoter-lacZ fusions in vivo show that deletion of the REP sequences had little effect on the yqjI promoter but strongly de-repressed expression of yqjH. This result indicates the importance of the REP elements for proper YqjI regulation of yqjH possibly by stimulating DNA bending to bring distant promoters together in order to block access of the RNA Polymerase enzyme to the target promoters. Since changing the length of DNA can also affect its capacity to bend we also are characterizing point mutations of the REP elements (rather than complete deletions). This approach will allow us to confirm our initial results while maintaining the same length of DNA between the yqjH-yqjI promoters.

Precipitation of Human Thymidylate Synthase from Recombinant Bacteria with Polyethylenimine
Aryel Lyra, Pharmacy - Sophomore
Mentor: Dr. Sondra Berger, Pharmaceutical and Biomedical Sciences
Human thymidylate synthase (hTS) is an important target for colon cancer treatment; yet, resistance to drugs that target hTS reduces patient survival. Recent studies have shown that the human enzyme exists in a catalytically inactive form, which is a novel target for new drug development. To facilitate drug discovery, recombinant bacteria were created that express hTS at 5-7% of total soluble protein. In purification of hTS from bacteria, two overlapping peaks of enzyme activity were observed during affinity chromatography. Previous studies indicated that hTS binds to nucleic acids. We postulated that one of the peaks of enzyme activity is hTS in complex with nucleic acids. Polyethylenimine (PEI) causes precipitation of nucleic acids and acidic proteins at low ionic strength by forming charge neutralization complexes and cross bridges between the complexes. The effect of PEI on hTS has not been reported. For obtaining hTS, preparative-scale cultivation of recombinant bacteria expressing hTS was performed, yielding 3.0 g of bacteria per liter. Cells were lysed by sonication in 50 mM Tris-HCl, pH 7.4 containing 20 mM β-mercaptoethanol, 1 mM EDTA, 1 mM phenylmethylsulfonyl fluoride, and 1 mg/ml lysozyme. After removal of cell debris by centrifugation, cell extracts were treated with PEI at the following concentrations: 0% (control), 0.1%, 0.15%, 0.2%, and 0.25%. After centrifugation to remove precipitated nucleic acids and protein, TS activity was analyzed. Pellets of increasing size were observed with increasing PEI. Importantly, there was no significant precipitation of hTS up to 0.25% and the specific activity in the soluble fraction was increased by approximately 3-fold. The data suggest that PEI not only removes nucleic acids from cell extracts, but also increases the purity of the enzyme in the soluble fraction. The effect of PEI treatment prior to purification of hTS by affinity chromatography is under investigation.

MicroRNA and Inhibition
Contessica McKinney, Biological Sciences - Junior
Mentor: Dr. Ashok Chauhan, Pathology and Microbiology
Dr. Ashok Chauhan’s laboratory research is focused around HIV infection antivirals and the molecular biology of the HIV virus. We are working on immune defenses against HIV and various ways to induce this defense in the body. To experiment lab consisted of cell culture HIV-1 replication and transfection. The methods used created stable cell lines allowed for a HIV model to be produced and miRNA to be tested on the subject. When data was collected HIV-1 infection didn’t spread as much in the cells transfected with the miRNA 29a. The results show that micro RNAs such as 29a and 223 can suppress the HIV-1 infection. These findings are significant in helping to design effective vaccines and inhibitors.
**Identifying the glutathione S-transferase gene family in fruitfly Drosophila.**

**Rick Brown**, Biological Sciences - Senior  
Mentor: Dr. Bob Friedman, Biological Sciences  
I identified the glutathione S-transferase gene family in fruitfly Drosophila melanogaster by searching its genomic sequence. Protein sequences from a previous study were used as a core set and then a Blast-based procedure located their precise positions in the fruitfly genome. We also searched for members of this gene family not previously identified. This process can be extended to other species of this insect family such as the mosquito genomes.

**Association of lipocalin-2 in colorectal cancer metastasis to the liver**

**Fides Elamparo**, Biochemistry and Molecular Biology - Junior  
Mentor: Dr. Maria Pena, Biological Sciences  
Metastasis frequently from the colon to the liver is the major cause of death with colorectal cancer reducing the five-year survival to less than 12%. Metastasis occurs due to productive collaborations between tumor cells and host-derived cells in the tumor microenvironment where a pre-metastatic niche is created to prime for cancer cell invasion into the target organ. In a highly metastatic colorectal cancer cell line implanted into the cecum of Balb/c mice microarray analysis showed LCN2 is the most highly expressed protein in the liver of tumor-bearing mice prior to metastasis. Western blot analysis and examination of blood serum by ELISA illustrated increased levels of LCN2 as tumors progressed into metastasis with similar results when RT-PCR was performed as greater levels of LCN2 mRNA were found in highly metastatic cells in contrast to less metastatic cells. It has been found that LCN2 is highly associated with the promotion of colorectal cancer metastasis to the liver with increased levels connected to the advancement of metastatic progression.

**The Effect of IL-6 Loss on Initial Ladder Climbing Exercise-Induced Changes in Strength and Muscle Mass**

**Amber Engel**, Exercise Science - Junior  
Mentor: Dr. James Carson, Exercise Science  
IL-6 contributes to skeletal muscle and systemic responses to exercise. It has been previously shown that mice lacking IL-6 have decreased endurance capacity an altered response to chronic overload and have a prolonged recovery period after atrophy. PURPOSE: The purpose of this study was to determine the initial effects on body composition with repeated weighted ladder climbing exercise on mice lacking IL-6. METHODS: Wild type (WT) (control: n = 3 trained: n = 5) and IL-6 KO (KO) (control: n = 3 trained: n = 4) mice started weighted ladder training (WLT) at 18-20 weeks of age. They were trained every other day for 6 days with progressively increasing weights. RESULTS: WT mice had a 1.2 fold increase (p = 0.04) in tibialis anterior weight with WLT (con: 61.7 ± 2.2 mg WLT: 73.0 ± 3.2 mg); whereas no increase (p = 0.66) was seen in the KO (con: 56.2 ± 3.8 mg WLT: 53.8 ± 3.5 mg). WLT increased volitional grip strength in both the WT (p= 0.03; con: 2.37 ± 0.08 N WLT: 2.59 ± 0.10 N) and in KO (p 0.01; con: 2.35 ± 0.05 N WLT: 2.57 ± 0.05 N). CONCLUSION: Our results suggest that initial changes in volitional strength with ladder training are independent of IL-6 while IL-6 may be important for initial changes in ladder exercise-induced muscle mass.

**Characterizing the Mechanical Behavior of Cancer Cells by Tracking Displacement of Gold Nanorods**

**Kara Garrott**, Biomedical Engineering - Senior  
Mentor: Dr. Edie Goldsmith, Cell Biology and Anatomy  
Cancer is a devastating disease that affects countless Americans. Based on statistics from the American Cancer Society, over 1.6 million new cases of cancer occurred in 2012 with an anticipated 600,000 deaths. Cancerous tumor cells are surrounded by a complex extracellular matrix environment containing a variety of proteins, including the structural protein collagen. The collagen surrounding tumors generally demonstrates a greater level of cross-linking, which can alter matrix stiffness, changing the response of tumor cells to their local environment and affecting tumor cell migration. The goal of this project was to investigate the strain fields that result when cancer cells exert local forces on the surrounding collagen matrix and to relate this measured mechanical behavior to the known aggressiveness or stage in tumor progression. To accomplish this goal, three different colon cancer cell lines (SW 948, SW 837, SW 1417) representing different grades of colon cancer were used. Cancer cells were plated on collagen matrices seeded with gold nanoparticles. The displacement of light scattered from the nanoparticles, produced by cell-induced deformations in the collagen matrix, was captured by dark field microscopy. VIC-2D image correlation software was used to analyze the displacements and calculate strains. SW948 and SW837 cell lines demonstrated the greatest strain increase while SW1417 cells generated the lowest strains with the measured strains correlating to the tumorgenicity of each cell line. Understanding how tumor cells respond to their local mechanical environment may provide insight into the mechanisms regulating tumor metastasis and give a basis for novel therapeutic strategies.

**Effect of Resveratrol on Aggregation of Amyloid-β (Aβ) Protein in Alzheimer’s Disease (AD)**

**Steve Marcous**, Biomedical Engineering - Senior  
Mentor: Dr. Melissa Moss, Chemical Engineering  
Alzheimer’s disease (AD) is a progressive neurodegenerative disorder that eventually causes the brain to become impaired. Patients diagnosed with AD are characterized by their inability to form new memories due to neuronal death. Neuronal death occurs as a result of the continuous accumulation of the amyloid-β protein (Aβ) in an aggregated, fibrillar form. Aβ fibrils deposit within the brain and are associated with neuronal dysfunction. Resveratrol is a strong antioxidant that is found in red grapes and consequently red wine. Epidemiological evidence suggests a correlation between the consumption of red wine and a reduced instance of AD. Thus, resveratrol was investigated for its ability to prevent the aggregation of Aβ protein; in particular, its effect on intermediate stages of Aβ fibril formation. Elongation and association assays were employed to determine the ability of resveratrol to inhibit post-nucleation stages of Aβ aggregation.
Examining the Role of Two eIF2α Kinases During Stress-Induced Apoptosis in Neuronal Cells

**Brittany Snee**, Biological Sciences - Senior
Mentor: Dr. Rekha Patel, Biological Sciences

The goal of this study is to examine the contribution of protein kinase PKR to induction of apoptosis in response to endoplasmic reticulum (ER) stress. Calcium mobilization, prevention of protein glycosylation, or accumulation of misfolded proteins causes ER stress and triggers programmed cell death or apoptosis. Previously in Dr. Patel’s lab, a stably transfected neuroblastoma cell line SK-N-SH was established to overexpress a trans-dominant negative mutant of PKR (K296R). PKR is rendered inactive due to mutation of the lysine 296 involved in ATP-binding. K296R binds to endogenous wildtype PKR and renders it inactive, thus reducing the PKR activity in cells. I used tunicamycin to induce ER stress primarily by blocking n-linked glycosylation of newly formed proteins, trapping them in the ER. My results demonstrate that the K296R cells show a marked decrease in apoptosis as compared to the parental (WT) cells. Western blot analysis showed that tunicamycin treated wild-type and K296R cells display a difference in phosphorylated eIF2α levels. I am currently examining the effect of PKR inhibition on kinase activity of PERK (PKR-like ER resident kinase), another important protein kinase involved in mediating apoptosis. PERK and PKR regulate cell fate in response to ER stress and the relative contribution of these two kinases to apoptosis has not been examined to date. ER stress plays an important role in onset and progression of neurodegenerative disorders such as Alzheimer’s and Huntington’s, and our research will identify targets for novel therapeutic treatments that could slow the progression or even reverse these disorders.

Sequencing of the new Animal Phylogeny

**Logan Peake**, Biological Sciences - Senior
Mentor: Dr. Bob Friedman, Biological Sciences

From the discovery of a new animal phylogeny prompted from ribosomal genes some year ago I will test this new phylogeny. Using 18S rRNA gene sequences from species across the animal kingdom and trying to obtain similar results from what has been discovered from the Bayesian inference protein tree. Based on ribosomal and nuclear information I will construct a phylogenetic tree.

Synthesis and Characterization of Hydrolytically Degradable Polyethylene Glycol Hydrogels for use in Tissue Engineering

**John Sieracke**, Biomedical Engineering - Junior
Mentor: Dr. Esmaiel Jabbari, Chemical Engineering

Hydrogels are hydrophilic polymeric networks capable of absorbing large amount of water without dissolving. Poly(ethylene glycol) (PEG), due to biocompatibility and water solubility, is one of the most studied polymers for producing hydrogels in biomedical applications. However, the polymer's lack of degradability limits its applications. To produce a hydrogel with the desirable mechanical properties of PEG and the hydrolytic degradability required for in vivo applications, star poly(ethylene glycol-co-lactide) acrylate (SPELA) macromonomers were synthesized using ring opening polymerization of PEG and lactide. The hydrogels were then characterized in the areas of modulus, gelation time, water content, sol fraction, and degradation. These properties were compared to the properties of linear poly(ethylene glycol-co-lactide) acrylate (LPELA). SPELA showed a shear modulus 2.2 times higher than that of LPELA. The sol fraction of SPELA was 5 times lower than that of LPELA. The degradation rates of SPELA were found to be greatly dependent upon the number of lactide monomers per macromonomer (nL). The degradation rates showed a biphasic behavior. After 6 weeks of incubation, the hydrogel with nL of 0 had a mass loss of 7%. The mass losses of nL or 3.4, 6.4, 11.6, and 14.8 were 37%, 80%, 100%, and 87% respectively. The results of these experiments demonstrate that the addition of different length lactide segments to PEG hydrogels causes significant changes in the mechanical properties of the hydrogels. They also demonstrate the potential for the use of hydrolytically degradable PEG-based hydrogels as scaffolds for tissue engineering and regenerative medicine.
Effect of Sediment Trap Preservatives on Phytoplankton Pigment Identification and Quantification

Christen Armstrong, Marine Science - Senior
Mentor: Dr. James Pinckney, Biological Sciences

Researchers commonly use sediment traps to collect and preserve particles in the water column over various periods of time ranging from days to months. These collections help scientists discover clues in ocean circulation and nutrient cycling. Although the effects of sediment trap preservatives on zooplankton, phosphorous, carbon and nitrogen flux [1] are well-documented, surprisingly few studies have attempted to measure the effects of the preservatives on phytoplankton pigments. [3] In this study pigment biomarker composition and concentrations were compared in two common types of sediment trap preservatives (formalin, sodium azide) with un-preserved controls. Eight types of phytoplankton cultures were exposed to preservatives for 24 hours, 1 week, 2 weeks, 4 weeks, and 8 weeks. Pigment composition and concentrations for the different exposure times were determined using HPLC. Preliminary results suggest the pigments are completely degraded in the preservatives after 8 weeks. The results of this experiment will help identify and quantify phytoplankton in sediment traps using pigment biomarkers to estimate their contributions to the downward vertical flux of a variety of elements and compounds, such as carbon. These results will provide insights into how ocean systems may respond to increasing atmospheric CO2 concentrations as well as climate induced changes in surface water mixing and nutrient availability.

Freshwater Fish Assemblages as an Indicator of Degraded Habitat Health

Victoria Barker, Marine Science - Senior
Mentor: Dr. Virginia Shervette, Biology; USC Aiken

There are many ways to monitor the health of an ecosystem. This study investigated whether freshwater fish communities are a reliable variable against the fitness of an ecosystem could be measured. I hypothesized that fish populations would be more diverse and individuals would have a higher biomass in healthy ecosystems than degraded ones. Two sites in Aiken SC were selected with varying degrees of contamination. All fish were collected via backpack electroshocker and samples were taxonomically identified to the species level with weight and length measurements gathered. Fish biomass and biodiversity were compared to abiotic factors such as oxygen saturation pH and temperature. Over 1000 samples were taken between the dates of July 8 2011 and October 18 2012 constituting 25 species from 18 genera. Only four species form the composition of both streams with the remaining 21 species being endemic to only one site. Certain species such as the Pirate Perch (Aphredoderus sayanus) follow a very strict growth rate with standard length and weight being nearly proportional at all sizes. Other species such as the Tesselated Darter (Percina nigrofasciata) show far more variability. This study builds upon previous research concerning fish assemblages in the anthropogenically-degraded Savannah River Basin and shows the impact of pollution and disturbance upon aquatic systems and fish communities. Additionally it holds significant importance for conservation biology and management techniques in the Aiken SC region.

Determination of Pollen-to-Ovule Ratios to Infer Mating Systems in Silene

Donathan Dendy, Biology - Senior; USC Upstate
Mentor: Dr. Benjamin Montgomery, Natural Sciences & Engineering; USC Upstate

Plants have various mating systems including self-pollination (autogamy) cross-pollination (xenogamy) or a combination of strategies. Pollen-to-ovule ratios tend to reflect a species’ breeding system; lower ratios suggest self pollination while higher ratios suggest cross pollination. We sought to determine pollen-to-ovule ratios of six Silene species at a study site in Yunnan Province China in order to infer their likely mating systems. For at least 10 flowers of each species anthers and ovules were collected. The numbers of ovules and pollen grains per flower were determined and from this data pollen-to-ovule ratios (P/O ratio) were calculated. Two species (S. gracilicaulis and S. yunnanensis) have high pollen-to-ovule ratios that suggest reliance on cross pollination; two species (S. asclepiadaceae and S. chungtienensis) have intermediate ratios that suggest a mixed pollination strategy; two species (S. hugguettiae and S. nepalensis) have low ratios that suggest self-pollination. Ongoing research investigates whether the self-pollinating species are better at avoiding damage from a moth pollinator whose larvae feed on Silene flowers.

Determining Genotype to Phenotype Relationships via Genotyping by Sequencing (GBS)

Katherine Hicks, Marine Science - Senior
Mentor: Dr. Stephen Kresovich, Biological Sciences

Understanding the relationship of genotype to phenotype is a fundamental objective in genetics and genomics. The objective of this research was to explore the effectiveness of genotyping-by-sequencing (GBS) for both agricultural and medical applications. Sorghum plants were grown under controlled conditions and then extracted DNA to be analyzed using GBS. The accuracy precision and reproducibility of GBS were determined. Also with GBS we attempted to establish the molecular framework to dissect the genetic basis of important phenotypes of the five races of sorghum. I expanded my research to link this genotyping method to dissect the genetic basis of key phenotypic traits in sorghum and in parallel linked this approach to characterizing important phenotypic traits in humans (genetic basis of diseases). This project helped further our understanding of the importance of genetic variation and its genetic basis in a range of materials representing diverse sorghum phenotypes. I learned that GBS is an accurate and quick method to further the understanding of the genetics of a species that is relatively easy to employ independent of the complexity of the species’ genome. I also learned that it could have many uses in underlying genetic foundation in the development of personalized medicine. In the case of crop improvement of sorghum it can help determine the genetic basis of phenotypic traits that are of value for production or human health. Its simplicity reproducibility and robustness make it an invaluable tool for genetic studies of genome organization and the inheritance of phenotypic traits.
Going No-Till at City Roots
Ross Johnson, Management Science - Junior
Mentor: Dr. Robin Kloot, Earth Sciences and Resources Institute
Over the next three years a local urban organic farm located in Columbia South Carolina known as City Roots will be phasing in a sustainable form of agriculture known as no-till. No-till is almost unheard of in vegetable/fruit farming. This project is being made possible by a Conservation and Innovation Grant from the USDA’s Natural Resource Conservation Service. The grant was awarded to City Roots farm manager Eric McClam and Buz Kloot a Research Associate Professor in environmental sciences at USC’s Earth Sciences and Resource Institute. The goal of the grant is to analyze the benefits of no-till vs. conventional till farming. As a research assistant working on this grant I am part of a small team responsible for conducting field tests recording quantitative and qualitative observations as well as collecting and analyzing soil samples from each field as they are converted to no-till. The field tests and observations range from measuring the infiltration rate of each field to taking soil slices and observing the different soil structures and how they are altered by the implementation of the no-till method. By collecting soil samples we are able to look at everything from the soils bulk density pH nitrate levels soil respiration through soil CO2 burst testing and nutrient composition. All of these data are taken into account when examining the changes that switching to no-till will have on the health of the soil. We expect that over time these tests will prove various advantages of the no-till method.

Ecological Effects of Resource Polymorphism in a Salt Marsh Crab Predator
Burns Newsome, Marine Science - Senior
Mentor: Dr. Blaine Griffen, Biological Sciences
Resource polymorphism is defined as morphological differences within a species related to differences in resource use (e.g. food or habitat). The mud crab Panopeus obesus occupies both oyster reef and salt marsh habitats in North Inlet SC and we tested for resource polymorphism in this crab by examining its morphology and diet across these habitats. We also compared the diet and morphology of P. obesus from reef and marsh to the obligate reef crab Panopeus herbstdii to test for morphological convergence. Last we examined how morphological changes affect crab feeding efficiency on bivalve prey in laboratory trials. In general P. obesus from the reef were intermediate in morphology between P. obesus from the marsh and P. herbstdii though some of these shape differences were driven by the larger size of P. obesus from the reef. Gut contents of P. obesus from the reef contained more oysters than P. obesus from the marsh. Feeding efficiency trials revealed that these morphological differences between P. obesus ecotypes confer some functional advantage in consuming hard-shelled bivalves from the reef habitat. However behavioral differences cannot be ruled out in driving feeding efficiency differences and future work should distinguish between these mechanisms.

Larval transport modeling – how to choose the ocean model
Hilde Oliver, Mathematics - Junior
Mentor: Dr. David Wethey, Biological Sciences
In order to estimate connectivity among benthic populations planktonic larvae are often modelled as Lagrangian passive particles using currents from numerical ocean models. We examined larval trajectories predicted by several operational models of the English Channel. Larval trajectories from different models diverged significantly after 5 days in some cases going in opposite directions. We developed statistical methods for measuring the rate of divergence among trajectories and for quantifying differences in connectivity estimates among models. We also measured the spatial scale of dispersal and compared it to empirical observations. The US Navy HYCOM model greatly overestimates transport and the UK Meteorological Office NEMO model sometimes has trajectories going in the opposite direction from the French MARS3D and MARS2D as well as the Spanish IBI – NEMO model. The French models appear to give the most realistic trajectories.

Geophysical model of granitic intrusives surrounding the Haile Gold Mine
Lancaster County SC using high resolution gravity data
Thomas Tuten, Geophysics - Senior
Mentor: Dr. James Kellogg, Earth and Ocean Sciences
The geometry of the Haile Gold Mine sediment contacts with the granitic plutons intruding it has been determined by forward modeling the gravity field from high density survey data provided by Romarco Inc. The new model takes advantage of the density contrast between the granite and the metasedimentary rocks hosting the gold mineralization. Locally the gold mineralization is found in the metasediments adjacent to the granite plutons. It was unknown whether the granite sediment contacts were vertical domed (with the sediments on top) or mushroom shaped (with mineralization hidden under the granite). 2 and 3-dimensional forward density models were developed with Oasis montaj software to match the observed gravity values. Although potential field models are inherently non-unique the large density-contrast between the granite and metasediments results in a reliable boundary model. Gravity and magnetic methods have proven to be effective in the identification of prospective gold districts mapping intrusions in sedimentary and volcanic terrain and identifying hydrothermal alteration. Gold mining operations in South Carolina were the first large scale gold mines in the United States with the Haile and Brewer gold mines opening in the late 1820’s. These gold mines are located in the Carolina Slate Belt part of a volcanic arc terrane that was accreted to North America during Paleozoic time. The Haile gold mineralization is hosted in Late Proterozoic to Cambrian aged sediments adjacent to older felsic volcanics. The gold host metasedimentary rocks subsequently underwent greenschist metamorphism folding and thrusting and granitic intrusions during Paleozoic age arc accretion and the continental collision that produced the Appalachian mountain chain and the Pangaea supercontinent.
Environmental Sciences II

Evaluating the impact of claw removal on diet physiological condition and reproductive abilities of the female Stone crab (Menippe spp.)

Erin Adams, Geological Sciences - Senior
Mentor: Dr. Blaine Griffen, Biological Sciences
The stone crab is a commercially important species throughout much of the Southern United States and is estimated to be worth about $706,000 in South Atlantic landings annually (National Marine Fishery Service 2010). The stone crab fishery is a sustainable fishery in that claws are removed from captured crabs and then crabs are returned alive to the ocean with the idea that they will regrow the claw on a subsequent molt. However, fishery-caused claw loss may cause a diet shift towards less preferred foods that are easier to handle but that are less nutritious. Data gained from this study will quantify diet shifts and measure any impacts on physiological condition and reproductive output of female crabs. This information will subsequently be used to assess the sustainability of current fishing practices.

The Sweet Smell of Carolina Jessamine: Evaluating the Floral Scent Profile of Gelsemium sempervirens

Austin Blackwell, Biological Sciences - Sophomore; USC Lancaster
Mentors: Dr. Bettie Obi Johnson, Chemistry; USC Lancaster  Dr. Annette Golonka, Biology; USC Lancaster
Gelsemium sempervirens commonly known as Yellow Jessamine or Carolina Jessamine is a toxic perennial distylous climbing shrub indigenous to the piedmont and coastal areas of the southeastern United States. The plant produces nectar and is pollinated by species of bees wasps flies and butterflies. While floral scent is known to play an important role in chemical communication between flowering plants and their pollinators there has been little research on the floral scent composition of this native South Carolina plant known for its sweet aroma. In order to identify the sweet scent of G. sempervirens a solid phase micro-extraction and gas chromatography-mass spectrometry (SPME-GC-MS) method was developed to separately detect and identify the volatile organic compounds present in the flower. Initial test results have revealed a number of volatile organic compounds emanating from the flowers including: benzaldehyde 4-methoxybenzaldehyde benzyl benzoate benzyl alcohol acetophenone hexyl acetate ethanol 2-methyl-2-propanol 4-methyl-1-pentanol and 2-ethoxy-2-methyl-propane. Future plans include verification and quantification of the floral scent compounds present in this species. In addition the floral nectar will be evaluated for nectar inhabiting microorganisms and their potential impact on scent. The results of this project will provide information on the scent compounds that contribute to the specific aroma of G. sempervirens and the impact of microbes on the scent profile of the plant.

Arabidopsis Plants MAP Kinase Activity Affected by Various Protein Phosphatases

Lynn Boyd, Biological Sciences - Senior
Mentor: Dr. Johannes Stratmann, Biological Sciences
The motivation behind my research project was to shed more light on stress signal transduction in the model plant Arabidopsis. In particular we were interested in the effects that knock-out of MAP kinase phosphatase genes would have on MAP Kinase (MAPK) activity. MAPKs are signal transducing enzymes that mediate the response to stress signals. MAPK phosphatases are enzymes that negatively regulate the activity of MAPKs and thereby determine how strong the MAPK activation will be and how long MAPKs are active. This may have important consequences for the stress responses that MAPKs activate. It was hypothesized that knock-out of genes coding for the dual-specificity protein phosphatases IBR5 MKP1 PHS1 and DsPTP1 and the ser/thr-phosphatases ABI1 AtPTP1 and PP2C5 will result in sustained MAP Kinase activity since MAPK downregulation in the absence of these phosphatases should be reduced; Wildtype (Col-0) Arabidopsis plants will be used as a control to compare MAPK activity between all different lines of plants. In order to complete this experiment various protocols were followed and adjusted when necessary.

Phytoplankton Community Composition in Stormwater Detention Ponds Near Myrtle Beach SC

Lauren Hehman, Marine Science - Senior
Mentors: Dr. Tammi Richardson, Biological Sciences  Dr. Erik Smith, Baruch Marine Field Laboratory
A common feature of South Carolina’s coastal communities is the management of stormwater runoff by the construction of stormwater detention ponds. Residential communities often use these stormwater ponds as a way to “beautify” their neighborhood and increase property value. However stormwater ponds by design capture nutrient-rich runoff from heavily-fertilized lawns and are thus the sites of rapid algal growth including species that are potentially toxic or harmful. In this study we examined phytoplankton community composition in stormwater ponds along the South Carolina coastline from North Myrtle Beach to Pawley’s Island. We hypothesized that community composition will vary with the concentrations and forms of nutrients present (nitrogen and phosphorus) and with the addition of copper sulfate (a common algaecide). We used measurements of chemical parameters taken with a handheld YSI HPLC analysis of diagnostic photopigments and microscopy to determine community composition. Total nitrogen to total phosphorus concentrations were determined by using standard methods for wastewater analysis. Our results indicate that there is a shift in composition and total biomass that is related to nutrient availability spatial distributions and treatment within the ponds. This research has broad-scale implications for improving coastal water quality in South Carolina as many of these stormwater ponds flow directly or indirectly into the coastal ocean and are thus potential sources of both chemical (copper) and biological (algae) pollutants.
Microalgae deposition and resuspension rates over a tidal cycle

Emma Kelley, Marine Science - Senior
Mentor: Dr. James Pinckney, Biological Sciences
South Carolina is home to major economically important fisheries for shrimp blue crab oysters clams shad catfish and various species. Understanding the food webs supporting these species is essential to effectively managing the coastal environment. Microalgae are essential primary producers in the marine environment and understanding their sources has major implications for our understanding of their roles in these economically important food webs. Current research suggests that concentrations of microalgae in the water column are higher during ebb flow than during the tidal flood. The differences in concentrations cannot be explained by algal growth alone and suggest the resuspension of deposited phytoplankton and benthic microalgae from the sediment surface. This project will quantify the rates at which suspended microalgae are deposited on the sediment surface and resuspended by tidal flows.

Assessment of Traits Contributing to Delayed Self Pollination in Linum rigidum

Caleb Phillips, Biology - Junior; USC Upstate
Mentor: Dr. Benjamin Montgomery, Natural Sciences & Engineering; USC Upstate
Linum rigidum (stiff flax) appears to have a mechanism for delayed self pollination at the time that petals abscise. We investigate two factors that may affect Linum's ability to sire seeds by self-pollination. We determine the extent to which petals abscission causes a reduction in spatial separation of anthers and stigma (herkogamy) and whether self pollen can sire seeds (i.e. self-compatibility). Herkogamy significantly decreased after petal removal in comparison to flowers with petals intact. In a breeding-system study we pollinated flowers with either cross or self pollen and harvested stigmas and styles one day later for viewing with fluorescent microscopy in order to detect pollen tubes. Most flowers in both treatments had pollen tubes present and the proportion of flowers with pollen tubes did not significantly differ among treatments. Cross pollinated flowers had pollen tubes that reached the base of the style more often than self pollinated flowers; however the difference was not statistically significant. Additionally fruit set was identical and seed set was not significantly different between pollination treatments. Together these results indicate that petal abscission reduces herkogamy which may facilitate delayed self pollination and L. rigidum is self compatible so pollen received when petals abscise can sire seeds.

Effect of diet on physiological and reproductive condition in the mangrove tree crab Aratus pisonii

Margaret Vogel, Marine Science - Senior
Mentor: Dr. Blaine Griffen, Biological Sciences
The mangrove tree crab Aratus pisonii is a major consumer of live Rhizophora mangle leaf one of the predominant species of mangrove trees in neotropical mangrove systems. Literature documenting their trophic behavior has often reported the species as being primarily herbivorous. However recent field observations and gut content analyses have revealed that the diet choices of A. pisonii are more accurately described as omnivorous. In order to investigate the implications of A. pisonii’s omnivorous behavior for physiological condition and reproductive output a controlled diet experiment varying both the type (proportion of plant and animal material) and amount of food offered to A. pisonii was performed in a long-term laboratory setting. In combination with field collections that provide snapshots of A. pisonii’s natural diet choices physiological condition and reproductive patterns this study provides insight into the effect of individual diet choices on the overall physiological and reproductive condition of a key consumer in neotropical mangrove systems.
Rate of Seroconversion Following Hepatitis B Vaccination Among Healthcare Students: A Pilot Study

Chelsea Ambrose, Pharmacy - Senior
Sara Wolf, Pharmacy - Senior

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

Background: Requirements for proof of protective Hepatitis B virus (HBV) titers in students enrolled in health science schools affords a unique opportunity to assess HBV seroconversion rates. The purpose of this study was to determine the HBV seroconversion rate in healthcare students at an academic institution in the Southeastern United States. Methods: This study has been approved by the Institutional Review Board. A retrospective, non-interventional pilot study was conducted at the University of South Carolina in Columbia, South Carolina in all pharmacy, nursing, and medical students enrolled between 2007 and 2011. Demographic data, dates of HBV vaccinations, and HBV titer results, were collected by immunization chart review. The primary endpoint is the percentage of students with positive Hepatitis B titers (≥10 IU/mL) after receiving the initial Hepatitis B vaccination series. A detailed assessment will be performed on data from students with an initial negative titer at enrollment that required HBV “booster” series. Results: Results from all healthcare students show 84% (597/712) of students had positive titers and averaged 9.6 years between completion of HBV vaccination series and follow-up titer. Students with initial negative titers 16% (115/712) had 10.8 years on average between last vaccination and titer. Conclusions: A seropositive rate of 83% among health science students is similar to limited published data. Increased rate of seroconversion was seen among students who completed the primary HBV series, with less time between last HBV vaccination and titer. With nearly 20% of health science students having a seronegative titer, documentation and established policies are critical.

Prediction of vancomycin clearance in obese pediatric patients

Caroline Enoch, Pharmacy - Senior
Dr. Christina Piro, Pharmacy

Mentors: Dr. Brandon Bookstaver, Pharmacy
Dr. Shawn Youngstedt, Exercise Science

Background: Childhood obesity has reached a prevalence of 17% both nationally and in South Carolina. Altered pharmacokinetics in obesity presents recognized challenges in antimicrobial dosing and glomerular filtration rate (GFR) estimation. The objective of this study was to determine which GFR estimation formula best correlates with patient-specific vancomycin clearance (VCl) in obese pediatric patients and identify host factors associated with formula precision. Methods: This IRB-approved retrospective, single center study compared VCl estimation among 4 formulas to patient-specific VCl in obese pediatric patients. Formulas included for evaluation were Cockcroft-Gault (CG), Salazar-Corcoran, Schwartz and the new bedside Schwartz. Obesity was defined as a body mass index >95th percentile of weight per height. VCl was calculated using patient-specific serum renal function formulas and patient-specific VCl. Results: A total of 65 patients, 22 obese and 43 non-obese were included. Mean VCl was calculated to be 89ml/min for obese patients and 75ml/min for non-obese patients. The CG equation was most closely correlated to mean VCl, estimating clearance to be 129ml/min and 123ml/min respectively. Conclusions: All formulas grossly overestimated VCl. Age ≥ 14 years, height ≥ 134cm and serum creatinine < 0.2 were primarily associated with discordance in estimation. The CG equation was the most precise followed by the new bedside Schwartz equation. The new Schwartz formula should be further evaluated in obese patients and those without underlying kidney disease for the purpose of medication dosing in pediatrics.

Are Depressed Seniors Sleeping Longer?

Kleve Granger, Marine Science - Senior

Mentor: Dr. Shawn Youngstedt, Exercise Science

Background: Sleep disturbances increase in prevalence with age. This study aims to characterize the correlation between night-time sleep durations in excess of 8 hours and less than 7 hours with depressive symptoms in older adults between the ages of 60 and 80. Study participants are chosen who possess long sleep durations (in excess of 8 hours), short sleep durations (less than 7 hours), and average sleep durations (~7 hours). Previous studies have indicated that sleep patterns in the adult population that exceed 8 hours or fall short of 7 hours put the subject at risk for certain morbidities (obesity, cardiovascular disease, diabetes, cognitive impairment, susceptibility to strokes, and depression). Data comes from the Geriatric Depression Scale survey (GDS) completed by study participants during specific study weeks. This data set is collected over a 14 week period. Analysis of our cross-sectional sample indicates that a longer sleep duration correlates with a higher chance of depression, and those with longer sleep durations are six times more likely to suffer from mild
depressive symptoms as opposed to average sleepers. These results indicate that sleep restriction could be explored clinically as a preventive risk measure.

**Eating Disorders Characteristics and the Effects on Fluid Balance in Female Collegiate Soccer Players**

*Erin Mulligan*, Athletic Training - Senior  
Mentor: Dr. Toni Torres-McGehee, Physical Education

Eating disorders have been characterized by a wide range of attitudes and behaviors related to eating and weight control. The purpose of this study is to examine eating disorder characteristics which include: drive for thinness, body dissatisfaction, self-esteem perfectionism along with pathogenic behaviors: dieting, bulimia, exercise dependence, binge eating, laxative use, and the effects on fluid balance among collegiate soccer players. Eating disorder behaviors can lead to negative effects on health and physical performance and hydration changes in the body however small can negatively affect all the body systems. It is extremely important for Athletic Trainers to recognize the risks associated with both eating disorders and fluid and electrolyte imbalance in the active population. Understanding these health risks may help decrease and sometimes irreversible medical complications. These results will provide preliminary data on fluid and electrolyte balance that can be used to guide recommendations for nutritional and fluid deficiencies monitoring safety trends for eating disorder behaviors general health and weight management policies. Furthermore the results will provide information for collegiate soccer players on the importance of matching dietary intake to meet performance needs.

**Evaluation of the influence of BMI on pain management in pediatric sickle cell patients**

*Michele Nations*, Pharmacy - Senior  
Mentor: Dr. Christina Piro, Clinical Pharmacy and Outcomes Sciences

Medication dosing in pediatric patients is generally based on body weight; however there are very few recommendations concerning if and how these dosing parameters should be adjusted in overweight or obese patients. With the increasing prevalence of overweight and obese patients providers are increasingly confronted with the clinical dilemma of how best to treat patients with an elevated body mass index (BMI). Adjustments are particularly challenging when treating pain especially related to patient outcomes. For example in sickle cell patients the length of hospital stay is often dependent on the time required to achieve optimal pain control. Therefore optimal initial dosing would be beneficial to maximize the patient’s pain control and minimize the length of hospital stay. Optimal dosing may not only provide prompt and adequate pain control but also minimize adverse effects of prolonged opioid administration. The purpose of this study is to evaluate the influence of BMI on opioid dosing for pain control in sickle cell crises of pediatric patients. This retrospective chart review will evaluate 200 pediatric patients admitted to a children’s hospital for sickle cell pain crises. Data will be grouped (by definitions of underweight, healthy weight, overweight and obese) and analyzed to detect a difference in opioid pain dose needed among groups. Data collection is ongoing. The primary outcome for evaluation is total opioid dose for the course of therapy and this outcome will be used as an objective measure of pain control.

**Let’s Get Active! – A Public Health Initiative with the Waverly Afterschool Program**

*Kristen Polinski*, Public Health - Senior  
*Yasmine Elraheb*, Public Health - Senior  
*Madeleine Pressley*, Public Health - Senior  
Mentor: Dr. Kara Montgomery, Health Promotion Education and Behavior

The American Public Health Association (APHA) says that obesity is one of the most serious public health problems facing America’s youth today. Alarming statistics from the CDC in 2009-2010 support the APHA’s claim in which 18.4% of adolescents ages 12-19 are obese. Low physical activity is one of many factors associated with childhood obesity; therefore we chose to address this problem for our senior thesis project by adding a physical activity component to the Waverly After-School Program. The after-school program was established in 2003 by USC students and it provided us with access to a population within the Columbia area where childhood obesity is an issue. Our goal was not only to increase the time children in the program were physically active but also to increase each child’s enjoyment of physical activity while introducing them to new activities. We added a nutrition and public health element to enhance the children’s experience. The physical activity component was incorporated into the Waverly After-School Program in September 2012 and we worked with children ages 5-9 every Monday and Wednesday for 30-40 minutes. In March 2013 we began transitioning leadership of this project to trained USC students who will continue the physical activity component we initiated. Our project did increase the amount of time children were physically active each week. Our physical activity component is now a permanent feature within the Waverly After-School Program.

**The Effect of Exercise on Sleep Quality in Combat Veterans with PTSD**

*Madeleine Pressley*, Exercise Science - Senior  
Mentor: Dr. Shawn Youngstedt, Exercise Science

The purpose of this study was to determine the effect of exercise on sleep quality in combat veterans with PTSD. Chronic psychiatric illness such as posttraumatic stress disorder (PTSD) is a major public health problem among current and former military service members especially those who have served in combat. The disorder represents a significant and costly illness to veterans their families and society as a whole. A cardinal feature of PTSD is decreased sleep quality. According to the CDC those who exercise regularly experience improved sleep quality. Therefore exercise may be a plausible non-drug treatment for combat veterans with PTSD and poor sleep quality. The subjects in this study were randomized into an exercise or stretching group. The subjects followed specific protocols for exercising or stretching three times per week for eight weeks. Additionally the subjects completed the PSQI assessment to quantify their sleep quality prior to starting exercise treatment. Changes in sleep quality between the control and exercising groups between baseline and the third week of the study were assessed via a two-way ANOVA analysis. The p-value for the sleep quality changes between baseline and three weeks was .819 and the p-value comparing the control and exercise group was 0.299. These values are below 0.05 meaning they are insignificant. This means that exercise does not appear to have an effect on sleep quality. This could be due to the intervention time being too short to cause a significant effect.
**Increased Physical Activity and Produce Consumption as a Result of Community Garden Participation**

**Zack King, Public Health - Senior**

Mentor: Dr. Kara Montgomery, Health Promotion Education and Behavior

The American obesity epidemic has become a growing threat to the health of our nation. At the root of increasing prevalence of obesity lies physical inactivity and reduced nutrition (low nutrient high calorie). The 2010 National College Health Assessment shows that 65.9% of University of South Carolina students eat two or less servings of fruits and vegetables per day; and that 55.4% engage in moderate physical activity two or less times per week. These responses fall well below criteria to maintain a healthy weight prevent chronic disease and avoid negative health outcomes. Finding ways to empower the student body to eat a healthier diet and be more physically active is key in helping our campus be as healthy and wellness-oriented as possible. In response to the growing attention to nutrition and sustainability on campus the Outdoor Recreation opened the Carolina Community Garden in the Fall 2012 semester. Community gardens have been used throughout American history and are widely accepted as beneficial in regards to healthy eating and community empowerment towards healthy lifestyles. Current research also shows that while there is a definite link between gardening and nutrition there has been little conversation about physical activity. In fact there is a need for research on community gardening as a practice in general. The purpose of this study was to (1) evaluate the nutritional habits and physical activity of both active Carolina Community Garden participants in comparison to non-participants; and (2) to analyze the effect of self-efficacy and attitudes on garden participation as well as any results garden participation had on attitude and behavior change.

**Comparison of Demographic and Behavioral Characteristics between Young Adults Entering Basic Combat Training and Young Adults Entering College**

**Sarah DePaepe, Exercise Science - Senior**

Mentors: Dr. Shawn Youngstedt, Exercise Science  
Ms. Shannon Crowley, Exercise Science

High school students have a variety of paths they can take after graduation some might choose college and some might choose the military. The literature shows that people with certain demographics and backgrounds tend to choose one path over another but less is known about differences in psychological health variables between the two groups. We compared characteristics of a military population using cross-sectional data from the larger Soldier Health Promotion to Examine and Reduce Health Disparities (SHERPHD) project to data obtained from a literature review of college populations. We compared the groups on the following variables: gender race/ethnicity family income (yearly) and depression. College population data was obtained by conducting a literature search using these databases: Pubmed Google Scholar EBSCO and Psynet. Keywords used included race mental health depression students college university income and socioeconomic status. Compared to a similarly-aged college population the Army BCT group was comprised of more males (72.4% vs. 35.1%) had a higher percentage of individuals with a household income over $50K/year (49% vs. 20%) and had a higher percentage of individuals reporting their race as African-American (25% vs. 6.4%). Additionally compared to the college population the Army group showed higher depressive symptoms (36.3% vs. ~16%). Differences observed in depressive symptoms between the Army group and the college population data may be due in part to differences in race gender and socioeconomic status observed between the groups in this study.
Red Alert: Minimizing Pediatric Anemia at Palmetto Health Children’s Hospital
Kathryn Lucas, Biological Sciences - Junior
Mentors: Dr. Patrick Hickey, Capstone Scholars
Dr. Elizabeth Mack, Palmetto Health Children’s Hospital
Blood transfusions in contemporary clinical studies have shown to produce more complications than benefits for overall patient health than previously believed. Particularly in child patients harmful hemolytic allergic and febrile reactions can accompany transfusions in response to low hemoglobin levels. However there is no official anemic “transfusion trigger” at which a physician decides transfusion should begin and is instead often decided by the personal discomfort of the physician. The Palmetto Health Hospital system has assembled a Patient Blood Management team of physicians and administrators across several disciplines to establish anemia management guidelines for adult and pediatric patients. The goal of the Children’s Hospital PBM team is to address how to minimize anemia by creating protocols to conserve blood drawn for lab testing. I analyze blood draw data from one week of each month from each unit in the Children’s Hospital and synthesize a number of measures that indicate where blood can be better conserved. Each measure is now being compiled into reports for the physician and nursing staff to sustain the effort for maximum blood conservation amongst the pediatric population. The study is still relatively new but through greater education on blood conservation we have observed general downward trends in mLs drawn across the units since the beginning of the program in January 2011. Through the efforts of this team pediatric patients could experience fewer anemic events shorter hospital stays and fewer transfusion-related illnesses.

Efficacy of Opioid Rotation in a Pediatric Intensive Care Unit
Jessica Michal, Pharmacy - Senior
Mentor: Dr. Christina Piro, Clinical Pharmacy and Outcomes Sciences
Successful pain management using opioid analgesics for moderate to severe pain involves major clinical challenges: balancing side effects and tolerance-related dose increases and anticipating both subjective and objective inter-patient variations in therapeutic response. Additionally barriers exist caring for pediatric patients because of their unique responses to treatment and inability to communicate pain. Alternating between structurally different opioid analgesics or opioid rotation takes advantage of incomplete cross-tolerance between agents. This ultimately limits tolerance-related dose escalation while maintaining pain control and minimizing dose-dependent side effects. This may also decrease consequent costs and length of stay. Upon initiating this observational study no published data exists using rotation in pediatric patients. The primary objective is to determine if opioid rotation will decrease the total opioid dose required for adequate pain management in pediatric intensive care patients. Included patients require at least 5 consecutive days of continuous intravenous opioid infusion (duration needed for tolerance to develop). Patients using rotation are compared to control patients of comparable clinical and physical conditions using standard care with a single agent. For comparison all doses are converted to morphine equivalents. With 50 matched pairs anticipated a mean difference of 0.07 mg/kg/day morphine equivalents can be detected with 80% power at the 0.05 level of significance. Decreased total dose indicates reduced tolerance development may correlate with reduced secondary outcomes of pain scale and withdrawal scores and associated duration of withdrawal treatment or hospital stay. Data collection is currently taking place and results will be available at the time of presentation.

Pregnant Latinas’ Communication with their Healthcare Provider and their HIV Testing Decision
Alexandra Turgeon, Biological Sciences - Junior
Mentor: Dr. Myriam Torres, Epidemiology and Biostatistics
This purpose of this project was to explore the association between pregnant Hispanic women’s relationship with their main healthcare provider (as rated by the women) and their decision to be tested for HIV. This project is of importance because it aims to acquire the information necessary to lower HIV rates in women and babies. Hispanic females have an HIV/AIDS infection rate many times that of Caucasian females but not every pregnant Latina knows if she were tested for HIV. Thus she cannot acquire the antiretrovirals that would lower the chance of vertical transmission of HIV (passage from the mothers to the babies). Physicians only prescribe them to HIV positive women so if a woman is not offered an HIV test or if she refuses it she gives her child an elevated chance of being born with the disease. In order to answer this research question I analyzed data collected through a survey given to 196 pregnant Latinas in South Carolina. I focused on the sections “Prenatal Health Care Provider” and “HIV Testing During Current Pregnancy” and used the analysis programs SAS and EpiData. Over the course of my research I explored the aforementioned connection between the patient-provider relationship and pregnant Latinas’ HIV testing decisions. This information can be used by medical professionals to determine how to cross the culture barrier and interact with their patients about HIV testing. This would enable them to form stronger bonds as well and to relay the necessity of an HIV test during pregnancy.

Effects of exercise on mood in combat veterans diagnosed with PTSD
William Waters, Chemistry - Senior
Mentor: Dr. Shawn Youngstedt, Exercise Science
Posttraumatic stress disorder (PTSD) is a psychiatric disorder that occurs as a result of experiencing a traumatic event and is often seen in veterans that have been in combat. PTSD often affects mood in individuals as anxiety and depression are common occurrences. Currently there are several treatments being used that have limited success but exercise is a treatment that has the potential to have very successful effects on mood due to its antidepressant and anxiolytic effects. The objective of this study is to determine if exercise reduces anxiety and depression in combat veterans with PTSD. A maximum of twenty combat veterans diagnosed with PTSD are randomly placed into the exercise group or stretching (control) group. The participants perform a resistance exercise or stretching routine three times a week for an eight-week period. The participants also complete several surveys (BDI-II and STAI) pre- and post-study as well as weekly throughout the study to assess levels of depression and anxiety. The scores of the surveys are examined and compared at baseline and at three weeks into the study to determine the effect of the treatment on the participant and the results are also
compared between the two groups to determine if the exercise treatment had a greater effect on the participant. The results of the surveys show a decrease in anxiety and depression in participants in the exercise group and a decrease in depression in the control group. However, anxiety increased for half the control group and decreased for the other half.

Vocabulary Knowledge and Comprehension of Complex Sentence Structures in Adolescents

Spencer Babb, Psychology - Junior
Mentor: Dr. Fernanda Ferreira, Psychology

Previous studies determined an adolescent’s ability to comprehend complex sentence structures increases over time (Dick Wulfeck Krup-Kwiatkowski & Bates 2004; Leech Aydelott Symons Carnevale & Dick 2007; Montgomery Magimairaj & O’Malley 2008; Vasilyeva Waterfall & Huttenlocker 2008; Slobin 1996; Wassenberg et al. 2007 2008). Moreover vocabulary knowledge has been shown to be associated with off-line comprehension performance. What is less well understood is how adolescents process sentences in real time and how vocabulary knowledge influences these processes. The current study examines the relationship between adolescent vocabulary knowledge and ability to process ambiguous sentence structures in real time via psycholinguistic and eyetracking techniques. 20 adolescents were tested to determine their vocabulary knowledge using the Woodcock-Johnson Reading Mastery test. They were presented with a list of 192 single-line sentences; each sentence was presented one at a time. Each list contained 48 items with ambiguous structure; these sentences contained coordinated noun phrases or pomonyms (e.g. The toddler knocked over the salt and the pepper went flying across the table). While the adolescents read the stimuli their eye movements were recorded using an Eyelink 2000 eyetracker. To further test the relationship between processing preference and vocabulary knowledge we also manipulated the ordering of the NPs (e.g. pepper and salt). Results from repeated measures ANOVAs revealed that similar to adults children spend longer reading sentences without a comma and were longest when NPs were reversed. Reading times were also predicted by vocabulary knowledge. Children with higher vocabulary scores spent more time reading the ambiguous sentences.

Examining the Effectiveness of a Structured Narrative Retell Intervention for Improving At-Risk Preschoolers’ Learning Comprehension Skills

Melanie Crouch, Public Health - Senior
Mentor: Dr. Suzanne Adlof, Communication Sciences and Disorders

Preschoolers from families of low socioeconomic status often experience difficulties in reading development. Related to this there has been more research on improving code based literacy skills than comprehension skills. The goal of this project is to determine whether Structured Narrative Retell Intervention (SNRI) is effective in improving narrative skills in at-risk preschoolers. This past summer I helped conduct a pilot study examining the promise of the effectiveness of SNRI for preschoolers at a local day care facility funded by a government voucher program. Participants were 9 children ages 4-7. Half of the participants received SNRI while the other half received a control intervention Code Focused Literacy Intervention (CFLI). The Assessment of Literacy and Language Listening Comprehension (ALL) task was used as a pre and post test to measure growth.
in narrative skills. We developed our own metrics for scoring microstructural and macrostructural aspects of the ALL. We created a macrostructural scale that scores the retells on five different aspects of the story including descriptions of the characters initiating event character’s response conflict resolution and the end of the story. I used SALT language software analysis to examine microstructural elements; including number of utterances number of different words mean length of utterances and clausal density. Statistically significant gains between pre and post tests were observed for number of words number of different words and clausal density when both groups were collapsed together. Means indicated that the SNRI group tended to make more gains than the CFLI group in both narrative microstructure and macrostructure although the pilot study was underpowered for detecting statistically significant growth between different groups.

Individual Differences in Language Ability and Eye-movement Patterns

*Alyssa Ives*, Psychology - Senior

Mentor: Dr. Fernanda Ferreira, Psychology

Previous research has shown that the development of reading ability is accompanied by changes in eye-movement patterns. In the current study we examined the extent to which individual differences in language ability could predict differences in eye-movement patterns. Twenty-one adolescent subjects completed three standardized language assessments that measured sight-word reading (SWR) vocabulary and reading comprehension ability. Participants then completed three tasks: text reading pseudo-reading and visual scene search. Participants’ eye-movements were recorded. Analyses of individual fixation durations revealed that better vocabulary and comprehension scores led to shorter fixations in reading and a larger difference in fixation durations between reading and the other tasks. Adolescents with better scores on these measures also moved their eyes in a more reading-like manner in the pseudo-reading task as measured by saccade amplitude. Sight-word reading was also highly predictive of pseudo-reading: as SWR scores increased participants made shorter fixations and longer saccades. We also analyzed mean fixation durations in each task. Comprehension modulated the relationship between the reading tasks and search. As comprehension scores increased reading and pseudo-reading mean fixation durations were less predictive of search means. As SWE scores went up reading means became more predictive of pseudo-reading mean fixation durations and means saccade amplitudes in search became less predictive of reading means. These results indicate that as children’s language abilities develop eye movement patterns become increasingly specialized and task-dependent. Language experience appears to change the eye movement system so that it gradually becomes selectively responsive to the demands of reading.

Early Grammatical Development in Children Across American English Dialects in South Carolina

*Bridgette Kennedy*, Elementary Education - Junior

Mentor: Dr. Denise Finneran, Communication Sciences and Disorders

Research on Mainstream American English (MAE) shows grammar development is affected by adult spoken language. The current study examines this effect for African American English (AAE) and Southern White English (SWE) as well as MAE. AAE and SWE vary from MAE in that the verbal –S marker (she runs) is not required with third person singular subjects (e.g. she). Thus a difference in –S use across MAE compared to AAE and SWE dialects may reflect the grammatical rules of children’s linguistic environment. My role in this study designed by Denise Finneran (PI) is to determine the effects of spoken language on –S marker use (e.g. she runs). This will be examined using novel verbs (e.g. the bear meks) for each of the 3 dialect groups. In this task the examiner presents a made-up verb either with –S (e.g. I see the bear deeks) or without (e.g. I see the rabbit mub). The child is asked to tell a puppet what happened. We expect all groups will be more likely to use the –S marker when modeled by the examiner but that –S use will be lower for the AAE group and possibly the SWE group than the MAE group. We predict the group differences will be more notable when the child does not hear the –S marker used but is given a context in which this marker should be used in MAE (e.g. I see the bear deek. The bear always...). These findings have clinical and research significance.

Attention and talking: How language involving different types of memory affects performance on a concurrent visuomotor task.

*Alan Peh*, Biological Sciences - Sophomore

*Amanda Bennett*, Psychology - Sophomore

Mentor: Dr. Amit Almor, Psychology

In today’s busy world, people tend to perform multiple tasks at once to save time. For example, having a conversation with a co-worker while working, listening to an audiobook while driving, or talking on the phone while crossing the street. These situations often involve both memory retrieval and vision. This study looked at how language involving two types of memory retrieval, from autobiographical and from spatial memory, affect performance of a visuomotor task. Participants answered different types of questions while detecting a target shape (a square or a diamond) among an array of distractor shapes (e.g., triangles). The dependent measures in this experiment were response time and accuracy. Three blocks were presented in a random order: a control block where participants performed the visuomotor task without answering any questions, a block of autobiographical memory questions, and a block of spatial memory questions. As predicted, participants responded more quickly and more accurately in the control block than in the other two blocks. In addition, participants performed more slowly and made more mistakes during the spatial block than during the autobiographical block. The results of the study show that conversation interferes with visual tasks, but that some topics pose greater interference than others. More broadly, these results can be used to better design and prepare for scenarios in which visual performance and conversation often co-occur.
Exploration of Affective States Using Sounds

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

Previous research has shown that humans having a rapid response to affective sounds may be crucial for welfare and survival (Redondo et al. 2008). When exposed to affective sounds activation of auditory cortices and amygdala is present (Vinnikainen 2012; Wolfgang 2010). The circumplex model of affect argues that all emotions can be described in terms of two underlying primary dimensions: valence and arousal (Russel 1980). Although there have been multiple studies to understand affective state there have been many more for visual stimuli than auditory stimuli which has left affective state with auditory stimuli still to be understood (Stevenson 2008). The goal of the present experiment was to determine if affective sound stimuli could be separated by arousal and valence to create four distinct categories (high arousal-positive low arousal-high arousal-negative and low arousal-negative) to expand and fill in the gaps of the International Affective Digitized Sounds database. Forty-eight sound stimuli presented for 5-6 seconds each were rated ten different times on a scale of 1-10 for valence and arousal. Preliminary results including four participants show a relatively clear separation on valence which is consistent with circumplex model but there is not a clear separation on arousal. More data is needed to find a clear separation on arousal as well.

The Role of Acoustics in Garden Path Processing

Victoria Sharpe, Baccalaureus Artium et Scientiae - Sophomore
Mentor: Dr. Dirk den Ouden, Communication Sciences and Disorders

The literature dealing with garden path sentences (such as While the man hunted the deer ran into the woods) establishes a relatively clear relationship between syntactic processing and prosody. Natural prosody facilitates ambiguity resolution by delineating boundaries between clauses (in this case between hunted and the deer) while unnatural or misleading prosody can make resolution of syntactic ambiguities more difficult. This study takes a quantitative approach to investigating the effects of prosodic manipulation on ambiguity resolution focusing on how and to what extent specific acoustic components of prosody namely fundamental frequency (F0) and the temporal envelope (E) contribute to a listener’s ability to parse garden paths. For this experiment garden path sentences and simple-structure fillers were presented with three different types of prosody: natural degraded E and degraded F0. Participants heard sentences from all conditions answering a yes-no comprehension question for each and then repeating what they heard. Preliminary analyses of the reaction times show that sentences with implausible garden path interpretations (e.g. While the man hunted the plane…) are processed significantly faster than those with plausible garden path interpretations (e.g. While the man hunted the deer…). This effect is particularly strong in sentences with modified E suggesting that when temporal cues for parsing are degraded listeners must make greater use of heuristic cues in order to comprehend what they hear. Further analysis including investigation of the production data is needed to confirm this and to assess the particular ways in which F0 and E affect comprehension.

Social Buffering of the Stress Response in Peromyscus Polionotus

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

In the wild the animals within the Peromyscus polionotus (PO) species have been observed as being monogamous and bi-parental throughout their reproductive life. This is in contrast to observations of another species Peromyscus maniculatus (BW) which displays reproductive promiscuity. 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 hormone corticosterone levels would be significantly lower in paired POs than those seen in the isolated PO animals or the BWs in either condition. Through these behavioral and hormonal analyses a partner-dependent buffering of an animal’s stress response is predicted to be shown and this animal model could be useful in regards to studies on resilience against depression and anxiety-like disorders.

Evaluating the cognitive number line: Are fractions and decimals equivalent?

Emily DeFouw, Psychology - Junior
Mentor: Dr. Melanie Palomares, Psychology

Overall mathematical ability and achievement as well as algebraic knowledge can be predicted by the ability to divide wholes into parts (Siegler et.al, 2012). In this experiment, we studied adults’ ability to estimate fractions, simplified fractions, decimals, and numerals on a number line. Since adults divide segments of the number line into proportions (Ashcraft & Moore, 2012), we hypothesize that number lines with explicit fractions will have significantly more accurate estimations than decimal and integer number lines. A group of 27 adults (18-24 years old) were asked to estimate the position of a number along a number line. We presented comparable number targets in standard fraction (i.e., 1/12, 2/12/3/12, 4/12, 5/12, 6/12, 7/12, 8/12, 9/12, 10/12, 11/12), decimal (i.e., 0.8, 0.17, 0.25, 0.33, 0.42, 0.5, 0.58, 0.67, 0.75, 0.83, 0.92) and integer (i.e., 42, 83, 125, 167, 208, 250, 292, 333, 375, 417, 458) formats. Then we simplified some of the fractions to 1/6, 1/4, 1/3, 1/2, 2/3, 3/4. Comparison of standard and simplified fractions shows that localizing simplified fractions on a number line were more accurate than standard fractions. We also found that standard fractions (0/12 to
12/12) were more accurate than decimals (0 to 1) or integers (0 to 500). Notably, participants tended to divide the number line in halves such that the accuracy is greatest at 6/12, 0.5 and 250. The use of explicit fractions as cognitive cues and the accurate representation of “half” support the notion that space and number are intrinsically connected (Dehaene, 2009).

### Modifying Mental Skills in Children with Autism Spectrum Disorder (ASD)
#### Laura Galanti, Exercise Science - Sophomore
Mentors: Dr. Jane Roberts, Psychology  
Mrs. Marissa Yingling, Autism Academy of South Carolina

Processing and Cognitive Enhancement (PACE) Method is a scientifically based program used to mentally stimulate the mind. Autism is a mental disorder linked with intellectual disability. The purpose of the experiment is to see if the PACE program can stimulate the mind of a child with ASD and improve their motor coordination and attention. If the PACE exercise is preformed then the child will be mentally stimulated and more attentive following the directions given to them. One Child was observed one-on-one using a song and PACE exercises to mentally stimulate the child. The child follows 20 related directions and the percentage of successes is recorded before the PACE activity and then the exercise is preformed again after the PACE exercise recording the percentages to compare the difference percentages of successes. There was a change in attentiveness and direction following and may be used to help autistic children to learn in further programs.

### Open Hardware for Conducting Psychology Experiments
#### Taylor Hanayik, Psychology - Senior
Mentor: Dr. Chris Rorden, Psychology

Input devices present two difficult challenges for cognitive neuroscience. First we need niche devices to measure behavioral responses (voice keys buttons for people with impaired motor control buttons for magnetic resonance imaging etc). Second we need to ensure minimal latency and a way to synchronize these events with other devices (e.g. electrophysiological recordings respiration heart rate etc). Here we present an open source hardware and software combination that directly addresses both of these problems. Precise timing in psychological experiments can be extremely important when measuring how humans respond to certain stimuli. Modern day computer hardware computer peripherals and operating systems can introduce variable latency into almost any psychological paradigm built with contemporary experiment generating software. In order to allow more psychologists to maintain control of timing variability in their experiments we have developed open source hardware and software that can measure the timing of events with microsecond precision. The hardware accepts two analog inputs which can be any combination of ambient light sensors or small microphones to capture visual and auditory events (e.g. sound onsets or screen changes) as well as 8 analog inputs (e.g. buttons). The events from these inputs can either emulate a standard USB keyboard or generate precise timestamps. This allows scientists to benchmark their own paradigms in order to accurately test human responses to stimuli. Since the hardware and software are open source other researchers have the ability to enhance and modify each respectively to suit their own specific needs.

### Comorbid Anxiety in Children With Autism Spectrum Disorders
#### Shelley Maxwell, Psychology - Senior
#### James Hull, Psychology - Senior
Mentor: Dr. Jane Roberts, Psychology

The Center for Disease Control estimates that autism spectrum disorders (ASD) currently affect as many as 1 in 88 children in the United States. Autism spectrum disorders are a group of neurodevelopmental disorders that can be characterized by a unique range of pervasive symptoms including stereotyped behaviors, social functioning and communication as well as comorbid issues such as delays in intellectual functioning. Because of its increasing prevalence among the general population greater understanding of autism’s unique presentation of symptoms is necessary. A common characteristic found among children diagnosed with ASD is anxiety. Anxiety is also a common occurrence among the general population and is thought to have negative consequences in regards to functioning and productivity. Because of this it is important to understand the relationship between ASD and anxiety in order to form a more holistic conceptualization of ASD as well as other pervasive developmental disorders. Previous research using typically developing children has shown that environmental factors such as parental over-involvement and negativity play a role in the development of higher levels of assessed anxiety among children. The current aim of this study is to understand how parental stress influences the presentation of characteristics of anxiety and autism in affected children. The results of this study aim to help explain the dyadic relationship between parents and their children with ASD as well as further define how comorbid anxiety is displayed and assessed within the ASD population.

### Phenotypic Differences in the Left and Right Rat Amygdala
#### Elisabeth Oliver, Chemistry - Senior
Mentor: Dr. Marlene Wilson, Pharmacology Physiology and Neuroscience

The amygdala is a centrally-located brain region and is important in emotional regulation such as the management of fear and stress. Clinical and preclinical studies have shown the right-hemisphere amygdala is more sensitive to pain and emotional stress than the left. There are two primary types of neurons in the amygdala basolateral complex (BLC): glutamatergic pyramidal projection neurons and several populations of inhibitory interneurons that regulate the pyramidal neurons. Parvalbumin (PV) is a phenotypic marker for one of the interneuronal populations; Ca2+/calmodulin-dependant protein kinase II (CAMKII) is a phenotypic marker for pyramidal neurons. This study investigated differences in the density of PV+, CAMKII+ and NISSL-stained cells between left and right BLC using stereological techniques. Serial sections were collected from rat brains and stained for PV, CAMKII, and NISSL to obtain total cell counts. The optical fractionator method obtained an unbiased estimate of the number of PV+, CAMKII+, and total cells in subdivisions in the BLC as well as volume estimates for the subdivisions. The BLC was divided into lateral and basolateral, and within these groups were smaller subdivisions. The results indicate that there are no density differences between left and right amygdala for CAMKII+ neurons and total number of NISSL-stained cells. The density of PV+ neurons in the left basolateral posterior amygdala is significantly higher than the right. This
Mapping mRNA and Protein Expression of Phosphodiesterase Families Across Brain Regions To Assess Conservation Between Rodent Species

Geetanjali Pathak, Biological Sciences - Junior
Mentor: Dr. Michy Kelly, Pharmacology Physiology and Neuroscience

Phosphodiesterases (PDEs) are the only enzymes known to break down cyclic nucleotides. Thus, PDEs are critical to the regulation of cell signaling. Individual reports have shown that various PDE families differ in function and vary in distribution across tissues. That said, very few studies have directly compared expression of multiple PDE families within a tissue and fewer still have compared expression of a particular PDE across multiple species. It is important that we understand potential species differences in PDE expression because mice and rats have long been used as animal models of human disease. Because mouse and rat PDEs are highly homologous (91-99% protein homology), we hypothesized that PDE distribution across brain regions would be conserved between mice and rats. Here, we mapped out the mRNA distribution of all brain-expressed PDE families in brains of C57BL/6J mice and Sprague Dawley rats as well as a limited number of PDE families in brains of 129S6 and Balb/CJ mice. To map mRNA expression, brains were cryosectioned and processed by autoradiographic in situ hybridization. We also characterized the protein expression of select PDE families (e.g. PDE11) in brains of C57BL/6J mice, 129S6 mice, Balb/CJ mice, and Sprague Dawley rats. To measure protein expression, dissected brain regions were processed by Western blotting. Overall, the distribution of each PDE isoform (at both the mRNA and protein level) was highly similar across mouse strains and between mice and rats, with only a few exceptions being noted (e.g. PDE2A mRNA is enriched in anteriorventral nucleus of thalamus in mice but not rats). Therefore, our data suggest expression patterns of PDE families are conserved across rodent species.
FR1) for 21 days. Compared to IC rats EC rats self-administered significantly less nicotine. In addition we determined whether environmental enrichment alters nicotine-induced increases in extracellular-regulated kinase (ERK1/2) activity a signaling protein involved in drug-induced neuroplasticity and drug reinforcement-related brain regions. In saline control group no difference in basal levels of phosphorylated ERK1/2 (pERK1/2) in prefrontal cortex (PFC) was found. However in response to nicotine pERK1 level was increased IC rats but not in EC rats while pERK2 level was increased in both EC and IC rats. Furthermore we found that the levels of pERK1/2 in PFC were correlated positively with mean total lever presses suggesting ERK activity is responsible for reinforced nicotine-taking behavior. Thus these findings suggest that environmental enrichment protects against self-administration of nicotine and ERK signaling may play a crucial role in nicotine-taking behavior.

Seeing Shapes: The effect of illusory motion on visual form processing
Annie Day, Psychology - Senior
Mentor: Dr. Melanie Palomares, Psychology

Form and motion have classically been thought to be processed by two distinct pathways in the brain – the ventral and dorsal visual pathways respectively (Livingstone & Hubel 1988). However emerging evidence suggests an interaction of these pathways earlier in visual processing than previously suggested. We analyze the effect of illusory motion on form processing in the human visual system using Glass patterns which are made up of an array of randomly placed dots matched with a second dot along a common rule. For this experiment random and circular Glass patterns were used. Adults aged 18-31 were asked to detect a circular pattern with the array of dots that varied in speed and inter-element spacing. Results show that detection of a circular shape was easier as the temporal frequency of illusory motion increased (Experiment 1 N=20). Increased speed of perceived motion was especially beneficial as dot pairs increased in separation (Experiment 2 N=19). Results support Geisler’s motion streak hypothesis (1999) which asserts that outputs of orientation-tuned V1 neurons are included in the determination of motion. When a moving object is observed a smearing of the image occurs parallel to the direction of motion similar to lines implying motion in cartoons. These results suggest further evidence of interactions between motion and form mechanisms in visual processing. Relationship to reading mechanisms (Englund & Palomares 2012) as well as other visual tasks (McCloskey et al 2009) will be discussed.

Correlations of Language Delay Seen in Fragile-X Syndrome and Autism Severity
Aimée Herron, Psychology - Junior
Mentor: Dr. Jane Roberts, Psychology

Fragile-X Syndrome (FXS) is the leading genetic cause of inherited intellectual disability. FXS is also related to autism spectrum disorders (ASD) in that 40-60% of children with FXS meet diagnostic criteria for an ASD. FXS is detected earlier in life than autism because genetic factors affecting FXS are medically detectable. However autism cannot reliably be diagnosed until around three years of age due to subtle symptoms until that time. Children with FXS may show language delays in early childhood which is also one of the earliest noted symptoms for autism. By looking at children with FXS we can assess their language development using standardized measurements to possibly identify a subgroup within FXS showing patterns predicting autism. The earlier autism is diagnosed the sooner treatments can begin which is linked to greater chances for social and academic success. The purpose of this study was to evaluate the relationship between language development in children with FXS and symptoms of autism. Participants included males with FXS and mentally age-matched typically developing (TD) controls. The study had four groups separated by age and diagnosis. Groups included a TD and a FXS group of young infants ages 11 to 33 months along with a TD and a FXS group of toddlers ages 34 to 50 months. Identifying subgroups by age and diagnosis would allow for increased accuracy in both aspects when investigating the relationship between language delays and ASD. Specificity in early identification of autism contributes to early intervention a key factor for optimal outcomes.

Erica Mazur, Psychology - Junior
Mentor: Dr. Jane Roberts, Psychology

Previous literature has indicated that mothers of children with fragile X syndrome may have higher stress levels if their child engages in aggressive behaviors. For instance a study by Bailey Sideris Roberts & Hatton (2007) found that out of several factors maternal stress was most highly correlated with child’s problem behaviors. The present study was conducted to examine familial characteristics that may contribute to the presentation of externalizing behaviors in fragile X syndrome in children. Specifically the current study focused on maternal stress in relation to the child’s level of problem externalizing behavior of aggression. The participants were young children with fragile X syndrome and their mothers. The mothers completed behavioral rating scales for their child designed to measure aspects of a childhood presentation of behaviors such as attention and aggression. Also the mothers completed self-report measures probing for stress associated with their family dynamics. This study has important implications for examining the relationship between maternal stress and child’s level of aggressive behaviors.

Can perceptual uncertainty and visual working memory load modulate the subitizing capacity?
Jesse Moyer, Psychology - Senior
Mentor: Dr. Melanie Palomares, Psychology

Human visual working memory appears to have a capacity limit of about four items (Cowan 2001). Additionally our ability to rapidly enumerate a set of small items (an ability known as subitizing) has a similar limit of about 4 items. We investigated the possibility of the two processes being related. Our dual-task paradigm used a rapid serial visual presentation (RSVP) stream in which we first taxed participants working memory with a spatial location memory task followed by an enumeration task. We hypothesized that as we increased the difficulty of the working memory task we would see reduced enumeration and subitizing performance. The RSVP stream consisted of participants being asked to remember a 3x3 matrix containing 3 5 or 7 alphabet characters presented for
1000ms. Next Gabor patches ranging from 0 to 9 were presented for 133ms and participants immediately keyed in a response. After submitting their response they completed a change detection task they viewed a similar matrix to the first which in half of the trials had two letters swap position and participants had to respond if they thought this matrix had changed or not. This design both divided the participants’ attention and taxed their spatial working memory for the duration of the trial. Results show that as numerosity and working memory load increased enumeration performance decreased. Interestingly these factors also seem to be independent suggesting that interactions between perceptual numerosity and working memory depends on the type of working memory task.

Field Practicum in Medical Social Work: A psychological perspective

Colleen Myers, Psychology - Senior
Mentor: Dr. Clylinda Nixon, Lexington Medical Center
A medical case social worker’s primary function is to provide the best placement services given specific resources that are available after a patient is discharged from a type of medical facility. While the medical team focus is on the patient’s physical recovery the social environment in post care alternatives is a medical case manager’s main concern. Simply providing a “placement” of any kind is likely to deteriorate quickly if relevant factors aren’t addressed in deciding the best placement for the patient. Many concrete medical and financial considerations must be addressed when finding the fit between the patient and placement. However there are a number of important psychological considerations that may be crucial in finding an appropriate placement. The purpose of this study is to monitor and observe psychological techniques performed during these patient and family interviews pertinent to placement. This includes interactions gaining information about the home environment relationships with family and friends and other environmental support systems associated to the patient. There is a necessity to learn and master strategies for developing rapport and gathering accurate information. This information will heavily contribute to the decisions the medical case manager makes in assigning a post care treatment plan. This project will track the psychological considerations for gathering data that will lead to the best care for the patient. These successful placements depends on five core components basement planning linking monitoring and advocate / implement the best “fit”.

Mitigating Distractions from Smartphones
Connor Bain, Computer Science - Sophomore
Mentor: Dr. Srijhari Nelakuditi, Computer Science and Engineering
A smartphone with its 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 focusing on student-smartphone interaction. This implementation has the power to analyze study patterns class schedules meeting schedules test/quiz dates sound levels accelerometer readings etc. and eliminate distractions based on that data.

Developing a Water Irrigation System for Organic Coffee Crops in La Victoria Ecuador
Brendan Croom, Mechanical Engineering - Junior
Andrea Eggleston, Biomedical Engineering - Sophomore
Mentor: Dr. James Burch, Epidemiology and Biostatistics
Engineers Without Borders (EWB) is a student-led organization dedicated to improving quality of life in developing countries by developing infrastructure. EWB is currently working in the community of La Victoria Las Lajas Ecuador to provide a sustainable water source for irrigation of organic coffee crops. An initial assessment trip in January 2013 proved the project’s feasibility and allowed EWB to assess different water supply methods. Rainwater catchment groundwater and mountain streams were evaluated as water sources; EWB elected to develop a gravity pipeline to route water from a high-elevation mountain stream to the coffee farms. EWB will return to La Victoria in May to begin project implementation. The chapter’s experiences provide a unique case study of student leadership activism and community involvement.

Recycled Fiber Reinforcement for Damage-Tolerant Earth Blocks
Bradford DiFranco, Civil Engineering - Senior
Mentor: Dr. Fabio Matta, Civil and Environmental Engineering
The quality of housing is important to sustaining a living in any environment. More so the quality of housing in rural and high energy zones is crucial to the survival of the environment. Rural areas with low income housing are hit most by underdeveloped homes. Mud has been the oldest material that dwellings have been made of since before the creation of concrete and steel but has a brittle increases durability of homes made of earth in high energy zones. Stabilizing
earth blocks using low amounts of lime or cement compressing and dry/wet curing allows the user to make bricks at site with little stabilizer which reduces cost and emissions for transportation. Hurricanes tornados high winds and earthquakes cover a large land mass in the United States and the stabilization processes make building with earth in these environments a more suitable material for strength durability availability and cost. Having the ability to stabilize a brick with recycled materials and with ultra-low carbon emission processes is a remarkable way to cut cost and lower environmental impact.

**Synthesis of carbohydrate-porphyrin (CPC) and carbohydrate-bacteriochlorin conjugates (CBC) via metal-catalyzed cross-coupling reactions**

*Ryan Dolewski*, Chemistry - Junior; USC Upstate
Mentor: Dr. Joshua Ruppel, Natural Sciences & Engineering; USC Upstate

The use of photodynamic therapy (PDT) as a viable cancer treatment has been hindered by the many limitations of the photosensitizers used in this therapy including solubility in biological fluids weak absorbance at clinically useful excitation wavelengths (NIR) and selectivity. Recently carbohydrate-porphyrin (CPC) and carbohydrate-bacteriochlorin (CBC) conjugates have gained attention for their ability to address several of these issues. Recent advances in the development of a concise and high yielding route for the synthesis of brominated porphyrins and bacteriochlorins has opened the door for the development of a modular synthetic approach for the rapid and high yielding synthesis of CPCs and CBCs based on a palladium-catalyzed cross coupling strategy. Herein we report our investigations into the first general and accessible approach using this strategy for the synthesis of an entirely new class of water soluble carbohydrate-bacteriochlorin conjugates (CBCs) with the potential to serve as a phototherapeutic agent.

**Implementation and Optimization of PDPA on Emerging Parallel Computing Technologies**

*Ahmed Khawaja*, Computer Engineering - Senior
Mentor: Dr. Homayoun Valafar, Computer Science and Engineering

The purpose of this project has been to use Graphical Processing Units (GPUs) to drastically reduce the running time of the protein structure verification program PDPA. The limitation PDPA was facing was the amount of computing power required and the expensive cost of acquiring the necessary hardware. This project focused on leveraging inexpensive emerging GPU technology to reduce the cost of using PDPA and improving the results it generated. PDPA is an iteration based program and was a natural candidate for being parallelized. The Nvidia Fermi line of GPUs was selected due to their low costs high parallel throughput and the availability of the CUDA programming environment. CUDA creates an abstraction layer that reduces the effort required to port programs over to run on GPUs and ensures any code written is portable across Nvidia GPUs. Most of our effort was thus spent on parallelizing the kernel of PDPA and not dealing with GPU specific programming tasks. Once we were able to verify that the parallel version of PDPA produced identical results to the original PDPA we measured the execution time for both programs with various inputs. The best version of the parallelized PDPA ran 32 times faster than the original PDPA. This has allowed PDPA to be run at a finer granularity with an order of magnitude more data. The viability of GPUs for general purpose parallel computing was amply demonstrated and is being considered for further use.

**A PEM Fuel Cell Contaminant Model to Determine Rate Constants**

*J Emrys McMahon*, Chemical Engineering - Senior
Mentor: Dr. Jean St-Pierre, Chemical Engineering

One of the primary challenges facing widespread adoption of Proton Exchange Membrane (PEM) Fuel Cells for power generation is hydrogen purity. Hydrogen is primarily sourced from natural gas reformation and therefore frequently contains trace impurities such as NOx SOx and CO. These contaminants adversely affect fuel cell performance because they poison the most commonly used catalyst platinum. A variety of solutions to this problem have been proposed. However one of the hurdles facing fuel cell development is a lack of kinetic rate constant information for contaminants at low concentrations. The experiment proposed a kinetic model general enough to apply to a variety of contaminants but specific enough to determine rate constants at low concentrations. Hydrogen and CO were stepped into the anode feed and the resulting data was analyzed and compared to the model to elicit rate constants. The results are thus far inconclusive.

**Algorithms for Constructing Covering Systems**

*Stefan Singer*, Mathematics - Senior
Mentor: Dr. Ognian Trifonov, Mathematics

Along with Dr. Trifonov, I wrote a program in Matlab to perform the Greedy Algorithm for several known covering sets of the integers. A covering set is a system of congruencies that, when all are taken into consideration, includes every integer. For example, \(x \equiv 0\) (mod 2) and \(x \equiv 1\) (mod 2) is a very simple covering set because all even integers and all odd integers are included in this system of congruencies. Once this was completed, we worked to improve the Greedy Algorithm to deal with more complex covering sets. I was interested in performing research because I wanted to learn about how mathematicians conduct research, and I also wanted the satisfaction of solving a difficult problem that has not yet been completed. This research will also be published as my senior thesis project. At this time, the new algorithms still have room for improvement, but I have programmed new algorithms that are about 10 times more effective than the Greedy Algorithm.

**Inquiry into the Implementation of a Low-Power Mobile System for Polychromatic Discrimination of Differently Sized Objects**

*Timothy Thompkins*, Electrical Engineering - Senior
Mentor: Dr. Roger Dougal, Electrical Engineering

Logistics is defined as the detailed coordination of a complex operation involving many people facilities or supplies often to achieve the seamless flow of resources from an origin to a destination to meet the requirements of a customer. For modern consumerism part of the process involves the transportation of goods about a shipping yard. In general this process is currently performed by humans operating large machines and working in relatively dangerous environments. With the aid of technology however it can become less human oriented and
instead be executed autonomously by robots; ideally making the process safer and more efficient. The proposed investigation seeks to test the feasibility of such an objective on a small scale. In this small-scale representation a differently sized and colored block represents each cargo. Based on these differences an autonomous low-power mobile system will differentiate each block and transport it to the appropriate location. Based on the systems ability to accurately discriminate and transport the objects the systems capability will be assessed.

**Passive Mechanics in the Renal Artery**

Lauren Wolf, Biomedical Engineering - Senior  
Mentor: Dr. Tarek Shazly, Biomedical Engineering

Cardiovascular disease is endemic in the geriatric population of the United States and increases with life expectancy. The renal artery is key in hemodynamic regulation and compromise to the integrity of this vessel through disease or injury is detrimental to the well-being of the entire body frequently resulting in hemodynamic instability widespread edema cardiac compromise and eventual death. To date a set of structure-motivated constitutive equations for the renal artery that is accountable for interpatient variability and involve both the passive and active mechanics of the vessel has not been developed. In order to gain insight into the mechanical behaviors inherent in the renal artery a procedure was developed to analyze vascular response (specifically the passive response) to changes in pressure as produced by altered fluid flow. Changes in vessel diameter and axial load in real time were examined; residual strain in each vessel was also ascertained by observation of opening angles in ring segments.

**Augmented Reality in the Ghosts of the Horseshoe**

Andrew Ball, Computer Science - Senior  
Mentor: Dr. Duncan Buell, Computer Science and Engineering

Augmented Reality (AR) is an emerging technology which refers to the process of enhancing or ‘augmenting’ real world objects or images with virtual content through the use of a camera and certain software. Though research into this technology began in the 1990s it is only starting to become widespread due to the advent of mobile devices like the iPhone or Android based phones that possess the hardware capable of supporting AR. As part of my senior thesis I participated in the development of the Ghosts of the Horseshoe project led by Dr. Heidi Rae Cooley and Dr. Duncan Buell. Ghosts is an iPad application dubbed a Critical Interactive that explores and uncovers the history of slavery at the university prior to the Civil War. The goal of Ghosts is empathy of a participant with the subject matter in part by multimedia presentation of the content while on-site on the Horseshoe. Ghosts uses AR to access and display content based on the participant’s location on the Horseshoe. My work so far has made use of Qualcomm’s Vuforia toolkit a marker-based AR framework originally developed for Android and recently ported to iOS. I implemented three instances of AR on the Horseshoe which variously make use of 3D models button functionality and audio content. The project is currently ongoing as is my participation in it.

**The Effect of Bimetallic Surface Composition on the Activity Towards Ethanol Oxidation**

Taylor Garrick, Chemical Engineering - Senior  
Mentor: Dr. John Weidner, Chemical Engineering

In the recent decade electrochemical fuel cells specifically proton exchange membrane fuel cells have been a viable option as energy sources that are not dependent on fossil fuels. Proton exchange membrane (PEM) fuel cells operating with hydrogen have received a lot of press recently but research is also being done on PEM fuel cells that operate with ethanol (EtOH) as a fuel source. PEM fuel cells operating with EtOH are not as efficient as their hydrogen counterparts but they are more practical to use due to the difficulties presented with storing and transporting hydrogen. One challenge for the DEFC is developing a catalyst for efficient oxidation of EtOH. Typically Platinum (Pt) catalysts are used for DEFC. One problem that has been seen is that the Pt becomes poisoned by carbon monoxide (CO) that is produced when EtOH is initially adsorbed. Studies have shown that bimetallic catalysts composed of platinum and tin or platinum and ruthenium on a carbon support are better able to catalyze the oxidation of ethanol compared to catalysts made of platinum supported on carbon resulting in less expensive catalysts. Using electroless deposition we have prepared and characterized several Pt:Ru bimetallic catalysts using typical electrochemical techniques.
Characterization of P450 Enzyme for Biofuel Synthesis

**Job Grant**, Chemistry - Senior
Mentor: Dr. Thomas Makris, Chemistry and Biochemistry

We live in a society powered by fossil fuels which are finite and non-renewable resources and viable alternative sources of energy such as biofuels are required. Unfortunately many current biofuels such as ethanol cannot be burned in our current cars or transported with our current infrastructure without modification requiring the development of “drop-in ready” biofuels. An exciting enzymatic process which has garnered significant attention for drop-in biofuel production is the conversion of fatty acid into hydrocarbons alkenes or alkanes. Much attention has been given to the enzyme aldehyde dehydrogenase oxygenase (ADO) which requires the formation of a fatty aldehyde intermediate and utilizes NADH as a cosubstrate in its reaction which may hamper its use as a biocatalytic process. The focus of this research is the initial characterization of a recently discovered P450 fatty acid decarboxylase enzyme which has the potential to create alkenes in a single step using the more cost-efficient hydrogen peroxide as cosubstrate. The P450 enzyme has been overexpressed in E. coli and has been purified. The substrate specificity of the enzyme has been determined through binding assays monitoring a natural change in absorbance of the P450 enzyme upon substrate binding. From this it has been found that this P450 binds a variety of fatty acid substrates and that the binding affinity varies significantly with the chain length of the fatty acid. The implications for these binding properties and the catalytic activity of the enzyme and its usefulness for future biofuels synthesis will be discussed.

Characterization and Optical Sensing Studies based on Novel Triarylamino Boronate esters

**Anthony Le**, Chemistry - Senior
Mentor: Dr. John Lavigne, Chemistry and Biochemistry

Recently, there has been increased interest in boronate esters that result from interactions between boronic acids and 1,2- or 1,3-diols as they form covalent, yet reversible linkages. This motif has been used to create covalent organic frameworks, linear polymers, and macrocycles with self-assembling abilities. At the same time, organoboranes, with Lewis acidic boron centers, have been used as sensors to detect Lewis bases (i.e. fluoride and cyanide). The empty p-orbital on boron extends the π-conjugation in boranes. Therefore, coordination of a Lewis base (nucleophile) causes a geometric change at the boron, from a trigonal planar to tetrahedron, resulting in a change of the compounds optical properties. However, this sensing scheme has only been applied to small nucleophiles due to the steric protection required at the boron center in organoboranes. Furthermore, boranes often suffer from complicated syntheses and are unstable towards hydrolysis and oxidation. To the contrary, boronate esters are relatively easy to synthesize based on a straightforward dehydration reaction between boronic acid and diol. In addition, the resulting compounds are stable towards air and moisture. Within this study, three boronate esters were designed each containing a triphenylamino-group and a unique diol moiety to alter the binding and optical properties of boronate ester. The synthesis, characterization, optical analysis, and computational studies of these boronate esters will be presented in detail.

The Difficulty of Finding Winning Strategies for Poset Games

**Daniel Grier**, Computer Science - Senior
Mentor: Dr. Stephen Fenner, Computer Science and Engineering

A poset game is a mathematical strategy game played over a partially ordered set (poset) in which two players alternate choosing an element of the poset removing it and all elements greater than it. The first player unable to select an element of the poset loses. Quick algorithms for finding the winner of a poset game exist in certain restricted cases such as the popular game of Nim. The complete solution for the game of Nim has been known since 1901 but there is still no algorithm for quickly solving the more general poset game problem. In this presentation I will give a reduction showing that this problem is almost assuredly computationally infeasible. More precisely the reduction shows that deciding the winner of an arbitrary finite poset game is PSPACE-complete. The proof relies on the PSPACE-completeness of Node Kayles a game in which players vie to chose an independent set in a graph but otherwise requires no background in computational complexity.

A Misère Nim Game

**Ibrahima Seck**, Nursing - Sophomore; USC Salkehatchie
Mentor: Dr. Wei-Kai Lai, Mathematics; USC Salkehatchie

In 1902 C. Bouton provided a complete mathematical theory of the Nim game for two players. In 2006 Kelly first analyzed the nim game for multi players assuming they form two alliances. In this project by analyzing the probability of losing (instead of winning) we found a pattern of a misère nim game for three players who play independently.

Bench Scale Methane Combustion System: Design and Preliminary Mercury Oxidation Data

**Stephen Smoak**, Chemical Engineering - Senior
Mentor: Dr. Bihter Padak, Chemical Engineering

Coal-fired power plants are the greatest anthropogenic source of mercury emissions globally. Due to adverse effects reducing mercury emissions is a major environmental concern. High-temperature coal combustion releases mercury into the flue gas as elemental mercury (Hg0). This variety of mercury is inert insoluble in water and therefore difficult to remove. When the Hg0 is oxidized to Hg2+ it becomes water soluble and is removable by the Flue Gas Desulfurization (FGD) unit allowing existing pollution control devices to capture mercury as a co-benefit. Additionally the Selective Catalytic Reduction (SCR) catalyst used to reduce nitrogen oxides has been shown to oxidize mercury by providing reaction sites for the oxidation via a poorly understood mechanism. Other attempts to characterize the reaction kinetics and mechanism for Hg0 oxidation were conducted using
simulated flue gas generated by mixing the combustion products; this does not represent a real combustion environment. In this study a bench scale methane combustion system was designed and built to investigate mercury oxidation on the SCR catalyst. This system includes a packed-bed reactor and burner to generate a laminar premixed flame. The burner allows for combustive generation of flue gas in the lab as opposed to mixing the flue gas components. This provides a more accurate way to investigate interactions between the flue gas and the catalyst. The reactor also provides the capability for studying the deactivation of the SCR material via poisoning and a testing site for novel SCR materials. The poster discusses the system's experimental design and preliminary results.

**Selective Oxidation of Glycerol over a Metal Catalyst**

*Quentin Todd*, Chemical Engineering - Junior

Mentors: Dr. Christopher Williams, Chemical Engineering Mr. Abraham Rodriguez, Chemical Engineering

Biomass conversion to biodiesel is gaining interest as a source of alternative fuel. Crude glycerol is a byproduct from this conversion process which can be distilled to a more pure form of glycerol. Neither crude nor pure glycerol is in high demand but we can obtain higher value materials from it. The catalytic oxidation of glycerol under basic conditions yields some of these compounds such as glyceric acid with higher value. Different monometallic and bimetallic catalysts were prepared characterized and evaluated to understand which one would yield the highest activity and selectivity. The monometallic catalysts were Au Pd Ag and Cu; these were prepared using incipient wetness. The bimetallic catalysts were Au/Pd, Ag/Pd and Cu/Pd; these were prepared by a method developed in our lab called electroless deposition. All catalysts were prepared on a carbon support. Reactions were run at set conditions with timely samples being taken and analyzed by HPLC. Both Cu/Pd and Ag/Pd bimetallic catalysts did not differ much from their monometallic counterparts but the Au/Pd catalyst showed much higher activity than each of its monometallics. Catalysts were prepared with intentions to show higher activity which includes faster glycerol conversion and higher selectivity. The Au/Pd catalyst which showed the highest activity reached 100% conversion after three hours with selectivity to glyceric acid of 80%. The results obtained could be used for large-scale production of selective chemicals from glycerol oxidation which would help the economics of biodiesel production processes.

**Motivations of Sports Tourism**

*Ashley Adler*, Hotel Restaurant and Tourism Management - Senior

*Caroline Rearden*, Hotel Restaurant and Tourism Management - Junior

*Vilora Mueller*, Hotel Restaurant and Tourism Management - Senior

*Andrew Hargest*, Hotel Restaurant and Tourism Management - Senior

Mentor: Dr. David Cardenas, Hotel Restaurant and Tourism Management

The purpose of this study was to determine why lacrosse players travel to South Carolina for tournaments. Tourism motivation is one of the most critical variables that determine travel behaviors. Travel is maximized by the effectiveness to promote and manage a region based on its native qualities. There is an important need to understand travel motivation in order to develop a successful marketing strategy. There is an even greater need for research on motivation in tourism in sports. The research question that guided the study was: What are the push and pull motivators causing lacrosse players to travel to South Carolina as opposed to other states? He project started with a literature review looking at what commonalities South Carolina has with other states where lacrosse is more popular and what aspects makes South Carolina unique. The next step is to conduct interviews with hopes of finding what motivates players from other states to travel into South Carolina to play lacrosse. Results will come after the data has been collected.

**Do Tourism Attributes Impact Students’ College Decisions?: A Case Study of The University of South Carolina**

* Kerstin Hudon*, Tourism Management - Junior

* Erika Bandolos*, Tourism Management - Senior

* Lauren Seder*, Tourism Management - Senior

* Adam Daniels*, Tourism Management - Senior

Mentor: Dr. David Cardenas, Hotel Restaurant and Tourism Management

This study was conducted to determine the impact that Columbia’s tourism attributes have on motivating students to attend the University of South Carolina. Push-pull theory has been used extensively in tourism research to better understand tourism behavior. Push factors are things that internally motivate someone to attend college such as wanting a high-paying career or wanting to learn more about a field. Pull factors are attributes of the destination that attract students to it such as strong academic programs and large financial aid packages. Currently there is limited research examining whether tourism attributes serve as pull factors for students choosing a college and these studies tend to examine only the pull factors for international students. Examining the impact that tourism factors have on student’s decisions may provide information that would allow the University of South Carolina to better market themselves to prospective students and that would aid the city of Columbia when developing tourism in the future. A survey will be sent to freshman living on-campus. This survey will ask students to rank how important various factors were when deciding to attend USC; more than half of these factors will be tourism attributes. The results are forthcoming.
The Expansion of the Panama Canal: Effects on the South Carolina Economy

Keaten North, International Business - Senior
Mentor: Dr. Douglas Woodward, Economics

The dredging deepening and improving of many U.S ports on the east coast has been elevated as major priority as reflected in recent state and federal budget allocations. With the expansion of the Panama Canal projected to be complete by 2014 many states are competing to become a “first call” port by Asian exporters looking to ship their goods directly to the east coast traversing through the Panama Canal. With one of the highest unemployment rates in the United States it is imperative for South Carolina lawmakers to recognize future prospects that have the potential to create jobs and facilitate economic growth. The expansion of the Panama Canal will have direct positive impacts on the economy of South Carolina by increasing activity in the Port of Charleston and creating numerous jobs for South Carolinians. This project was funded through the Magellan Scholar program to research the local economic outcomes of expanding the Port of Charleston. By utilizing input-output modeling this paper will examine the total effects the expanded Panama Canal will have on the South Carolina economy.

By gathering payroll expansion new construction activity expenditures annual operating expenditures and local demands for the influx in shipments we can use the input-output model to assess the direct and indirect effects that the Port of Charleston and the state of South Carolina will experience. After completion of this assessment we will also have quantified the effects of the expanded trade through Panama Canal on the South Carolina economy.

The Current Global Financial Crisis with Relation to Governance and Regulation in the Financial Sector of Easter Europe (Serbia)

Stevan Novakovic, International Business - Senior
Mentor: Dr. David Hudgens, International Business

The project entailed an in-depth personal look at business practices in the Balkan region primarily Serbia. While economic and historical data were considered to develop an understanding of the background for the SWOT (Strengths Weaknesses Opportunities and Threats) analysis the primary sources of information were acquired first-hand. A multitude of individuals were personally interviewed some in English some with translation. Individuals ranged from logistics managers customs officers business owners attorneys consultants bankers energy directors insurance derivative bosses town mayors and economics students among others. In addition there were tours of distribution centers business offices and physical stores etc. The general consensus among private workers was that business is hampered by corruption difficulties in acquiring capital to start business and sketchy legal climate heavily affected by corruption. Public employees across the board were unwilling to admit corruption and were more apt to label difficulties related to the global financial crisis. While there is some development overall and modernization of technology is developing the business climate must be revamped and corruption (especially with regard to monopolies) must be stamped out before Serbia sees real economic growth.

Institutional Change Judicial Decision-making and Rights Protection in Costa Rica

Marta Ribao Gil, Political Science - Senior
Mentor: Dr. Lee Walker, Political Science

Institutions are power seeking. Much of the literature on the role of the judiciary in the protection of civil and political rights argues that it is support structures in civil society that advance the development of a rights agenda. The courts then follow the demands that are made by the public. Costa Rica is an excellent place to test this idea because of the passage of the 1989 Law of Constitutional Jurisdiction which created Costa Rica’s Constitutional Chamber. The creation of this chamber resulted in a tremendous number of new civil and political rights cases entering the court. Using data that I coded with other USC students I find that the Costa Rican Supreme Court is extremely proactive in the manner in which it handles these cases.

Downtown Revitalization as a Tool to Attract Tourists: Case Study of Business Owners’ Satisfaction with Redevelopment in Downtown Columbia South Carolina

Caroline Richardson, Tourism Management - Senior
Andrew Sherman, Tourism Management - Senior
Olivia Figary, Tourism Management - Junior
Kendell Hillis, Tourism Management - Senior

Mentor: Dr. David Cardenas, Hotel Restaurant and Tourism Management

The purpose of this study is to gain insight into the perceptions of business owners with establishments located in the Columbia South Carolina Business Improvement District (BID) regarding their experiences with downtown revitalization. The research will examine the degree of BID business owners’ satisfaction with the returns on their investments toward the downtown revitalization project. Stakeholder theory will be the foundation for this research process which will assist in determining the importance of business owners as stakeholders in the creation of a BID. Research will consist of interviewing 12 business owners including a survey with Likert-type scale questions. The survey assessment will be used to determine the general perceptions of business owners of the Columbia Business Improvement District with respect to downtown revitalization. Results are forthcoming.

Communicating on behalf of single fathers: the Midlands Fatherhood Coalition

Azissa Singh, Baccalaureus Artium et Scientiae - Junior
Ross Geiger, Psychology - Sophomore
Jason Mohn, Public Relations - Junior

Mentor: Prof. Karen Mallia, Advertising

Karen Mallia’s service-learning course “Communicating for a Cause” asks students to partner with a local non-profit and provide service in the form of a communications campaign. In this case the team worked with the Midlands Fatherhood Coalition an organization that helps fathers overcome the barriers to being responsible and involved teaching not only practical skills (e.g. changing diapers budgeting etc.) but also less tangible fathering skills such as how to build and maintain healthy relationships. After meeting with Coalition participants and
staff we discovered that while current participants find the program helpful many heard about it purely by chance. Another issue was the prejudice against single fathers particularly the belief that the men were not involved because they did not want to be—a belief that resulted in differential treatment by the social services system. Thus the main goals of the campaign were to raise awareness of the mission and success of the organization and to combat the common stereotypes—and ultimately to communicate that better fathering makes for a better future not just for children but for the whole community.

Investigating an educational pharmacy camp’s impact on high school students

Kristen Ammay, Pharmacy - Senior
Laura Jeffcoat, Pharmacy - Senior
Mentors: Dr. Betsy Blake, Pharmacy
Ms. Nancy Taylor-Culberson, Pharmacy

The pharmacy profession is more diverse today than it has ever been before with the development of new areas and the expansion of others over the past several years. It is of great benefit to educate those on the brink of selecting their career pathway about these opportunities. This study was designed to analyze the impact of an educational pharmacy camp on high school students’ interest understanding and perception of pharmacy. High school students attended a five-day camp held annually in the summer during which they were educated about various areas in pharmacy including clinical nuclear compounding hospital and community. A survey was administered on the first and last days of the camp to determine students’ interest understanding and perception of pharmacy before and after participating in the camp. Data was collected over two years to increase the sample size. An overall decrease in the number of students considering a career in pharmacy was observed despite an increase in students seriously considering attending pharmacy school. There was an increase in the students’ understanding of the pharmacy profession and the different areas as well as in their confidence to perform pharmacy-related tasks and jobs in various areas. The results of this study indicate that the “Adventures in Pharmacy” camp is effective at increasing high school students’ knowledge and understanding of the pharmacy profession. The camp plays a beneficial role in equipping high school students with knowledge and experience that will aid them as they consider various careers to pursue.

Student Well-Being and Schooling

Noelle Chasmar, Exercise Science - Junior
Mentor: Dr. Scott Huebner, Psychology

This study of Child and Adolescent Positive Psychology is based on the premise that psychology has been dominated by studies of psychological problems resulting in models of human functioning that are devoid of the positive features that make life worth living. To complement the emphasis on youth “problems” this study seeks to understand youth “strengths” and the conditions that enable youth to flourish at home school and in the community. This project focuses on longitudinal relationships among student strengths and middle school students’ subjective well-being and engagement in schooling. A survey has been administered to a middle school in a local school district to analyze subjective well-being. The multidimensional model consists of the constructs life satisfaction behavioral and student engagement hope climate etc. These strengths are being analyzed on multiple levels with a focus on their influence on subjective well-being as a whole. The data is collected in a multi-wave form to better the tracking of the students’ perceptions skills and environmental resources over time.
The prediction is that there will be a varying level of exposure to CAMs with the majority being a lower level of coverage. The goal is to identify the topic gaps of educational exposure.

**The Eight Year Old Doctor**
*Patrick Sajovec*, Psychology - Senior

**Mentor:** Dr. Brad Smith, Psychology

**Shaina Mayekar**, Psychology - Senior

**Katherine Schmidt**, Psychology - Junior

**Mentor:** Dr. Brad Smith, Psychology

Science Technology Engineering and Math have recently become the focus of educational reforms and increased government funding. It is important to introduce these core subjects to students as early as possible. For this reason a group of counselors at the Seven Oaks Elementary Challenging Horizons Program have worked to develop an interactive science curriculum that enhances what the third through fifth grade students learn in school. To measure the effectiveness of this science program pre-tests and post-tests will be administered as well as surveys that measure enjoyment and career expectations. Students’ classroom science grades will also be taken into consideration.

**Giving a Distracted Child the Desire to Complete Homework**
*Emily Street*, Psychology - Senior

**Mentor:** Dr. Brad Smith, Psychology

Clinical and school psychologists often complete individual case studies to document response to intervention. This case study followed one fourth-grade student throughout the semester tracking homework completion. This student initially had a low homework grade in his regular classroom due to either not completing homework losing homework or simply not turning it in. Interventions were implemented in an effort to improve focus on homework tasks as well as remember to turn in homework the next day. Immediate rewards for small tasks were the first step and with success make the rewards more intermittent and advice on complementary and alternative medication therapies. In the past the science of pharmacognosy was a standard part of pharmacy school curriculum but this has been replaced as the widespread use of manufactured pharmaceuticals became the primary medication utilized in the U.S. Dietary supplements vitamins and herbal products education is provided in the pharmacy curriculum but possibly in varying degrees between schools. Complementary and alternative medication therapies have remained available in the U.S. and appear to be increasing in popularity and use. It is important from a medication safety perspective that healthcare providers in particular pharmacists have considerable knowledge in these therapy options. An earlier study by Shields (2003) evaluated the level of exposure for this subject matter by evaluating the subjects covered and the texts utilized in the courses. This study will build upon this previous research by providing an updated review of similar questions while also exploring specific subject matter and the difficulty level in which it is taught in the pharmacy school curriculums. The data will be collected through a survey mechanism that will be sent out nationally to all pharmacy schools.

**Evaluation of US Pharmacy School Curriculum on Complementary and Alternative Medicines**
*Casey Morgan*, Pharmacy - Junior

**Mentor:** Dr. Bryan Ziegler, Pharmacy

This study aims to analyze educational exposure to complementary and alternative medication therapy within the curriculum of United States pharmacy schools. Pharmacists are a key healthcare provider that provides education and advice on complementary and alternative medication therapies. In the past the science of pharmacognosy was a standard part of pharmacy school curriculum but this has been replaced as the widespread use of manufactured pharmaceuticals became the primary medication utilized in the U.S. Dietary supplements vitamins and herbal products education is provided in the pharmacy curriculum but possibly in varying degrees between schools. Complementary and alternative medication therapies have remained available in the U.S. and appear to be increasing in popularity and use. It is important from a medication safety perspective that healthcare providers in particular pharmacists have considerable knowledge in these therapy options. An earlier study by Shields (2003) evaluated the level of exposure for this subject matter by evaluating the subjects covered and the texts utilized in the courses. This study will build upon this previous research by providing an updated review of similar questions while also exploring specific subject matter and the difficulty level in which it is taught in the pharmacy school curriculums. The data will be collected through a survey mechanism that will be sent out nationally to all pharmacy schools.

**Peer Leadership Among Middle School Students**
*Angelica Teran*, Psychology - Junior

**Mentor:** Dr. Brad Smith, Psychology

Ideas of giving students responsibilities early on have been found to help and improve the behavior and level maturity of certain children and teenagers. We investigated whether or not such responsibilities in an after school setting would improve the desire for the students to be want to be there. The students were given several activities to conduct that mostly included leadership and responsibility among their peers. The students were given choices such as leading check-in or choosing the activity for block of the day while their peers were expected to treat the student in charge with the same courtesy as a counselor or another adult. Students were first required to behave in such a manner to where
the leadership role was an earned privilege and could be represented in a certain amount of demerit points. Results showed that the students who were having to listen to instructions given by the students in charge felt that they also could do the same and in turn causing better behavior during the after school program.

**Distributed Math Practice in the Challenging Horizons After-School Program**

*Candace Whitaker,* - Senior  
Mentor: Dr. Brad Smith, Psychology

Many students in South Carolina are falling behind in math skills. One of the cutting-edge approaches to improving math performance is curriculum based measurement (CBM) linked with academic intervention for skill deficits. Based on the CBM model the math curriculum of the Challenging Horizons After-School Program implements a weekly math test for students. The math tests vary in level of difficulty and have 100 problems that the student must complete in 4 minutes or less. Students can progress through the levels by solving correctly 90 or more of the problems in the allotted time. In order to improve the math scores students participated in math enrichment blocks in which they played games and participated in activities to improve their math skills. Students were given feedback based on the CBM as to what problems they missed. They were instructed to practice the problems that they missed before taking the scored exam the following week and data were collected to assess whether these methods improved student performance. The study assesses a group of 50 elementary school students in second through fifth grades. Scores were compared between groups participating in the enrichment activities with those that did not get enrichment.

**USC Connect Showcase**

**Pumpkin Chunkin’**

*John Clegg,* Biomedical Engineering - Junior  
Mentors: Dr. Kirk Randazzo, Carolina Leadership Initiative  
Ms. Sarah Johnston, Carolina Leadership Initiative

While many high schools in South Carolina have pre-existing engineering programs most of the rural low-income schools do not. With funding issues to blame these students are not exposed to the engineering field which could potentially provide them a personally and financially rewarding career. The purpose of the Pumpkin Chunkin’ was to expose participants to the engineering concepts of material science mechanical design and projectile motion through the construction and operation of a trebuchet. On Saturday November 3rd eleven teams from eight schools participated in a daylong competition; the judged events were based on distance accuracy and presentation components. Seventy USC students and five faculty members volunteered as mentors organizers and judges for the event which showcased both the skill of the participants and the opportunities available through higher education at USC. Ultimately this event was meant to establish a mutually beneficial mentor – mentee relationship between USC engineering students and SC high school students. It also aimed to spark interest with participating high schools to develop engineering-oriented clubs and organizations for their students. This event was supported by the Carolina Leadership Initiative and facilitated by the USC Theta Tau chapter.

**E-Portfolio: Amanda Cosenza Edition**

*Amanda Cosenza,* International Business - Junior  
Mentor: Dr. Irma Van Scoy, USC Connect

E-portfolio is a way that students can organize their experiences inside and outside of the classroom through five pathways-global learning research community service internships and peer leadership. Through this project I was not only able reflect on my work and experiences thus far but I was also able to build connections between those various pathways. The online publishing aspect also allows me to share my experiences goals and skills with others!

**Navigating National Fellowships: Experiences Applying for the Fulbright**

*Kali Esancy,* Biological Sciences - Senior  
Mentor: Ms. Jennifer Bess, Fellowships & Scholar Programs

Two of the most important horizon-broadening activities a student can take part in over the course of their undergraduate education are study abroad and research. Academic Fulbright grants encompass both of these experiences providing funds for students to continue such endeavors after they graduate from their undergraduate institutions and allowing them to conduct research abroad. This past fall I applied for an academic Fulbright grant to work in a neurobiology laboratory at the Université d’Angers in France. Though I have yet to find out whether or not I have been awarded this grant going through the application process itself was an illuminating experience. It not only made me more familiar with USC’s Office of Fellowships and Scholar Programs (the OFSP) it also helped
me to develop many of the skills necessary for a future life in academia—I learned how to prepare for interviews adequately write personal statements and statements of purpose how to find and contact professors at other institutions and more. Compiling my Fulbright application helped me to clarify my academic goals and interests and was a boon in writing my graduate school applications. In addition to refining my technical skills through the Fulbright application process I was able to get a better sense of who I was and what I wanted in my future studies and career.

**CCHAPS Internship**

*Victoria Gates*, History - Senior; USC Sumter  
Mentor: Dr. Sarah Miller, History; USC Salkehatchie  
During the Spring of 2013 I interned at the Colleton County Historical and Preservation Society. I served several purposes: I completed office and computer based tasks I created a way of better organization for storage and I updated the website. My primary project; however involved the organization of the basement. There are two rooms in the basement neither of which was fully accessible. The space had been used for storage not only of artifacts but also of miscellaneous supplies. These items included: various pieces of wood windows metal hinges door handles doors various miscellaneous items signs and various household project items. I evaluated each item and organized and stored non-historic items. I then identified inventoried labeled and arrange them in a more usable and accessible format. The Colleton County Historical and Preservation Society is a volunteer organization with only one part time office employing through my internship I was able to help the Society with several project that had been lingering for some time. In the process I learned the many aspects and duties of a small county historical society and was able to use my skills learned in the Bachelors of Liberal Arts History. Overall it was an enjoyable experience I will be able to use in future work.

**Ask My Name Campaign**

*Olivia Keyes*, Film and Media Studies - Senior  
Mentors: Dr. Kirk Randazzo, Carolina Leadership Initiative  
Ms. Sarah Johnston, Carolina Leadership Initiative  
The Ask My Name Campaign (AMN) is a new approach to the bullying problem. Targeted at children and adults at all walks of life AMN invites participants to tell a story show a talent or share a fact about themselves that no one would know about them unless they bothered to ask. The idea behind this approach is that instead of victimizing someone a person is humanized by sharing something personal with the audience beforehand. As research shows humanizing a person in the face of adversity is the first step towards ending prejudice. Showing the power of personal voice in documentaries by citing my own short films and other professional works I will teach students how to construct their own pieces by going through the filmmaking process step-by-step: pre-production planning production post-production and distribution. The short films are all compiled on an official website where anyone can submit a project and other resources are available about bullying and how to prevent it.

**Exploring Australia: Edge of the Outback Photography Course**

*Erinn Whiteside*, Psychology - Senior  
Mentor: Ms. Susan Hochreiter, Study Abroad  
I have always dreamed of participating in a particular kind of study abroad program; I wanted to spend the summer abroad and I wanted to be outside the classroom interacting with the community. Last summer I participated in the ideal study abroad experience called “Edge of the Outback: Photography.” This study abroad opportunity was a 19-day program located in Mildura Australia with several extended trips to the Outback. The purpose of the course was to learn the basics of photography such as the operations of a SLR camera different styles of photography and how to use professional editing software. Over the course of the program I not only learned a great deal about photography but I also met an array of interesting people explored a country I’ve always longed to visit and learned a lot about myself. At the end of the program students had the opportunity to display their best picture in a local art gallery. Through Discovery Day I hope to show other students the potential of study abroad through my work from Australia displaying my portfolio as well as some other photographs that capture the essence of the trip and the visual journal I kept while abroad.
Targeting Polo-like kinase 1: a new approach to cancer therapy

**Jake Bowling**, Biological Sciences - Junior

Mentor: Dr. Michael Wyatt, Pharmaceutical and Biomedical Sciences

Polo-like kinases (PLKs) have been identified as critical regulators of the mammalian cell cycle. PLK1, a well-characterized PLK, is overexpressed in a variety of human tumor types and represents a promising chemotherapeutic target. Though ATP-competitive inhibitors of PLK1 have progressed to clinical trials, cancer cells are found to mutate and resist these drugs; the unique polo-box domain (PBD) is a more advantageous region to target. Under the guidance of Dr. Michael Wyatt, I took part in an ongoing collaborative project aimed at developing a PBD-specific inhibitor of PLK1. My role in the project was first to establish a set of cell lines as a model for PLK1 overexpression and then to analyze the model's response to a series of test compounds. To establish a model, I amplified transgenic vectors each containing a gene for green fluorescence fused to either PLK1 or a specific PLK1 mutant using bacteria. I then purified this DNA and ensured its quality using gel electrophoresis and spectrophotometry. The resultant DNA was electroporated into human cancer cells which were then treated with test compounds. I used fluorescence microscopy to score the effectiveness of these test compounds. A major success of this project is the establishment of a model for PLK1 overexpression from which we are able to visualize the effects of test compounds. Encouraging compounds have been identified, and my analysis guides the modification process by which further improvements are made. This system will continue to be used as we work toward a new treatment for cancer.

Role of Toll-Like Receptor 4 on Brain Inflammation in a Mouse Model of Obesity

**Jonathan Chay**, Biological Sciences - Senior

Mentor: Dr. Angela Murphy, Pathology and Microbiology

A pathophysiological mechanism that may link obesity to disease risk is neuroinflammation. Toll-like receptor 4 (TLR4) is thought to regulate obesity-induced inflammation and may be an important therapeutic target for brain inflammation. The purpose of this study was to examine the role of TLR4 on brain inflammation following high fat diet (HFD) feedings in mice. Wildtype mice and TLR-4-/- mice were assigned to either 1) wildtype mice on HFD (WT-HFD), 2) wildtype mice on normal diet (WT-ND), 3) TLR-4-/- mice on HFD (TLR4-/-HFD), or 4) TLR-4-/- mice on ND (TLR4-/-ND) (n = 8/group). Mice were fed their respective diets for 18 weeks beginning at 4 weeks of age. The HFD contained 40% fat calories. Body weight was measured weekly, and body composition (percent fat, fat mass & lean mass) was measured bi-monthly using a DEXA scanner. Mice were sacrificed following 18 weeks of their dietary intervention. Fat pads were removed and weighed. Brains were dissected and were stored at -80°C until analysis. mRNA expression of inflammatory mediators including MCP-1, IL-1β, IL-6 & TNF-α were assessed in the cerebellum. HFD increased body weight,
fat mass, percent fat and visceral fat weights and TLR4 deficiency offset this effect. While there was no increase in brain inflammation with HFD, there was a main effect for TLR4 deficiency to decrease inflammation in the brain; IL-1β & TNF-α were decreased in TLR-4-/ mice. TLR4 may emerge as an important therapeutic target for the prevention of diseases that are driven by brain inflammation.

**Determining Allele Frequency of African-American and BrCa DNA Samples by Genotyping at the Trem 2 Locus to Determine Breast Cancer Aggressiveness**

*Shandrea Foster*, Biological Sciences - Sophomore  
Mentor: Dr. Bert Ely, Biological Sciences  
High levels of CRP (C-reactive protein) trigger myeloid cell activation and inflammatory response and lead to increased cardiovascular risks which include atherosclerosis high blood pressure and problems with metabolism (Pearson et al. 2003). High CRP levels have been found in people of African and Hispanic origin and are associated with genetic variation at the Trem2 locus (Khera et al. 2005). CRP levels also predict the aggressiveness of breast cancer (BrCa) in women affecting the prognosis (Allin et al. 2011). Therefore we hypothesize that the G allele of the Trem2 rs774513 locus is a breast cancer risk factor and that there is a correlation between patient Trem2 genotypes CRP levels and the aggressiveness of BrCa. To test this hypothesis we will determine the Trem2 locus genotypes of African American breast cancer (BrCa) patient DNA samples using PCR restriction enzyme digestion and agarose gel electrophoresis. The resulting genotypes will then be compared to the patient’s breast tumor characteristics to determine if tumor aggressiveness is correlated with the presence of the Trem2 rs774513 G allele. The importance of this research is that determining the Trem2 rs774513 genotype of women could predict breast cancer risk so that early prevention could be implemented. Future experiments could include determining whether CRP levels are correlated with the presence of the Trem2 rs774513 G allele as well (Reiner et al. 2012).

**The Anti-angiogenic Effects of Sparstolonin B**

*Gabrielle Jenkins*, Biological Sciences - Senior  
Mentor: Dr. Susan Lessner, Cell Biology and Anatomy  
Angiogenesis the process of new capillary formation from existing blood vessels is dysregulated in many pathological disorders including tumor growth and atherosclerosis. Sparstolonin B (SsnB) is a novel bioactive compound isolated from the aquatic herb Sparganium stoloniferum that has shown potential to inhibit angiogenesis. In prior functional assays SsnB inhibited endothelial cell tube formation and cell migration in a dose-dependent manner. Microarray experiments with human endothelial cells demonstrated differential expression of genes associated with cell proliferation cell cycle cell motility and cell division. Flow cytometry and quantitative PCR were utilized to study how SsnB affected progression through the cell cycle and the expression of several key genes from the microarray data respectively. Flow cytometric cell cycle analysis of human umbilical vein endothelial cells treated with SsnB showed an increase of cells in the G1 phase and a decrease of cells in the S phase. Cyclin e2 (CCNE2) and Cell division cycle 6 (CDC6) are regulatory proteins that control cell cycle progression through the G1/S checkpoint. Diaphanous homolog 3 (DIAPH3) hyaluronan-mediated motility receptor (HMMR) and anillin (ANLN) are proteins associated with actin remodeling cell motility and cytokinesis respectively. These genes were downregulated in the microarray and quantitative PCR data. The data suggests that SsnB may exert its anti-angiogenic effects by downregulating CCNE2 and CDC6 halting progression through the G1/S checkpoint and by downregulating DIAPH3 HMMR and ANLN which are involved in cell motility and division. Overall this study demonstrates the potential of SsnB as a novel pharmaceutical agent to inhibit angiogenesis.

**Measuring the comparative effectiveness of anti-HIV-1 Tat siRNAs**

*Alexander Jureka*, Biology - Senior; USC Aiken  
Mentor: Dr. William Jackson, Biology/Geology; USC Aiken  
Human Immunodeficiency Virus type 1 (HIV-1) is the etiological agent of the AIDS epidemic, and is classified as a lentivirus in the family Retroviridae. CD4+ T Helper lymphocytes are the primary target for HIV because of its affinity for the CD4 marker. T Helper cells coordinate a number of important immunological functions, and the loss of these functions results in the progressive impairment of the immune response, leading to AIDS. Successful HIV-1 replication depends on expression of a small regulatory gene termed tat (trans-activator of transcription). Tat functions to enhance transcriptional elongation by binding to the TAR (trans-activating response element) sequence which forms a stem loop structure on all nascent viral mRNAs. One mechanism of inhibiting tat function may be the use of anti-RNA reagents such as siRNAs. In each case tat mRNA can be used as a target for inhibition by exogenously introduced siRNAs. Such siRNAs act through the DICER/RISC complex to cleave target mRNAs in a sequence specific manner. Previously our lab has designed and cloned four anti-tat siRNAs (pSRNGsi6010, pSRNGsi5892, pSRNGsi5860, pSRNGsi5834, and a control pSRNGsiCtrl). These RNA reagents were targeted to the HIV-1 NL4-3 tat sequence (Accession number M19221) as indicated by the numerical designation of each plasmid. Although these reagents acts to down-regulate gene expression at the mRNA level, direct comparisons between these siRNAs in cell culture have not been made. The results of this study indicate that short interfering RNAs successfully down-regulate the HIV-1 transactivator of transcription in a transient luciferase assay.

**Flavonoid’s Ability to Attenuate Alzheimer’s Disease by Inhibiting Amyloid-ã Oligomer Formation**

*McCall Rogers*, Chemical Engineering - Junior  
Mentor: Dr. Melissa Moss, Chemical Engineering  
There are an estimated 5.4 million Americans living with Alzheimer’s disease (AD) making it the most prevalent form of dementia. Despite years of study there are still no treatments available to significantly slow or stop the neural deterioration that defines AD. One of the primary causes of AD is the aggregation of monomeric amyloid-ã (Aã) proteins into larger fibrils and senile plaques. Aã which naturally occurs at safe levels in the body is formed when the cytoplasmic amyloid-ã precursor protein (APP) is cleaved by á-secretase and á-secretase forming Aã monomers. In the presence of salt these Aã monomers will oligomerize and form soluble aggregates before aggregating into large fibrils
These soluble Aβ aggregates are known to cause death in neuronal cells and are believed to be the causative agents in the progressive neurodegeneration observed in AD patients. One class of compounds that show promise preventing this aggregation is flavonoids. Studies have shown that diets rich with flavonoids reduce the incidence of AD and that certain flavonoids have the ability to inhibit Aβ aggregation. In this study the oligomer inhibition characteristics of four flavonoid compounds Quercetin, Rhamnetin, Isohamnetin and Tamarixetin were studied. After allowing Aβ to oligomerize in the presence of the test compound gel electrophoresis and western blot analysis were used to detect the size and concentration of the oligomers formed. By performing statistical analysis on these results the ability of these compounds to inhibit Aβ aggregation can be observed.

**Comparative study of HIV-1 induced apoptosis by expression of pro-apoptotic Bax and tBid**

**Priscilla Simon**, Biology - Senior; USC Aiken  
Mentor: Dr. William Jackson, Biology/Geology; USC Aiken  
The Human Immunodeficiency Virus type 1 (HIV-1) is a lentivirus in the family Retroviridae that infects CD4+ T-Helper (TH) lymphocytes. Long-term HIV infection is associated with the loss of the TH lymphocyte population progressive impairment of the immune response and AIDS. We are currently investigating the inhibition of viral replication in HIV-1 infected cells through induction of pro-apoptotic gene expression. This strategy takes advantage of a distinctive characteristic of HIV-1 infected cells which is based on the activity of the viral transactivator of transcription (tat). Tat binds to the viral transactivation response element (TAR) located within the first sixty nucleotides of all viral mRNAs and recruits a number of host factors that act to hyperphosphorylate the C-terminal domain of RNA Polymerase II which results in increased processivity and efficient transcription from the viral promoter/enhancer. We have created a number of plasmids containing an expression cassette that is controlled by the HIV-1 promoter and enhancer and that are therefore Tat dependent. Studies in 293T cells co-transfected with pU3ReGFP and pCMV-Tat indicated that GFP was expressed in a tat-dependent manner. To determine the ability of the pU3R plasmid to drive expression of pro-apoptotic genes the eGFP sequence was replaced with either tBid or Bax which are members of the Bcl-2 family and occur naturally in eukaryotic cells. Studies thus far have shown that tBid is more toxic to cells in the presence of Tat. Studies are underway to determine the ability of each pU3R plasmid to initiate apoptosis in a tat-dependent manner and their effect on cells in the absence of tat.

**Evaluation of the effects of adhesive strength on drug release from a sealant biomaterial**

**Alek Wagner**, Biomedical Engineering - Senior  
Mentor: Dr. Tarek Shazly, Mechanical Engineering  
The initial focus of this project was to develop a protocol for testing the penetration of a drug (an antibiotic for example) into various types of tissue when released from a sealant material to be used in surgical procedures. The process of developing this protocol led to the start of a more comprehensive study that will examine how varying the strength of the adhesive material's binding to the tissue will affect the way the drug penetrates into the tissue. To do this a system to visualize the location of the released molecules was needed. Options available include the drug linked to a fluorescent molecule but due to expense a simple fluorescent molecule (i.e. fluorescein sodium) will be used as a surrogate for the drug (Vancomycin). This has resulted in a two-tiered experiment that consists of the following procedures. One the fluorescent molecule will be released in conjunction with various adhesion strengths to demonstrate a correlation; the most likely result being that stronger adhesion will result in better penetration because of more direct contact between the tissue and the material. Two the results derived from the use of fluorescein should be compared to the fluorescently-linked drug to see if the kinetics are comparable. It is expected that due to the smaller size of fluorescein compared to Vancomycin that the overall penetration for the former will be greater even if the release curves are comparable. Using these methods the release of molecules from the material can be examined while still keeping costs low.
**Biology and Biomedical Sciences II**

**Effect of chemotherapy drugs on breast cancer cells encapsulated in a peptide-conjugated hydrogel**

*Pooja Choudhari*, Chemical Engineering - Senior  
*Purva Choudhari*, Chemical Engineering - Senior  
*Mentors: Dr. Esmaiel Jabbari, Chemical Engineering*  
*Mrs. Samaneh Sarvestani, Chemical Engineering*

Tumor microenvironment in vivo includes both cancer cells and cancer stem cells (CSCs). CSCs are a small population of cancer cells that can self-renew and are resistant to conventional methods of cancer therapy. Considering the complexity of tumors, it is important to perform in vitro studies that can be used to investigate the effects of isolated factors on tumor growth. Hydrogels as three-dimensional matrices that are biocompatible and allow easy diffusion of oxygen nutrients and waste can be a good choice for this study. In tumors, cancer cell growth and development are regulated by specific signaling pathways which play important roles in cell-cell and cell-extracellular matrix interactions. Modifying hydrogels with peptides contribute to mimicking the tumor microenvironment. Previous research has demonstrated the different effects of heparin-binding and integrin-binding peptides on breast cancer tumorsphere formation in 3D poly-ethylene glycol (PEG) based hydrogel matrices. The goal of this project is to modify hydrogels with integrin-binding and heparin-binding peptides to result in breast cancer cell and CSC growth in the same matrix. The effects of cancer drugs such as Doxorubicin (DOX) and Salinomycin on the cells encapsulated in the modified matrix will be investigated. It is anticipated that DOX as a conventional chemotherapy drug will be toxic to the cancer cells but will not have an effect on the CSCs. On the other hand, Salinomycin as a drug that specifically targets CSCs will have a stronger effect on CSCs in comparison to DOX.

**Mitochondrial Changes in a MLASA Mouse Model**

*Johnathon Elkes*, Biological Sciences - Senior  
*Mentor: Dr. Jeffrey Patton, Pathology and Microbiology*

Mitochondrial dysfunction in mice is one of the most common tRNA post-transcriptional modifications. In humans a genetic dysfunction of one of the enzymes responsible for this modification Pseudouridine Synthase 1 (PUS1) is known to cause Mitochondrial Myopathy and Sideroblastic Anemia (MLASA). While MLASA presents with a variety of well-described symptoms, there is lesser known about the link between PUS1 dysfunction and the disease. This work aims to begin identifying the etiology of the disease through first characterizing a PUS1 Knockout mouse model. Based on the pathology of MLASA in humans, we expect the affected genotypes to display mitochondrial dysfunction that presents primarily in skeletal muscle tissue and is caused by decreased translation efficiency. We have chosen to focus our initial experiments on the variations in tRNA steady-state level DNA expression muscle physiology and mitochondrial function between the +/+ +/− and −/− genotypes. As expected the preliminary results have shown a significant and progressive variation between +/+ +/− and +/+/−.

**Mitochondrial Myopathy and Sideroblastic Anemia (MLASA)**

The mutation results in a truncated form of lamin A known as “progerin.” One result of progerin expression is an accumulation of DNA double-strand breaks (DSBs). However, the effect that expression of progerin has on DSB repair has never been investigated in detail to our knowledge. To examine this effect, we took two experimental approaches. Both approaches use a repair substrate that allows us to induce a DSB with an endonuclease and then recover repair events occurring by nonhomologous end-joining or by homologous recombination in the form of gene conversions or crossovers. Using a cell line with a stably integrated DNA repair reporter construct, we examined DSB repair in the presence and absence of progerin expression. In preliminary experiments, it appears that the genotype comparisons. Additional comparisons between different tissues of the same affected −/− genotype have also yielded surprising and significant results. These findings represent meaningful progress towards the better understanding of the etiology of MLASA and the impact of pseudouridylation on tRNA function and regulation.

**Inhibition of amyloid beta protein self-aggregation by novel polyphenol analogs**

*Jasdeep Gurum*, Biological Sciences - Sophomore  
*Mentor: Dr. Melissa Moss, Chemical Engineering*

AD commonly affects older people and is the most prevalent neurodegenerative disorder. The disease is linked to the aggregation of amyloid-beta protein formed from the proteolytic cleavage of the amyloid precursor protein. Recently, there has been a vast increase in reports claiming that small aromatic rich compounds especially certain polyphenolic molecules show inhibition of amyloid-beta aggregation. The purpose of the research conducted was to identify novel polyphenols that inhibit amyloid-beta protein from aggregating. Thirteen compounds obtained from Johns Hopkins University that are analogs of polyphenols were first screened to determine their inhibitory potency toward amyloid-beta aggregation. The compounds that exhibited inhibitory potency were then tested further using a monomer aggregation assay which probes inhibition of amyloid-beta aggregation in two ways: extension of the lag time to aggregation formation and reduction of the equilibrium plateau representing the total aggregate formed. Four of the 13 compounds exhibited inhibitory potency toward amyloid-beta aggregation. Future studies will explore modifications of these 4 compounds to determine the structural components responsible for inhibition. Understanding the structural properties of polyphenols that impart inhibitory capabilities could result in lead compounds for future treatment and help prevent the disease.

**The Effect of Progerin on DNA Double Strand Break Repair**

*Caroline Hendricks*, European Studies - Junior  
*Mentors: Dr. Alan Waldman, Biological Sciences*  
*Mrs. Yibin Wang, Biological Sciences*

Hutchinson-Gilford Progeria Syndrome (HGPS) is a rare fatal autosomal dominant genetic condition characterized by accelerated aging in children. This syndrome is most commonly caused by a specific point mutation in the LMNA gene which normally codes for lamin A an important component of the nuclear lamina. The mutation results in a truncated form of lamin A known as “progerin.” One result of progerin expression is an accumulation of DNA double-strand breaks (DSBs). However, the effect that expression of progerin has on DSB repair has never been investigated in detail to our knowledge. To examine this effect, we took two experimental approaches. Both approaches use a repair substrate that allows us to induce a DSB with an endonuclease and then recover repair events occurring by nonhomologous end-joining or by homologous recombination in the form of gene conversions or crossovers. Using a cell line with a stably integrated DNA repair reporter construct, we examined DSB repair in the presence and absence of progerin expression.
Targeted Insertion of the mPing Transposable Element

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

Transposable elements like mPing are mobile pieces of DNA that can move throughout the genome of a cell through a cut-and-paste mechanism. 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 so researchers can determine gene function. My goal is to modify the ORF1 and Transposase proteins to produce targeted insertion of mPing. If mPing insertion could be targeted to specific sequences in the genome specialized mutagenesis applications could be performed. To determine if targeted insertion is possible I tested whether adding a GAL4 DNA binding domain to either the ORF1 or the Transposase protein would change mPing's insertion pattern. These modified proteins were tested using a yeast transposition assay. The results indicated that modification of these proteins did not interrupt transposition and increased the insertion frequency near a GAL target site. Both proteins showed an increase in preference of GAL targeting the data suggested that the modified ORF1 was more successful. My next step is to test the larger and more specific TALE binding domain to see if other binding domains can be used.

Anti-HIV VIF Activity Using a Hammerhead Ribozyme Expressed From an RNA Polymerase III Promoter

**Madison Sweet**, Biology - Senior; USC Aiken
Mentor: Dr. William Jackson, Biology/Geology; USC Aiken

APOBEC3G is an anti-retroviral host protein that causes hyper-mutation of retroviral DNA during reverse transcription thereby terminating the viral lifecycle. HIV encodes the virion infectivity factor (Vif) which degrades APOBEC3G and allows HIV to replicate unimpeded. Hammerhead ribozymes are small catalytic RNAs that contain a conserved catalytic core and cleave target mRNA's in a sequence specific manner. We have designed and cloned hammerhead ribozymes against three sites within the HIV-1 NL43 Vif sequence (accession number M19221). Each ribozyme was cloned into the retroviral vector p.Super.retro.puro (pSRP) forming a library of reagents: pSRPVif 5113 pSRPVif 5127 and pSRPVif 5127NC and pSRPVif 5154NC. To test the anti-Vif activity of these ribozymes 293T cells were co-transfected with two micrograms pNL43.Luc.R-.E-(pSRP) forming a library of reagents: pSRPVif 5113 pSRPVif 5127 and pSRPVif 5154. Similarly we have cloned a non-catalytic version of each: pSRPVif 5113NC pSRPVif 5127NC and pSRPVif 5154NC. To test the anti-Vif activity of these ribozymes 293T cells were co-transfected with two micrograms pNL43.Luc.R-E-an HIV-1 genomic clone and four micrograms of either a catalytic or non-catalytic ribozyme. Reverse Transcriptase PCR of the resulting cellular RNAs suggests that Vif 5113 and Vif 5154 reduce Vif RNA expression as compared to the control.

Use of PEG-based polymers to fabricate micropatterned hydrogels

**George Plasko**, Biomedical Engineering - Junior
Mentor: Dr. Esmaiel Jabbari, Chemical Engineering

This project compared the effect attaching different functional groups to star peg polymer chains would have on the hydrogels fabricated from them. Each hydrogel was crosslinked with a UV light sensitive photoinitiator with a patterned film blocking some of the light. Different films were used to determine the optimum opaque grid for a patterned cellular scaffold.
Fusing Sensor and Image Based Approaches for Automatic Image Tagging

**Justin Baumgartner**, Computer Science - Junior
Mentor: Dr. Srihari Nelakuditi, Computer Science and Engineering

Automatic image tagging has been a long standing problem. Social media such as Facebook has led to a greater increase in the need to tag people in images. While the fields of image processing and face recognition have made significant progress it remains difficult to automatically label a given picture. Recently an approach called TagSense which utilizes phone sensors to generate image tags has been proposed that takes advantage of the trend that smartphones are becoming inseparable from humans and are replacing traditional cameras. Given the complementary nature of TagSense and facial recognition methods we are working to develop a more sophisticated and robust application for automatically tagging images.

**A Comparative Analysis of Healthcare Effectiveness for Chronic Diseases in South Carolina Using a Knowledge Discovery System**

**Jake Hennett**, Computer Science - Senior; USC Upstate
Mentor: Dr. Wei Zhong, Mathematics & Computer Science; USC Upstate

This project focuses on comparing the healthcare effectiveness for chronic diseases at Spartanburg county state and national levels. Through the study of healthcare effectiveness for chronic diseases in different regions this project aims to provide quantifiable information for community planners and healthcare providers to enhance healthcare services for chronic diseases in South Carolina.

Exploration of Proteome Signatures for Peptide Sequencing

**Amadeo Bellotti**, Computer Engineering - Senior
Mentor: Dr. John Rose, Computer Science and Engineering

The main goal of the project is to develop and evaluate amino acid usage models compiled at different levels of taxonomic abstraction. The purpose of this research is thus to increase the accuracy of de novo sequencing to address this critical need. Tandem mass spectrometry is the driving force in protein identification. The task of identifying a protein from its spectrum is currently the weak point in this process. There are currently three ways of identifying peptides: database search methodstagging and de novo sequencing. Database search methods are a passive approach to identifying peptides. Since only 1-10% of peptides are known this doesn't let us identify novel sequences. De novo doesn't require prior knowledge rather it uses a probabilistic approach it is better at identifying new peptides. Our method recognizes that amino acid usage varies widely from organism to organism but can be similar based on taxonomy. How we can take this into account is to create a Hidden Markov Model of the transitions between known peptide sequences. These models can be created at different taxonomic levels while excluding a peptide we can then test to see where the peptide belongs. In doing this we discovered that the smallest resolution did not necessarily give us the best result. Our discovery impacts the scientific community by making available a software suite that allows us to rerank or reorder de novo results based on what is already known. This will allow scientists to improve the identification of novel peptides.

Using LEGO Mindstorms to Model Over-Subscription Planning and Distraction

**John Hollingsworth**, Computational Science - Senior; USC Beaufort
Mentor: Dr. Brian Canada, Computer Science; USC Beaufort

Time management is a problem for many. A well-planned schedule can go awry due to unexpected events chance encounters or simple distractions. Over-subscription planning (OSP) refers to the problem of completing the highest-value subset of a given set of goals given a limited time-frame. As each objective has a “priority value” associated with its completion then the cumulative value of the unfinished tasks represents the “cost” of over-planning. A desirable OSP solution strives to minimize this cost by optimizing the travel path between objectives given various constraints along with the required travel time between any two objectives. We wish to solve OSP problems complicated by distraction modeled as dynamically introduced (sometimes random) deviations from the planned path. Like planned objectives distractions also have a “priority value.” However the distraction’s value is not constant but likely time-dependent; the value may be higher when the distraction is first introduced during the pathfinding process but because the distraction prevents completing all objectives its value may be reduced depending on which objectives were left unfinished. While many OSP problems are solved using well-studied pathfinding algorithms the added complexity of distraction necessitates algorithmic modification. Here we report on progress in using LEGO Mindstorms to implement a location-aware robotic simulation of the “OSP+distractions” problem. As a practical physical test case our robot model may help to visualize how well the algorithms might work in use-case scenarios involving human users which could potentially lead to novel location-aware software tools for personal time management.
Affordable Medical Ultrasound Training Simulator

Logan Hood, Computer Science - Junior
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 PlayStation Move) 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 PlayStation Move 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.

Modeling the impact of control strategies on mosquito population in Beaufort County SC: Can the community stop the spread of West Nile Virus?

Patrick Niehaus, Computational Science - Junior; USC Beaufort
Mentor: Dr. Kasia Pawelek, Mathematics; USC Beaufort

West Nile Virus (WNV) is a major health concern in Beaufort County SC consisting of a large active elderly community which is at the highest risk of contracting WNV and having the life threatening symptoms caused by it. Our research focus is to find strategies to reduce the potential vectors for the WNV that would not damage the rich nature of the Beaufort County area. Currently Beaufort County Mosquito Control utilizes adulticides and larvacides (abatement of adult mosquitoes and larvae using public health insecticides) as a main strategy of reducing the mosquito population. Our objective is to investigate how source reduction a low cost and environmentally friendly method of mosquito breeding sites employed by the community will lower the possibility of transmission of WNV in this area. By using mathematical modeling based on the system of Ordinary Differential Equations along with surveillance data we explore optimal control strategies of mosquito population to lower the possibility of WNV transmission. We found that source reduction can significantly lower the population of mosquitoes while reducing the frequency of insecticides spraying.

A Video Game for Crowdsourcing Large-Scale Image Annotation Projects

Ivana Simic, Computational Science - Sophomore; USC Beaufort
Mentor: Dr. Brian Canada, Computer Science; USC Beaufort

As a crowdsourcing mechanism "serious games" can be helpful to the general public for solving certain kinds of difficult scientific and engineering challenges such as large-scale annotation of biomedical images particularly those exhibiting morphological abnormalities that result from genetic mutations. Following a historical review of the successes and failures of both serious games as well as those designed purely for entertainment we have identified a core set of game design attributes likely to yield a popular commercially successful game. For instance combining high production values with a familiar interface should attract the interest of the “casual gamer” who should be able to begin playing such a game on their computer or mobile device with little instruction. However the game must be addictive enough to sustain user interest for the long term which is essential for a crowdsourcing application to be successful—if people stop playing no science is being accomplished. Here we present our progress in applying these core attributes to a prototype game that requires users to arrange images into sequences based mainly on visual similarity. The game is scored based on the extent to which the player’s chosen arrangement matches those previously selected by other users playing asynchronously. For a given set of images the greater the consensus between user-chosen arrangements the higher each user’s score will be. We will show that these consensus sequences can be used to enable passive image labeling provided that a subset of images had been previously annotated directly by human experts.
Dissolved oxygen was seen to rise between June and January and highest at Turkey Creek and lowest at Briar Branch. Coliforms and cyanobacteria were found at all sites though higher at the PS and downstream sites. The higher amounts of organic matter observed at the PS leads to eutrophication causing cyanobacteria to flourish at the PS and downstream sites.

**Mercury Concentrations in Fishes from an Isolated Pond in South Carolina**

**Brandy Bossle**, Biology - Senior; USC Aiken

Mentor: Dr. Virginia Shervette, Biology/Geology; USC Aiken

Many people believe that eating fish is bad because of concerns relating to mercury exposure; however there are many nutritional benefits to a diet rich in fish. Much debate exists concerning the benefits and risks so quantifying the actual mercury concentration in fish that are commonly targeted by recreational and subsistence fish consumers and anglers is an important first step in enabling people to make an informed decision. Additionally mercury has the potential to negatively impact the health of the fish themselves but little research has looked deeply into this for common species in South Carolina. I examined how the length of fish is related to total mercury concentration in muscle tissue of two fish species from the Centrarchid family that were collected from an isolated pond on a hunting and fishing property north of Columbia South Carolina. I also determined how sex and growth rate are related to mercury in both species. Largemouth bass Micropterus salmoides had the highest concentrations of mercury and bluegill Lepomis macrochirus had the lowest. Mercury concentrations were generally positively correlated with length and weight for both species. This study provides important information for a pond area where fish are commonly caught and then consumed.

**Honors Garden Expansion**

**Andrea Eggleston**, Biomedical Engineering - Senior

Mentor: Mr. Sam Johnson, Sustainable Carolina

The Honors Green Team (HGT) located in the Honors Residence Hall focuses on promoting sustainability and conservation in the Honors College. Last year HGT implemented a garden in the western courtyard of the residence hall which provides students with the option to plant their own crops including vegetables and herbs. Students or groups can reserve their own plots or plant in the community garden space. This garden provides a place for botany research or other potential thesis projects. By working with Sustainable Carolina and using a Mini-Magellan Grant for funding HGT was able to expand these gardens to include more plots rows decorations and a compost area. This project is now presented during tours of the Honors Residence Hall as a testament to the green initiatives of Sustainable Carolina. Honors Green Team also worked with Engineers Without Borders to create a rain water catching system which allows the garden to be watered solely by natural rainfall. As the project moves forward Honors Green Team hopes to implement vertical gardens to improve the aesthetic quality of the area. Other HGT activities include making posters explaining the dorm recycling schedule implementing a glass recycling system promoting a “freecycling” program to rotate extra goods between students and making signs bringing attention to lights left on in community rooms. Honors Green Team has successfully raised attention to conservation practices in the residence hall. The group has expanded and promoted the sustainable garden project to a long-lasting feature of the Honors College.

**Check the Swamp Waters: Elemental Analysis and Use of Bioindicators to Monitor Water Quality in the Pocotaligo Watershed**

**Rachel Byrd**, Biological Sciences - Sophomore; USC Sumter

**Alexander Sims**, Chemical Engineering - Sophomore; USC Sumter

Mentors: Dr. Pearl Fernandes, Biology; USC Sumter

Dr. Kajal Ghoshroy, Biology; USC Sumter

The Pocotaligo watershed encompasses over 30000 acres of wetlands and has endured severe anthropogenic and natural alterations. The Sumter Wastewater Treatment Plant (WWTP) is the main point source of pollution. Our objectives were to determine the possible effects of non-point and point sources of pollution on water quality using physiochemical measurements elemental analysis and biological indicators. Samples were taken multiple times from five sites: Point Source (PS) two control sites upstream from the PS namely Briar Branch Creek relatively unimpacted by point and non-point sources of pollution and Turkey Creek impacted by non-point sources along with two downstream sites DS and Twelve Bridges. Energy-dispersive X-ray spectroscopy revealed that potassium calcium and chlorine were present at all sites with aluminum at much higher concentrations at Briar Branch Turkey Creek and Twelve Bridges. Manganese and sulfur were found only at upstream sites with Turkey Creek having the highest concentration of iron and also testing positive for fluorine and molybdenum indicating possible contamination occurring at or just above Turkey Creek. Diatoms flagellated unicellular and filamentous green algae were found in all sites but most abundant at Turkey Creek where euglenoids were also observed.

**Sensitivity of Species Within the Plant Family Solanaceae to FACs from Herbivore Saliva**

**Laquita Grissett**, Biological Sciences - Freshman

Mentor: Dr. Johannes Stratmann, Biological Sciences

Plants are commonly attacked by herbivorous insects such as caterpillars. When plants are wounded they use various mechanisms for defense. Many plants have physical defenses such as thorns that provide protection while others rely on chemical defenses. When tomato plants are attacked they release chemicals that block the digestive system of herbivores. Plants are able to detect when they are harmed because they sense molecules in the saliva of caterpillars and other herbivores. The best known saliva compounds that plants recognize are fatty acid-amino acid conjugates (FACs). FACs are the extracellular signals that induce defense responses in plants. However not all plants can sense FACs. Within the plant family Solanaceae (eggplant tomato potato tobacco petunia bell pepper) it has been shown that some species respond to FACs while others do not. The objective of this project is to find out whether the sensitivity to FACs follows an evolutionary relationship among the Solanaceae.
will be identified by measuring the activity of mitogen-activated protein kinases (MAPKs). MAPKs are signal transducing enzymes that can be activated by FACs. As a consequence they activate cellular defense responses. FAC-induced MAPK activity was measured in protein extracts from the treated leaf samples.

**Characterization of transfer zones within the South Georgia Rift using 2-D seismic lines and well data**

*Kimberly McCormack*, Geophysics - Senior

Mentor: Dr. James Knapp, Earth and Ocean Sciences

The South Georgia Rift Basin (SGR) has long been thought to be relatively simple on terms of its geology: with coastal plain sediments that vary gradually in thickness overlaying a uniform basalt province known as the “J-horizon”. However recent re-examination of well data collected throughout the SGR concludes that the J-horizon is not a ubiquitous basalt province but represents the base of the coastal plain sediments (Hefner D.M. 2011). These wells along with seismic data also suggest the presence of transfer zones that accommodate polarity reversals along the SGR. To better understand these anomalies we interpret one of the SCO2 seismic lines collected in 2010 that appears to cross a possible transfer zone. By doing so and correlating it with available well and gravity data we will contribute to a better understanding of the South Georgia Rift (SGR) by determining the location and orientation of this transform zone. These possible zones are currently only constrained by well and sporadic seismic data and thus their exact direction location and extent remain poorly understood. The characterization of the transfer zones within this area is important because of the possibility of CO2 sequestration within the South Georgia Rift. It has also been suggested by previous research that the transfer zones cutting through the SGR may line up with and have originally been connected to the fracture zones that are found along the Mid Atlantic Ridge today. A better understanding of the location extent and orientation of these zones through seismic studies is essential to understanding the overall geology of the South Georgia Rift Basin. Processing and interpretation of 2D seismic line SCO2-1 has lent evidence to the existence of a transfer zone with our study area and has helped us to better constrain its location.

**A study of biodegradation of Rose Bengal dye by Aspergillus niger**

*Sandra McFadden*, Biological Sciences - Senior

Mentor: Dr. Anindya Chanda, Environmental Health Sciences

Filamentous fungi have a great potential of remediating our environment. Here we report a study that we are conducting to examine the role of Aspergillus niger in the biodegradation of industrial dyes using Rose Bengal as a test dye. The organism decolorized the dye by 10%. However upon inducing cellular stress by addition of 1M CaCl2 the decolorization of the dye increased 10-fold. The results from our research so far has opened up a new area of Aspergillus research that can focus on the functional relation between cellular stress and its ability to decolorize industrial dyes.

**Aqueous toxicity of nickel to the estuarine invertebrate copepod Amphiascus tenuiremis**

*Emily Stewart*, Marine Science - Senior

Mentor: Dr. Thomas Chandler, Environmental Health Sciences

Nickel (Ni) is a common constituent of the atmosphere and sediment in estuarine areas. These coastal areas are key habitats to aquatic invertebrates such as benthic copepods. These organisms are often utilized as indicators of environmental health in marine systems. In this experiment Ni toxicity was determined through the examination of the copepod species Amphiascus tenuiremis. Stage and sex-specific survival rates coupled with fecundity measures were used to produce estimates of intrinsic population growth (r) as a function of exposure from the metal Ni. Aqueous Ni exposures at five concentrations were conducted on individual nauplii (less than 24-hours) reared to sexual maturity in 96-well microplates with seawater renewals every three days and feeding every six days. The individuals were observed daily for endpoints of mortality life-stage development sex ratios reproductive success and fecundity. It was observed that Ni significantly affected copepod mortality and life-stage development. Increased mortality and life-stage specific developmental delays were observed in both 70 and 100 ppb ug Ni/L seawater treatments.
**Phaseolus acutifolius Transformation**

*Courtney Burckhalter*, Biology - Junior; USC Aiken  
Mentor: Dr. Nathan Hancock, Biology/Geology; USC Aiken  

Phaseolus acutifolius or more commonly known as tepary bean is much like the common beans we eat however they are drought high temperature and bacterial resistant. They have a much shorter cultivation period and about the same yield and nutrition as common beans although the beans are smaller. Our goal is to discover which genes control these special characteristics. If we can answer these questions then we would be able to create a stronger healthier crop for farmers that would require less water and resist pests drought and high temperatures. Plant transformation is the process in which genes from one plant are introduced into another plant to genetically mutate or change the genetic makeup of that plant. The goal of my research project is to improve the tepary bean transformation procedure to ensure an easier mechanism for testing and targeting genes. Since transformation requires undifferentiated plant cells called callus I tested different variables associated with inducing and infecting the callus cells with Agrobacterium which carry a transgenic plasmid. After infection we used GUS staining to detect transgenic cells. We tested 6 cultivated genotypes for the ability to produce callus and found that some genotypes produce callus more efficiently. Currently we are able to produce callus infect the callus with Agrobacterium and obtain transgenic cells but we are not able to efficiently produce shoots and regenerate plants. Since wild genotypes have been shown to have better regeneration we are now testing these lines.

**Seatrout heart infection by Cardicola (italicized) sp.: are small fish in more trouble?**

*Brian Fazzzoneare*, Biology - Senior; USC Upstate  
Mentor: Dr. Vince Connors, Natural Sciences & Engineering; USC Upstate  

Spotted seatrout Cynoscion nebulosus (Cuvier 1830) are important game fish in South Carolina estuaries and are thought to be negatively affected by parasites. In particular seatrout in South Carolina are heavily infected with Cardicola sp. an aporocotylid trematode whose eggs often penetrate the heart ventricle and become encapsulated in granulomas that are thought to potentially lead to heart dysfunction. Because of high prevalence and parasite burden in adult fish we hypothesized that infection in smaller fish would lead to a greater proportion of tissue damaged than in larger fish. Histological sections of spotted seatrout ventricle were taken from each specimen and three sections from each ventricle were chosen randomly and inspected for the presence of granulomas. All granulomas in a given field of view were counted in each section and the average calculated. The 10 largest [375 mm total length (TL)] and 10 smallest (325 mm TL) most infected fish were used for comparison of relative tissue damage. Two of the three sections of ventricle tissue were subsequently examined and six pictures were obtained at 400X magnification from each examined section. ImageJ software was used to analyze percent of granulomatous tissue area per section as a measure of heart tissue damage. Preliminary analysis indicates that a higher percent of heart tissue is granulomatous in smaller infected fish than in larger infected fish.

**The influences of diet on energy reserves in Hemigrapsus sanguineus**

*Lacey Goulding*, Marine Science - Senior  
Mentor: Dr. Blaine Griffen, Biological Sciences  

Understanding diets of invasive species helps determine key aspects to their survival and success in foreign environments. The Asian shore crab Hemigrapsus sanguineus is an invasive species of crab to the northeast U.S. coastline. The Asian shore crab is an omnivorous forager but typically feeds on algae. The objective of the experiment was to test if diet influences energy reserves in H. sanguineus. We predicted that algal consumption would lead to more energy reserves than animal tissue consumption but was not influenced by algal consumption. This suggests that the animal tissue consumed contributes to crab growth while algal consumption could possibly be used to maintain metabolic rate on a day-to-day basis.

**A Noninvasive Genetic Technique to Detect Invasive Species: eDNA in the Savannah River Drainage**

*Kaitlin Little*, Marine Science - Senior  
Mentor: Dr. Joseph Quattro, Biological Sciences  

Environmental DNA (eDNA) approaches are being used to detect the presence of the invasive Alabama Spotted Bass (Micropterus punctulatus henshalli) within the native range of Redeye Bass (M. coosae) in the Savannah River Drainage. Spotted Bass have replaced Redeyed Bass in regions of overlap but Redeyed Bass still persist in small tributaries to the Savannah River drainage. Describing the range and implementing comprehensive monitoring of the invasive relative to the native species is of paramount importance to rare species management. eDNA is advantageous over other more orthodox sampling methods because it is a less destructive yet more inclusive technique. eDNA allows the detection of all species within an ecosystem but can be targeted to the detection of specific nonnative species. eDNA sampling is easier and less time consuming than more laborious sampling techniques. Furthermore since no fish handling is necessary this minimizes stress especially to rare native species under consideration. Water samples from areas of the Savannah River drainage that are most likely to contain both species are being collected. eDNA will be extracted through suction filtration and a Mo Bio PowerWater DNA Extraction kit. Extracted eDNA will be amplified via Polymerase Chain Reaction (PCR) and assayed for the presence of the invasive Alabama Spotted Bass relative to native Redeyed Bass. This study will help to evaluate the potential of eDNA as a method to detect invasive species and expand on previous Quattro lab work on the impact of invasive black basses on native species in the Savannah River drainage.
A Survey of the plant family Solanaceae for sensitivity to FACs
Khalilah Logan, Biological Sciences - Junior
Brandon Washington, Biological Sciences - Senior
Mentor: Dr. Johannes Stratmann, Biological Sciences

Plants have developed defense mechanisms to protect themselves from herbivorous insects. The defense response is initiated by the presence of fatty acid-amino acid conjugates (FACs) which are elicitors present in the saliva of caterpillars. When caterpillars chew on leaves they deliver FACs to wound sites. This leads to the activation of mitogen-activated protein kinases (MAPKs) which regulate the production of toxic proteinase inhibitors. The objective of our experiments is to determine a connection between the plants sensitivity to the FACs 18:3-glutamine and 18:3-glutamic acid and the phylogeny (evolutionary relationship) of these plants within the family Solanaceae. Previous researchers (Schmelz et al. 2009) have shown that not all plants respond to FACs. Even within the Solanaceae family some plants respond to FACs while others do not. The sensitivity to the FACs is measured by the activation of MAPKs. The FACs are introduced to the plants through a scratch wound-site on the leaf of the plant. The proteins are then extracted after different times to measure MAPK activity.

We tested plants within the Solanum and Nicotiana genera. Plants closely related to tomato did not respond to the FACs (with the exception of eggplant) while other plants within the two genera did respond to these FACs. We concluded that the sensitivity to FACs is not reflected in the phylogeny of the tested plants. For example eggplant and tomato both in the Solanum genus are closely related, but one responds strongly while the other does not respond at all.

Correlation of cold seep activity with sea level rise at a gas hydrate mound in the Gulf of Mexico
Nathan Robinson, Geological Sciences - Senior
Mentor: Dr. James Knapp, Earth and Ocean Sciences

Woolsey Mound is an active venting gas hydrate and cold seep system in the deepwater (900 m) Gulf of Mexico which appears to operate in synchronicity with global sea-level changes. High resolution CHIRP seismic data acquired at MC-118 Woolsey Mound display decimeter vertical resolution. Integration of this very high resolution seismic data with radiocarbon dated and biostratigraphically restricted cores (Ingram et. al. 2010) located on and around the mound provides chronostratigraphic constraints that are reflected in seismic signatures. Mapping these seismic signatures reveals changes in sediment layer thickness since the last glacial maximum (26-19 kya). The sediment is dominantly hemipelagic and does not suggest slope failure or destabilization. Isopach (sediment thickness) maps quantitatively display changes in layer thicknesses and reveal the extent of erosion and/or non deposition over the mound. We associate the variability of sedimentation with uplift of the southern flank of the mound from salt tectonics and erosion of the uplifted sediments by deep water currents. Master faults at Woolsey Mound intersect the sea floor and act as conduits for hydrocarbon movement and gas hydrate accumulation (Macelloni et. al. 2011). Operation of the most recent phase of the hydrate system at Woolsey Mound appears to be correlated with (1) salt tectonism (2) active faulting and (3) sea-level rise since since the last glacial maximum (~15 ka) based on analysis of these data. Further analysis of deeper core data may demonstrate a similar relationship for previous Quaternary sea-level changes.

The Role of MAPK Phosphatases in MAPK Regulation in Arabidopsis thaliana
Mark Taylor, Biological Sciences - Senior
Mentor: Prof. Johannes Stratmann, Biological Sciences

Since plants are sessile and do not possess acquired immunity each cell must be able to respond to stress. Mitogen-activated protein kinases (MAPKs) are signal transducing proteins that coordinate the intracellular response to both biotic and abiotic stressors. MAPK phosphatases are enzymes that deactivate MAPKs by dephosphorylating them. The regulatory mechanisms by which a specific MAPK interacts with a specific substrate in response to a specific cue is largely unknown. This project explores these mechanisms by assaying the activation kinetics of MAPK 3 4 and 6 in the absence of six different MAPK phosphatases in the model plant Arabidopsis thaliana. Phosphatase knockout mutants were obtained grown and genotyped by PCR to confirm knockout homozygosity. They were then stressed by wounding and UV-B irradiation. Stress-induced MAPK activity was gauged by Western blot analysis using an antibody specific for active phosphorylated MAPK. For wounding treatment results have shown equivocal differences between knockout mutants and phosphatase-intact wildtypes. However UV-B irradiation indicated prolonged phosphorylated MAPK activity among four mutants. This has several implications: (1) signaling robustness through redundancy because the loss of single phosphatases do not alter MAPK kinetics (2) wounding and UV-B stress are transduced via distinct cascades are (3) phosphatases are not globally essential nodes in these signaling networks. To test these implications three further single-knockout mutants will be assayed double knockouts will be generated and alternate stress elicitation methods applied.
Communicating for a Cause: The Development of an Advertising Campaign Strategy for Columbia’s Family Shelter
Anna Fischer, International Studies - Freshman
Haley Rabic, Public Relations - Sophomore
Benjamin Peele, Psychology - Junior
Savannah Strom, Public Relations - Sophomore
Lauren Burner, Public Relations - Sophomore
Mentor: Prof. Karen Malia, Advertising
The advertising team (Lauren Burner, Anna Fischer, Savannah Strom, Haley Rabic, and Benjamin Peele) was presented with the Family Shelter’s subpar advertising and the almost complete lack of knowledge of the shelter within the greater Columbia area. The team was challenged to study the situation and develop a creative and effective advertising campaign to revamp the Family Shelter’s reputation and eventually raise more funds for the nonprofit. The purpose of this project was to use the team’s intellect and willingness to benefit a cause in our own neighborhood. In order to effectively complete this project data was collected brainstorming and creative strategy sessions were used to develop new and innovative ideas and a final advertising strategy will be developed to help ease the Family Shelter’s implementation of the new campaign. The team learned exponentially more about the homeless situation in Columbia and the truth behind homelessness. Our empathy and understanding for those we pass on the street everyday has been forever altered for the better. This project will hopefully lead to the furtherance of such empathy within our community and will result in a hopeful and reinvigorated atmosphere at the Family Shelter.

The Destruction of Modern Muslim Shrines by Fundamentalist Movements
Esmael Mayar, Biology - Senior; USC Upstate
Mentor: Dr. David Damrel, History, Political Science, Philosophy, & American Studies; USC Upstate
Muslim communities around the globe have been engaged in intense religious and political struggles during the last century over exactly what constitutes the “true” nature of Islam and Islamic practice. During these sharp disagreements certain Islamic fundamentalists more properly called ‘Islamists’ have declared that many rituals associated with Shi’ite Islam Sufism and “folk” Islam are un-Islamic and must be opposed. The Islamists are particularly opposed to practices connected with visiting the shrines tombs and graves of holy men and women. Since at least 1989 various Islamist groups around the world including for example the Taliban in Afghanistan and Pakistan as well as al-Qaida and similar groups operating in South Asia West Africa and North Africa as well as in Iraq Somalia and Indonesia have employed violence against other Muslims in order to enforce an Islamist vision of “true” Islam. Anecdotal evidence suggests that attacks on Shi’i and Sufi ‘holy places’ have increased in these nations and others presumably related to an Islamist anti-shrine agenda. This study has collected evidence of over 90 different attacks by Islamists on Sufi and Shi’i shrines throughout the Muslim world post 1989. Our data shows a spike in the number of attacks occurring after certain key developments including the events of 9/11 the wars in Afghanistan and Iraq and the destabilization connected with the Arab Spring. Our ongoing analysis of the data explores how the occurrence of anti-shrine violence may or may not be correlated with these events.
Advancing and Relocating the Rule of Law
Kedar Patel, Economics - Senior
Mentors: Dr. Gordon Smith, Rule of Law Collaborative
  Dr. Joel Samuels, Rule of Law Collaborative
I hosted two closed conferences: one on rule of law theory and another on rule of
law promotion. By inviting a variety of faculty associates and asking about their
rule of law related research and findings I wanted to discover some of the many
perceptions of the rule of law by academics from different educations. I wrote up a
"think piece" to offer background information to speakers in order to stimulate
reflection by providing issues and queries to question how their work relates to
the many aspects of the rule of law. On February 22nd and March 1st I held two
conferences in which various faculty associates of the Rule of Law Collaborative
attended. Asking some of the most pertinent questions concerning the rule of law
today I found answers on how the concept of rule of law in theory and practice
evolve with the gathering of different disciplines. Hotly contested by academics
practitioners and politicians the rule of law is not an easily defined concept and
the many interpretations lead to different sets of actions in global development.
This conference helped shed light on the complex issues of development and
governance raised abroad. Rule of law reform in developing nations needs
constant work and by attending such conversations faculty associates can
contribute to the ongoing dialogue and position themselves and their research
with the interest of advancing and relocating the rule of law.

Judicial Decisionmaking in Human Rights Cases and Changing Regime Type
Jorge Penalba Moreno, International Business - Junior
Mentor: Dr. Lee Walker, Political Science
Protection of human rights has received a great deal of attention in recent years.
I argue that courts do look at civil and political rights differently overtime.
Using data from Nicaragua from 1980 to 2003 I examine how the Nicaraguan
Constitutional Court rules against the government and for or against the
expansion of rights protection overtime. I find that ruling against the government
is quite consistent overtime while expansion of rights protection does increase
slightly overtime.

Storage Activities at the Johannes Kolb Site in Darlington South Carolina
during the Middle Woodland Period
Ashley Stepp, Anthropology - Junior
Mentor: Dr. Joanna Casey, Anthropology
This research is the archaeological investigation of the contents of a storage
pit dating to the Middle Woodland period (ca.1000 B.C. – A.D. 1000) from the
Johannes Kolb site a multi component site in Darlington Co. SC. Storage pits
are important features in archaeological investigations because they were
intentionally created and their contents give us an indication not only of their
function but also of many aspects of the material culture and subsistence
strategies of the people who made and used them. During the Middle Woodland
people in the Southeastern United States were starting to settle in one place for
longer periods of time and beginning to cultivate plants and storage technology
would have been an important aspect of their subsistence strategies. By studying
these storage pits we have been able to determine that they were used to either
store or hide food that was to be used at a later time giving us insight into the
process of sedentism. My research indicates that this pit was first used for storage
but later used as a refuse pit. This research helps us understand the Woodland
peoples' storage and discard activities and the life cycle of the pit contributing to
our overall understanding of this pivotal period of Southeastern prehistory.

The Effects of Raw Material Quality on Tool Form During the Early Archaic at
the Johannes Kolb Site
Joe Wilkinson, Anthropology - Senior
Mentor: Dr. Joanna Casey, Anthropology
Archaeologists who study prehistory rely on information obtained from
stone tools because they survive the test of time and do not decay. Stone tool
technologies tell archaeologists a great deal about human behavior in the past
and the many factors that affect their daily lives. This thesis will examine a
sample of the Early Archaic projectile points excavated at the Johannes Kolb Site
in Darlington County South Carolina and study the effects of raw material quality
on hafting technology and tool form. Understanding these effects are important
for archaeologists because recognizing variability among raw materials and
understanding their limitations enables archaeologists to identify culturally
sensitive time markers more accurately in the archaeological record. This study
attempts to quantify raw material quality by examining the role of pressure
flaking in the production of notched projectile forms by the analysis of notching
on prehistoric tools from the Kolb Site a survey of flint knappers with experience
in working different varieties of raw materials and through the experimentation
of notching on flake blanks of selected materials. Their results are compared to
the Kolb Site sample to test for relevancy in the archaeological record.
internet (54%). Even though students were aware that STIs can cause infertility they were unaware that STIs can cause cancer and damage to the liver and brain. Seventy percent of the students were not aware of the risk of contracting STIs through oral intercourse and 33% were unaware that alcohol and drug use could pose as potential risk factors. Participants reported that teen pregnancy (75%) and STIs other than HIV (69%) were problems in their community. Fifty-five percent of the students surveyed indicated that they needed additional information and confidential crisis or hotline resources. Based on the results educational materials have been created to provide necessary information for STI detection prevention and treatment.

**Candy and Soda for Breakfast: A nutritional assessment of popular children’s breakfast foods**

**Brittney Austin**, Exercise and Sports Science - Senior; USC Aiken

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

The United States is facing a childhood obesity epidemic and what children are eating for breakfast may be contributing to this problem. Many common breakfast foods and beverages marketed specifically for children are high in calories, fat, sugar and sodium. The nutritional value of these foods may resemble candy or soda more than a healthy well-balanced meal. The purpose of this project was to compare the nutritional value of some of the popular children's breakfast foods and beverages to that candy and soda. The total calories, fat, sugar and sodium content for popular children's breakfast foods and beverages were determined from nutrition information available on packaging or from manufacturer websites. These were compared to the nutritional values for several foods and beverages commonly recognized as candy and soda. Additionally the nutritional values for healthier breakfast options were determined and those items were also compared. The nutrition information suggests that the popular children’s breakfast foods and beverages often served to young children as ‘a healthy meal’ were more similar to candy and soda than healthier breakfast options. These choices could lead to childhood obesity, diabetes and other health problems. Knowledge of nutrition information and guidelines for selecting healthier alternatives could help promote healthier food purchases by parents and healthier eating by children.

**Retrospective Review of Antibiotic Prophylaxis in Open Lower Extremity Fractures**

**Derek Bremmer**, Pharmacy - Senior

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

Patients with open fractures receive antibiotics to reduce the risk of future infections based on the Eastern Association for the Surgery of Trauma (EAST) Guidelines. Although recommendations exist there are currently limited data supporting the use and appropriate selection of antibiotics for osteomyelitis prophylaxis in open fractures. The purpose of this study is to evaluate guideline practices’ impact on osteomyelitis rates. This observational retrospective single-center study included adults with lower extremity open fractures of the ankle, tibia fibula or femur from January 2009 to March 2011. The primary endpoint was the incidence of osteomyelitis following open fracture. Secondary endpoint
comparisons include infection rates between fracture grades relationship between time of antibiotic initiation and infection rates and impact of prolonged prophylaxis after closure. A total of 96 patients were included. Patients suffered from Gustilo grade fractures 1 (12.5%) 2 (54.2%) 3a (26%) 3b (2%) and 3c (1%). Almost all patients received cefazolin (96%). Of the 25 grade 3 fractures 16 patients received Gram-negative coverage with gentamicin (13) and aztreonam (3). The average time from patient presentation to antibiotic administration was 6.2 hours. The rate of osteomyelitis was 9.3% with all cases involving Gustilo grades 2 (6.2%) and 3 (3.1%) fractures. All of the grade 3 fracture patients with osteomyelitis received Gram-negative coverage along with cefazolin. The rate of osteomyelitis was slightly higher than in other previously published studies with osteomyelitis rates of 7% and 6.5%. These increased rates require further evaluation to help optimize open fracture antibiotic prophylaxis.

The Effects of Exercise on Sleep Quality in Combat Veterans with PTSD

Nidha Khan, Biochemistry and Molecular Biology - Sophomore
Mentors: Dr. Shawn Youngstedt, Exercise Science
Ms. Shelli James, Exercise Science

Post-traumatic stress disorder (PTSD) is classified as a type of anxiety disorder which occurs after exposure to a traumatic event. PTSD is the most common mental health diagnosis of veterans coming back from combat. Studies have been implemented to better understand the effects of PTSD and it has become apparent that PTSD is associated with disturbed sleep. There is some evidence that disturbed sleep after trauma is predictive of the development of PTSD. Conversely treatment of sleep disorders has elicited improvement in PTSD symptoms. Exercise training could potentially improve sleep quality while reducing PTSD and its comorbidities including irritability. In this study combat veterans between the ages of 18 and 65 were studied. Following screening and baseline assessment participants were randomized into one of two 8-week treatments. One group of participants underwent moderate physical activity while the other group underwent stretching. Both groups completed self-reported questionnaires weekly to determine the severity of PTSD sleep quality and other comorbidities. The hypothesis is that moderate physical activity will help improve sleep quality and reduce related comorbidities while overall decreasing the severity of PTSD in combat veterans. The null hypothesis would suggest that physical activity will not have any effect on the sleep quality or related comorbidities thus keeping the severity of PTSD the same.

Communication about the Right Choice Fresh Start Farmers’ Market among food assistance recipients

Kathryn Kranjc, Nursing - Junior
Mentor: Dr. Darcy Freedman, Social Work

The Right Choice Fresh Start Farmers’ Market (RCFS) is a collaboration between USC researchers and Family Health Centers Inc. to increase availability of healthy produce and provide economic opportunity for small-scale farmers in Orangeburg SC. South Carolina has one of the highest obesity rates in the nation and access to healthy produce is most limited in low-income areas. In its second year the RCFS market introduced a food assistance matching program “Shop N’ Save” (SNS) to increase federal food assistance use at the market. The program engaged 336 participants who carry at least one form of federal food assistance 74% of whom identified at least one barrier to purchasing fresh fruits and vegetables. The purpose of this study is to identify how users of this program were drawn to the market. Several methods were used to advertise RCFS and SNS in the community. Data on how participants heard about the market were collected through enrollment surveys and quantified in a final report at the end the market season. Most SNS users said they heard about the market from friends or relatives (34%) or at the SNAP/WIC office where they receive federal vouchers (21%). Sixteen percent of the participants were returning customers from the previous year. Knowing how low-income customers heard about the RCFS market and the SNS program may help guide implementation of food assistance matching programs at other markets. Such incentive programs may help improve access to fresh local produce among low-income consumers receiving food assistance.

When Medicine Meets Culture: Cambodian American Views of Mainstream U.S. Medicine

Daravie Pel, Biological Sciences - Senior
Mentor: Dr. Elaine Chun, English Language and Literature

Cambodian Americans compared to other Asian American groups face significant challenges that prevent them from immersing well within U.S. culture. The research project identifies the cultural and linguistic reasons that some first-generation and second-generation Cambodian Americans in three urban cities in the United States (Atlanta GA Long Beach CA and Lowell MA) choose to maintain folk/traditional Khmer medical practices as opposed to adopting mainstream U.S. practices. Exercise training could potentially improve sleep quality while reducing PTSD and its comorbidities including irritability. In this study combat veterans between the ages of 18 and 65 were studied. Following screening and baseline assessment participants were randomized into one of two 8-week treatments. One group of participants underwent moderate physical activity while the other group underwent stretching. Both groups completed self-reported questionnaires weekly to determine the severity of PTSD sleep quality and other comorbidities. The hypothesis is that moderate physical activity will help improve sleep quality and reduce related comorbidities while overall decreasing the severity of PTSD in combat veterans. The null hypothesis would suggest that physical activity will not have any effect on the sleep quality or related comorbidities thus keeping the severity of PTSD the same.

Exercise training could potentially improve sleep quality while reducing PTSD and its comorbidities including irritability. In this study combat veterans between the ages of 18 and 65 were studied. Following screening and baseline assessment participants were randomized into one of two 8-week treatments. One group of participants underwent moderate physical activity while the other group underwent stretching. Both groups completed self-reported questionnaires weekly to determine the severity of PTSD sleep quality and other comorbidities. The hypothesis is that moderate physical activity will help improve sleep quality and reduce related comorbidities while overall decreasing the severity of PTSD in combat veterans. The null hypothesis would suggest that physical activity will not have any effect on the sleep quality or related comorbidities thus keeping the severity of PTSD the same.

Communication about the Right Choice Fresh Start Farmers’ Market among food assistance recipients

Kathryn Kranjc, Nursing - Junior
Mentor: Dr. Darcy Freedman, Social Work

The Right Choice Fresh Start Farmers’ Market (RCFS) is a collaboration between USC researchers and Family Health Centers Inc. to increase availability of healthy produce and provide economic opportunity for small-scale farmers in Orangeburg SC. South Carolina has one of the highest obesity rates in the nation and access to healthy produce is most limited in low-income areas. In its second year the RCFS market introduced a food assistance matching program “Shop N’ Save” (SNS) to increase federal food assistance use at the market. The program engaged 336 participants who carry at least one form of federal food assistance 74% of whom identified at least one barrier to purchasing fresh fruits and vegetables. The purpose of this study is to identify how users of this program were drawn to the market. Several methods were used to advertise RCFS and SNS in the community. Data on how participants heard about the market were collected through enrollment surveys and quantified in a final report at the end the market season. Most SNS users said they heard about the market from friends or relatives (34%) or at the SNAP/WIC office where they receive federal vouchers (21%). Sixteen percent of the participants were returning customers from the previous year. Knowing how low-income customers heard about the RCFS market and the SNS program may help guide implementation of food assistance matching programs at other markets. Such incentive programs may help improve access to fresh local produce among low-income consumers receiving food assistance.

When Medicine Meets Culture: Cambodian American Views of Mainstream U.S. Medicine

Daravie Pel, Biological Sciences - Senior
Mentor: Dr. Elaine Chun, English Language and Literature

Cambodian Americans compared to other Asian American groups face significant challenges that prevent them from immersing well within U.S. culture. The research project identifies the cultural and linguistic reasons that some first-generation and second-generation Cambodian Americans in three urban cities in the United States (Atlanta GA Long Beach CA and Lowell MA) choose to maintain folk/traditional Khmer medical practices as opposed to adopting mainstream U.S. practices. Qualitative data (12 interviews) and quantitative data (150 surveys) have been collected and analyzed in order to understand Cambodian American motivations and rationales for their medical choices. My preliminary findings suggest that facets of Cambodian culture such as language tradition religion and familial hierarchy play roles in a Cambodian American’s choice of medicine—some of which permeate across generations. Findings from this study may invite mainstream health practitioners to become aware of non-mainstream folk/traditional Khmer medical practices as opposed to adopting mainstream U.S. practices. Qualitative data (12 interviews) and quantitative data (150 surveys) have been collected and analyzed in order to understand Cambodian American motivations and rationales for their medical choices. My preliminary findings suggest that facets of Cambodian culture such as language tradition religion and familial hierarchy play roles in a Cambodian American’s choice of medicine—some of which permeate across generations. Findings from this study may invite mainstream health practitioners to become aware of non-mainstream folk/traditional Khmer medical practices as opposed to adopting mainstream U.S. practices.
Assessing medication adherence in an HIV/AIDS patient population: one pill versus three pills as a once a day regimen

Matthew Caudle, Pharmacy - Senior
Mentor: Dr. Celeste Caulder, Pharmacy

Adherence to antiretroviral therapy (ART) is one of the strongest predictors of disease progression in HIV/AIDS patients. This project compared adherence rates between two once-daily dosing regimens with different number of pills in patients with HIV/AIDS. Secondary objectives measured viral load suppression and CD4 count achieved. Patients with a documented clinic visit during the study period who filled medications through the state AIDS Drug Assistance Program were eligible for inclusion. The regimens compared were efavirenz/ emtricitabine/tenofovir (EFV/FTC/TDF) in a combined single pill once-daily dose and emtricitabine/tenofovir/atazanavir/ritonavir (FTC/TDF/ATV/r) in three pills also dosed once daily. Twenty-four consecutive months of HAART were evaluated. Computerized pharmacy refill records patient self-reported missed doses between visits demographics number of concomitant medications and ART information including treatment naïve or experienced were collected. Viral load and CD4 count values throughout the study period were also documented. Our sample consisted of 198 patients with 99 patients in each treatment group. Sixty-five percent of patients in the EFV/FTC/TDF group had 90% adherence according to pharmacy refill records. Fifty-seven percent of patient in the FTC/TDF/ ATV/r group had 90% adherence according to pharmacy refill records. Forty-eight patients with an initially detectable viral load were undetectable by the end of the study. Average increase in CD4 cells was 104. In conclusion HIV/AIDS patients were more adherent to one pill daily versus three pills daily. The virus was controlled on both ART regimens and immune response was appropriate. Pill burden and frequency continue to be important factors in designing new regimens for patients.

Curing Columbia Volunteering Corps- Helping Us Help You

Meghan Conroy, Anthropology - Junior
Mentors: Dr. Kirk Randazzo, Carolina Leadership Initiative
Ms. Sarah Johnston, Carolina Leadership Initiative

The Curing Columbia Initiative a volunteer corps paired with Palmetto Health Richland and the Leadership Scholars program was designed to give students the opportunity to help patients and doctors alike without having to concern themselves with transportation and the costs of volunteering. Many students do not have a car on campus but they desire the opportunity to get experience inside the four walls of a hospital and to give back to the Columbia community. Through Curing Columbia students volunteer for 3-4 hours per week and develop networking skills and experience in the professional realm over the 2012-2013 academic year. The students selected were chosen as some of the most caring responsible empathetic and motivated members of Carolina's campus and these students were placed in appropriate departments in the hospital that best suited their personalities and skill sets. For students who want to acquire bedside experience with patients there are opportunities to work with physicians and get experience in the medical realm. The ultimate goal of Curing Columbia was to provide students with the means to volunteer off-campus. Not only will the students benefit but the patients and staff of the hospital will as well. The hope was that the 28 students would develop teamwork and interpersonal skills in addition to creating and maintaining lasting friendships. Curing Columbia has the potential to continue long after the grant period ends for Carolina students' love of volunteering and bettering the community will never cease.

Fast Food: Can I Get That to Go?

Trevor Herring, Biological Sciences - Sophomore; USC Sumter
Randi Page, Biological Sciences - Sophomore; USC Sumter
Mentor: Dr. Pearl Fernandes, Biology; USC Sumter

Most college students need food that can be eaten quickly in order for them to return on time to their next class or place of work. The quickest option they can think of is fast food. There is a healthy alternative to fast food and that is slow food. Many students have never heard the term “slow food.” The study was conducted to gather information on students’ knowledge and consumption of fast and slow food so education and information on healthy eating habits can be developed and disseminated. A convenience sample of 100 college students attending the University of South Carolina Sumter was obtained. Of the 100 students surveyed 45% were male and 55% were female. The majority ranged in age from 18-24. Eighty-seven percent enjoyed eating fast food and 12% supervised their food if given the option. While none of the students thought fast food was completely healthy 15% were concerned about the health risks associated with fast food. Twenty-two percent of the students cooked their own meals whereas 74% had either a family member who cooked or cooked along with the family member. However 4% reported that they did not cook nor had family members who cooked and used fast food as an option. More than 50% were interested in learning about slow food. Our results indicate that information and education on slow food and healthy eating habits is necessary for the wellbeing of college students and we plan to develop educational materials on these topics.

Paternal Experiences During and After Pregnancy

Stephania Jackson, Women's and Gender Studies - Senior
Mentor: Dr. Deborah Billings, Health Promotion Education and Behavior

Traditionally having a baby has been female centered. Throughout western culture the primary role of fathers’ has been financial provider disciplinarian and protector of the family. However with the changing gender roles the primary role of fathers as providers has evolved and fathers are now more involved in the caring of their children. Father involvement has proven to be extremely important to in the health and development of their children and families. When examining the relationship between expecting mothers and expecting fathers the relationship has been seen as being stronger the recent years than in the past. Expecting fathers who develop a good relationship with the expecting mother of their infant child are more than likely to be involved with providing care for
their newborn babies before and after birth. As fathers’ transition from primary provider to being equally involved with prenatal and postnatal care of their children it is overwhelmingly clear that maternal and childbirth education needs to change to fit the needs of the family as a unit.

**Comparison of Fitness Levels between Individuals Entering Basic Combat Training at Fort Jackson and Individuals Entering College**

**Becky Spitzer**, Public Health - Senior  
Mentors: Dr. Shawn Youngstedt, Exercise Science  
Ms. Shannon Crowley, Exercise Science

As our nation continues its struggle with overweight obesity and lack of physical activity and fitness we have overwhelming numbers of individuals entering our military and scholastic institutions with low fitness levels. The purpose of this study was to examine the relationships between similar-aged individuals who enlist in the Army vs. those who pursue a college degree. Our goal was to determine if there are differences between the two populations regarding physical fitness levels or if we are simply getting less fit as a whole. Using data from the Soldier Health Promotion to Examine and Reduce Health Disparities (SHPERHD) project Army Physical Fitness Test (APFT) scores (consisting of push-ups sit-ups and a 2-mile run) of new Army recruits at Fort Jackson in Columbia SC were compared to college population data obtained through a systematic literature search in the following databases: PubMed Medline and Google Scholar. Keywords used were: fitness college students and exercise. Results from the SHPERHD data show that 38.3% of individuals were classified as “unfit” according to APFT scores while results from the literature search for college population data revealed that an average of 49.4% of students are not meeting the American College of Sports Medicine recommendations for physical activity. The observed differences in physical activity/fitness levels between the two populations may be partly due to the increasingly sedentary behavior of college students who choose to put exercise on the backburner as they adjust to a new lifestyle with decreased structure and surveillance.

**Comparison of Nutritional Quality in Fast Food and Casual Dining Restaurants**

**Kyle Sprow**, Exercise and Sports Science - Junior; USC Aiken  
Mentor: Dr. Brian Parr, Exercise and Sports Science; USC Aiken

Fast food has a stigma of being unhealthy and many people choose casual dining restaurants as a healthier option. However most people are not aware of how the calories fat sugar and salt found in restaurant food and as a result may not be making a healthy choice. The purpose of this study was to compare the nutritional value of meals at fast food and casual dining chain restaurants. I identified popular menu choices at three restaurants: a typical fast food restaurant (McDonalds) a healthy fast food restaurant (Subway) and a popular casual dining chain restaurant (Applebee's). Nutrition information available from the restaurants’ website was used to determine the nutritional value of meals at these three restaurants. Specifically the total calories total fat saturated fat sugar and salt in a typical lunch at each restaurants was compared. The results suggest that casual dining restaurant food is not nearly as healthy as many people perceive and many dishes at casual dining restaurants are higher in calories fat saturated fat sugar and sodium than at fast food services. Great variation in the nutritional quality exists at health fast food establishments such as subway. Fast food restaurants of this nature can offer meals on either end of the healthy eating spectrum. In conclusion consumers may be making unhealthy eating choices without realizing it. These choices could lead to weight gain hypertension diabetes and other health problems. Knowledge of nutrition information and guidelines for selecting healthier alternatives could help to promote healthier eating.

**Eating Disorders Characteristic Female Athlete Triad and the Effects on Fluid Balance in Collegiate Female Soccer Players**

**Virginia Winn**, Athletic Training - Senior  
Mentor: Dr. Toni Torres-McGehee, Physical Education

The increased prevalence of the female athlete triad in collegiate athletes has been noted but little research has been done especially in collegiate soccer players. The female athlete triad refers to the interrelationships among energy availability menstrual function and bone mineral density as defined by the American College of Sports Medicine. Furthermore little research has been done examining the female athlete triad and its effects on fluid and electrolyte balance. We studied the University of South Carolina's women's soccer team. Bone mineral density and body composition was assessed using a DXA scan. Energy availability was examined using dietary intake and energy expenditure over 7-days. A 7-day daily training log was kept and energy expenditure will be calculated. We hope to find that low energy availability in collegiate soccer player will highly correlated with previous research in non-aesthetic athletes and as a result of low energy availability collegiate soccer players will display abnormal menstrual cycles decreased bone mineral density and a negative alteration on fluid and electrolyte balance. This study is important not only to USC community but to health care professionals because there is a gap in current research relating the female athlete triad and its effect on fluid and electrolyte balance. These results will provide preliminary data on low energy availability and fluid and electrolyte balance that can be used to guide recommendations for nutritional and fluid deficiencies monitoring safety trends for signs of the female athlete triad general health and weight management policies.
Psychology and Neuroscience I

Changes in Right Hemispheric Functional Cerebral Systems With Trait Anxiety Classification: Some Preliminary Findings
Jessica Bunting, Liberal Studies - Senior; USC Lancaster
Sara Newton, Psychology - Junior; USC Lancaster
Mentor: Dr. Kate Holland, Psychology; USC Lancaster

Bunting J. Newton S.E. Holland A.K. Coe M. Carmona J.E. & Harrison D.W. The current research uses a dual concurrent task approach whereupon right hemispheric functional cerebral systems are predicted to change with trait anxiety classification and exposure to right lateralized stress. We predicted that individuals with high levels of trait anxiety will evidence an increase in diastolic blood pressure (DBP) after caffeine consumption and completion of a design task relative to low anxious individuals. Fifteen participants completed the Trait subscale of the State-Trait Anxiety Inventory and were administered the Ruff Figural Fluency Task before and after consuming 450 mg of caffeine. Blood pressure measures were taken before and after each experimental manipulation. A main effect for Condition for DBP was found (F(4 52)=18.35 p.0001) indicating an increase in DBP in the post physiological stress conditions. A nonsignificant Trait x Condition trend was found (F(4 52)=2.19 p=.08) which potentially indicates an increase in DBP for highly anxious individuals in the post physiological stress condition relative to their low anxious counterparts. A main effect for Trait was found (F(1 13)=4.8 p.05) indicating that highly anxious individuals made more perseverative errors relative to low anxious individuals. The current results show promising preliminary findings that support the role of changes in right hemispheric systems with trait anxiety as a function of exposure to physiological and cognitive stress. Highly anxious individuals evidenced diminished capacity in performing the design task concurrently with maintaining parasympathetic tone.

Examining Age-Related Changes in Left Hemisphere Functional Cerebral Systems Before and After Exposure to Pre-Digestive Stress: Evidence in Support of the Capacity Model
Jessica Bunting, Liberal Studies - Senior; USC Lancaster
Sara Newton, Psychology - Junior; USC Lancaster
Mentor: Dr. Kate Holland, Psychology; USC Lancaster

Objective: The current research examined age-related changes in left hemisphere function to provide further support for the capacity model (Holland Carmona & Harrison 2012). We predicted that older women would evidence a diminished capacity to regulate left hemisphere functional cerebral systems proposed to regulate the ingestion absorption and pre-digestion of food concurrent with completing a left-lateralized cognitive task. Method: Right-handed women ages 55-85 (n=20) and 18-26 (n=21) were administered the Controlled Oral Word Association Task (COWAT) before and after ingesting 44-48 grams of carbohydrates. Electroencephalography (EEG) readings were taken before and after each experimental manipulation to assess changes in left hemisphere activation in the frontal and temporal electrode sites. Results: A main effect for Age was found for Low Beta power (F(1 24)=5.17 p.05) indicating increased Low Beta power in older women relative to younger women across conditions. An Age x Condition interaction (F(1 24)=2.73 p.05) indicating a relative increase in Low Beta power in the post stress conditions for older women. A main effect for Age was also found for the number of rule violations made on the COWAT (F(1 38)=5.84 p.05) indicating that older adults made more rule violations across both administrations of the COWAT. Conclusions: The results provide promising preliminary evidence in support of the capacity model. Older women evidenced increased Low Beta power in the post stress conditions. Moreover older women showed a reduction in capacity to maintain performance on the COWAT relative to their younger counterparts.

Anxiety and Fragile X Syndrome
Sara Deal, Psychology - Senior
Mentor: Dr. Jane Roberts, Psychology

In the United States, anxiety disorders are the most common diagnosed psychological condition, affecting 29% of individuals during their lifetime with 2-13% of those affected being children. Both environmental and genetic factors are associated with anxiety disorders and have been associated with disruption in the emotion-regulating and executive regions of the brain. Fragile X syndrome (FXS) is the leading known genetic cause of intellectual disability, affecting 1 in 4000 individuals. Previous studies have found that 70-83% of individuals with FXS will experience anxiety in their lifetime. Currently, there are limited studies investigating the early onset of this link between neurodevelopmental disorders and anxiety. Therefore, the purpose of this study is to examine the early development of anxiety in typically developing children and children with FXS. Mothers of 60 males with FXS aged 34 to 71 months (M= 59; SD=10) completed the Childhood Behavior Checklist (CBCL) to measure child internalizing behaviors, specifically anxiety. CBCL anxiety raw scores for the group with FXS ranged from 0 to 12 (M=4.2; SD=2.7). The Mullen Scales of Early Learning (MSEL) was also completed to account for differences in mental age and standard age. For FXS the MSEL mental age scores ranged from 14 to 62 months (M=29.97; SD=9.95). Results indicated a positive relationship between CBCL anxiety scores and MSEL mental age (r=.67, p.05). The final presentation will include a more detailed description of the relationship between CBCL anxiety scores and the effect mental age has on these scores in children with FXS.
Early Grammatical Development in Children Across American English Dialects in South Carolina
Elizabeth Farmer, Spanish - Junior
Mentor: Dr. Denise Finneran, Communication Sciences and Disorders
Research on Mainstream American English (MAE) shows grammar development is affected by adult spoken language. The current study examines this effect for African American English (AAE) and Southern White English (SWE) as well as MAE. AAE SWE and MAE all have disparate grammar rules. To assess the extent to which a child is able to imitate the researcher and to learn to use the standard grammar of MAE in a short amount of time nonword repetition tasks are used. Many of these tasks use nonwords that would likely be produced in different ways by different speakers due to rules specific to each dialect. During the tasks participants are asked to immediately repeat nonwords 1- to 4-syllables in length. Their responses are recorded for later transcription and scoring. Responses are scored based on the number of speech sounds in a response that matches the examiner’s production. Percent accuracy will be calculated for each syllable level for each child. The purpose of this analysis is to determine the strength of relationship between nonword repetition performance and NMAE dialect use.

Factors Predicting Speech Recognition in Adverse Listening Conditions
Michael Hood, Baccalaureus Artium et Scientiae - Junior
Priya Purohit, Biomedical Engineering - Sophomore
Jiaqian Xu, Biological Sciences - Sophomore
Mentor: Dr. Daniel Fogerty, Communication Sciences and Disorders
The aim of this research study was to define how the various acoustic and linguistic properties of speech contribute to comprehension under adverse listening conditions. The study consisted of several exercises testing speech comprehension memory and lexicon usage administered to ten young normal hearing listeners between the ages of 18 and 30. The experiments were performed in a sound-attenuating booth and featured stimuli consisting of short sentences that underwent signal processing to mask temporal properties of either the amplitude envelope (E) or fine frequency structure (TFS) as well as overlaid with continuous interrupted or speech-babble noise. Participant responses were analyzed according to the lexical properties of their responses. Therefore in addition to speech recognition abilities these tests also indicate to what degree lexical access abilities are used in adverse listening conditions. Memory and sentence comprehension are factors correlated to the ability to comprehend speech in noisy and disrupted environments; therefore subjects completed short-term and working memory tests as well as English comprehension skills. Preliminary results suggest participants perform better with TFS during continuous noise but experience similar performance for E and TFS in other noise conditions. Listener responses were also analyzed according to the lexical properties of word errors. Associations between use of acoustic properties and memory with speech recognition measures will be discussed.

Examining Core Affect through Dynamic Stimuli
Mary-Catherine Newell, Psychology - Junior
Mentor: Dr. Svetlana Shinkareva, Psychology
The International Affective Digitized Sounds (IADS) database and the International Affective Picture System (IAPS) contain stimuli that are able to elicit an affective response. Stimuli from these systems are helpful for research in areas like judgment perception or decision-making. The goal of the current research was to develop a comprehensive set of affective video stimuli that will be useful for future neuroimaging studies. Video stimuli offer a more dynamic and natural way to present stimuli opposed to static/picture stimuli which allows for a stronger BOLD response (Huth et al. 2012). Videos of naturally occurring stimuli (e.g. baby crying) were downloaded from the Internet and edited for time and quality. Videos sampled the four quadrants of the valence-by-arousal affective state and behavioral experiments were conducted for validation. Stimuli were equally distributed in each affective quadrant and were balanced for semantic content (e.g. living things versus nonliving). The data were analyzed using multidimensional scaling. Preliminary results indicate good separation of the dynamic stimuli by valence.
Psychology and Neuroscience II

**Can the Elimination Lineup Increase Older Adults’ Eyewitness Identification Accuracy?**

*Christina Bullard*, Psychology - Senior; USC Beaufort  
Mentors: Dr. Brandon Cosley, Psychology; USC Beaufort  
Dr. Jennifer Beaudry, Psychological Sciences and Statistics;  
Swinburne University  
The leading cause of wrongful conviction is mistaken eyewitness identifications. Compared to younger adults older adults have a tendency to choose from traditional simultaneous lineups regardless of whether the lineup contains the culprit which leads to higher false identification rates when the culprit is absent. Researchers have unsuccessfully tried to decrease this choosing tendency without reducing correct identification rates. Interestingly children show this same increased tendency to choose. A new lineup procedure—the elimination lineup—decreases children’s false identification rates while having minimal impact on their correct identification rates (Pozzulo & Lindsay 1999). Given the similarities in response styles between children and older adults we hypothesized that the elimination lineup would reduce older adults’ false (but not correct) identification rates. To test this we are utilizing a 2 (Age: Younger vs. Older) X 2 (Lineup: Simultaneous vs. Elimination) X 2 (Culprit: Present vs. Absent) between-subjects design. Participants (N = 240) viewed a mock-crime video and were randomly assigned to a condition. Specifically older and younger adults will be compared in terms of the correct identification rates (correctly selecting the target when he is present) and correct rejection rates (correctly rejecting the lineup when he is absent) from elimination and simultaneous lineups. The preliminary results (N = 150) replicate the higher false identification rates of older adults compared to younger adults and indicate that the elimination lineup was not successful in reducing their selections. If this pattern persists it will suggest that children and older adults are choosing for different reasons.

**Effect of Articulatory Complexity on Respiratory Planning**

*Emily Graczyk*, Biomedical Engineering - Senior  
Mentor: Dr. Julius Fridriksson, Communication Sciences and Disorders  
The purpose of this study was to examine the effect of articulatory complexity and sentence length on respiration during speech. Respiratory effort was measured with a piezoelectric respiratory effort belt placed just below the rib cage where the induced voltage varied with the circumference of the speaker’s thoracic cavity. Participants read aloud sentences of short and long duration composed of English-derived nonsense words of high and low articulatory complexity presented visually on a computer screen as their respiratory effort and speech were recorded. We expect the results to shed light on the relationship between articulatory complexity and respiration planning in normal individuals and to help us build a paradigm for studying respiration effects in patients with articulatory deficits such as apraxia.
How extreme positions change people’s political attitudes
Samantha Mueller, Psychology - Sophomore
Peter Magness, Psychology - Senior
Mentor: Dr. Douglas Wedell, Psychology

Political surveys often seek to assess attitudes toward specific positions. This research investigates how attitudes are determined by the survey context. Prior research has shown that with numerical positions people readily shift their preferred position toward contextual extremes. For example when survey respondents were asked the degree to which they endorse different funding allocations for education those exposed to lower contextual values preferred a lower level of funding than those exposed to higher contextual values. The current research uses both numerically defined positions and more qualitatively defined positions along a liberal to conservative dimension to determine if the same or different effects would occur. The survey will be administered to a student and/or non-student population. We anticipate that results may differ for the numerical and qualitative formats. Pilot research suggests that with qualitative positions exposure to an extreme liberal position may shift people toward a moderately conservative position and exposure to an extreme conservative position may shift them toward a moderately liberal position. In order to evaluate these effects the survey included initial items that attempted to identify the degree to which the participant preferred conservative or liberal positions generally. These general positions were used to reduce the error variance in assessing responses to specific items. Exploring these issues can reveal the degree to which pollsters can bias their survey results and it also potentially reveals how exposure to extreme positions in society may result in attitude change toward or away from those positions.

Changes in Left Hemisphere Activation as a Function of Type II Diabetes Classification: Some Preliminary Findings
Sara Newton, Psychology - Junior; USC Lancaster
Jessica Bunting, Liberal Studies - Senior; USC Lancaster
Mentor: Dr. Kate Holland, Psychology; USC Lancaster

Objective: Functional cerebral systems in the left hemisphere have been demonstrated to change with Type II diabetes classification (Holland et al. 2011). For the current research food ingestion is conceptualized as a left-hemisphere stressor and is used concurrently with the performance of a left lateralized motor task using a dual task paradigm. Method: Individuals diagnosed with Type II diabetes (N=13) and individuals without Type II diabetes (N=18) completed the Finger Tap Task (FTT) before and after ingesting 44-48 grams of carbohydrates. Electroencephalography (EEG) measures were taken after both administrations of the FTT and 5 minutes after eating. Results: A main effect for Location was found for High Beta power (F(1, 23)=9.44 p<0.05) indicating an increase in high beta power across the left temporal electrode sites relative to the left frontal sites across conditions. A Diabetes x Condition x Location interaction was also found for High Beta power (F(4, 81)=2.72 p<0.05) indicating a relative increase at the left frontal and temporal electrode sites for diabetic but not non-diabetic individuals in the post stress conditions. Moreover a Diabetes x Condition interaction was found for the FTT score (F(10.06 p<0.05) indicating an increase in score for diabetic but not non-diabetic individuals in the post stress condition. Conclusion: The current results support our hypothesis in that diabetics evidenced a diminished capacity to regulate left hemispheric activation concurrently with maintaining performance on a left-lateralized motor task.

Grammatical Role Primes Spatial Attention
Karen Shebuski, Psychology - Junior
Mentor: Dr. Amit Almor, Psychology

Previous research has indicated that spatial awareness is closely tied to numeric processing. For example the numbers 1-4 prime faster responses to targets appearing on the left side of personal space and the numbers 6-9 prime faster responses to the right. This is potentially an effect of how numbers are learned ordered from left to right. We hypothesized that these findings would extend to the realm of written language (English) in which grammatical subjects typically appear on the left and objects on the right. Thus encountering the subject/object of a sentence should prime faster responses towards the corresponding side of the visual field. In this experiment participants were presented with transitive sentences (e.g. John punched Gary at the park.) one word at a time in the center of a computer monitor. Following the presentation of each sentence a probe word that was or was not included in the previous sentence was presented to the subject on either the right or left side of the monitor. The participant pressed a button to indicate a probe that was included in the sentence they had just read. Even though the object probes appeared in the sentence more recently participants responded faster to subject probes appearing on the left than to object probes appearing on the left. The opposite was true for the right side. This indicates that grammatical role rather than recency impacts spatial awareness. These results help us to further understand how spatial awareness and language processing interact.
Establishing a Repertoire of Combinatorial Synthesis and Processing Methodologies

Jennifer Fadimba, Civil Engineering - Senior
Mentor: Dr. Jason Hattrick-Simpers, Chemical Engineering

Material scientists are continuously looking for materials with properties that are better than those currently used. However determining the characteristics of complex materials at different conditions can be very time-consuming. With high-throughput combinatorial approaches a variation of a specific property can be achieved on a wafer. Here at USC we are developing predictive modeling systems that will enable us to screen ranges of processing and composition. To measure the thickness of a film within different areas of a sample UV-VIS spectrometry was used. Spectrometry confirmed that the sputtering chamber could deposit a material such as InO with varying thickness along a wafer. To vary temperature along a sample length a gradient annealing unit was built. With a glove bag surrounding it glass substrates were able to achieve gradient temperatures in air and Nitrogen. The characteristics along of Indium Tin Oxide at varying temperatures were analyzed after corresponding distance with temperature. The annealing unit was redesigned in order to fit into an UHV cell which will enable testing of samples in different environments and possibly in vacuum. Using high-throughput methodologies allows us to save time and money by cutting down on the number of experimental runs needed.

Optical Tunability and Morphological Control of Core-Shell Hybrid Nanoparticles

John He, Chemistry - Senior
Mentor: Dr. Hui Wang, Chemistry and Biochemistry

Metal-semiconductor nanostructures exhibit significantly enhanced optical tunability that arise from the unique nanoscale interactions between the metal core and semiconductor shell. These enhancements have a wide variety of applications in solar cell technology and energy transfer. We demonstrated that the location of the plasmon resonance peak can be finely tuned by coating a cuprous oxide shell onto a silver core. There was an observed change in the dielectric constant of the surrounding medium after coating the nanoparticle. Furthermore we also investigated the impacts of morphology on the plasmon resonance peak by modulating the shape of the nanostructure and the thickness of the shell. This provided a quantitative understanding of how the shell thickness affects the plasmon resonances and the extinction spectra.

Honeycomb electrospun fiber scaffold for expending cancer stem cells

Christine Hsieh, Chemistry - Senior
Mentor: Dr. Qian Wang, Chemistry and Biochemistry

The capability of cancer stem cells (CSCs) to self-renew and differentiate may be responsible for tumor relapse and resistance to treatment. Colorectal cancer is the second leading cause of death from cancer in the US; therefore it is imperative that new therapeutic strategies are developed. Currently it is difficult to screen anti-CSC drugs making it a challenge to maintain a stable and enriched population of CSCs. In this study honeycomb like fibrous scaffolds to control the growth of CSCs were developed. The fabrication conditions of the fibers were optimized along with seeding density surface coating and culture media for cell culturing.

The Temperature Dependence of the Solvatochromism of Methylene Violet in Alcoholic Solvents

Ashleigh Kimberlin, Chemistry - Senior; USC Aiken
Mentors: Dr. Monty Fetterolf, Chemistry; USC Aiken  Dr. Gerard Rowe, Chemistry; USC Aiken

The temperature dependence of the visible absorption of the organic dye methylene violet in 8 primary alcoholic solvents (methanol through n-octanol) was determined using a Perkin Elmer Lambda 3 UV-Vis spectrometer equipped with a temperature-controlled cuvette base. The UV-Vis spectrum of methylene violet in these alcoholic solvents contains at least 2 peaks where the intensities change in response to temperature. This is consistent with the idea that equilibrium exists between two chemical species in alcoholic solution that form as a result of solute-solvent interactions. The $\Delta H$ for this equilibrium can be calculated from the relative peak heights using the van't Hoff equation, $\ln((abs a)/(abs b)) = -\Delta H/RT + \text{Constant}$. The $\Delta H$ values, which range from -2 to -8 kJ/mol, tend to increase as the number of carbons on the primary alcohol solvent increase. Time dependent density functional theory calculations will provide insight into what solvent/solute interactions are important to consider in order to account for the observed solvatochromic shifts.

Ballistic Resilience of Engineered Earth Masonry Walls Against Flying Debris from Extreme Winds.

Raymond McElroy, Civil Engineering - Senior
Mentor: Dr. Fabio Matta, Civil and Environmental Engineering

Compressed earth blocks (CEB) masonry is an old construction system that is pushing its way to the top as a sustainable solution for specific applications. CEB are constructed using local materials and a relatively simple production system. CEB production requires a press and materials on site. On site construction of CEB brings local jobs at a fraction of the production cost. One of the issues with CEB is their durability in wet conditions. The lack of durability in these conditions is directly related to the materials compressive strength. This can be enhanced with use of stabilizing agents such as Ordinary Portland cement (OPC) or lime. Compressed and stabilized earth blocks (CSEB) have more durability dimensional stability and compressive strength. Recent high wind events in the US such as (Hurricane Katrina and Hurricane Sandy) have shown the vulnerability of the United States construction systems and its materials. One of the most important issues with high wind events are impact loads due to flying debris.
which typically cause the most of human deaths and injuries. Flying debris is not only an issue for structures but is also a cause of many casualties during a high wind event. Wood-frames and hollow-brick masonry are not suitable for areas subjected to impact loads from flying debris. CEB is a cost-effective sustainable and environmentally friendly solution that could be applied in high wind regions for low-income dwelling construction. Flying debris creates impact loads on structures that require increased strength and toughness. The toughness of the CSEB required to withstand impact loads can be is obtained in CSEB by adding recycled non-biodegradable plastic strips fibers. Compressed stabilized and reinforced earth blocks (CSREB) are more durable stronger and more resilient than CEB and CSEB. Research is needed to understand the response of the earth masonry under impact loads from wind-born debris. During a high wind event wind speeds can be higher than 100 miles per hour. An Impact tests air cannon involving shooting a piece of wood into a CSREB wall at 100 mph could be useful to an determine if CSREB is the viability or feasibility of the CSREB masonry to stand wind-born impact loads.

**Thermal Infrared Imaging For Visualization Of Blood At Crime Scenes**

*Emory Straube*, Biological Sciences - Senior  
*Hao Shi*, Business Economics - Senior  
*Mentors: Dr. Stephen Morgan, Chemistry and Biochemistry  
Dr. Michael Myrick, Chemistry and Biochemistry  
Mr. Zhenyu Lu, Chemistry and Biochemistry  
Ms. Brianna Cassidy, Chemistry and Biochemistry*

Modern crime scene analysis for the detection of blood on various substrates employs methods that often lead to contamination of physical evidence. Techniques such as luminol application or blood protein staining are often toxic compromise the integrity of biological stains and result in false positives. Based on previous experiments of physical adsorption-desorption characteristics of fabrics exposed to water [1] we have begun using a steaming approach developed in Dr. Myrick's laboratory (Professor USC Columbia) for the examination of fabrics doped with differing concentrations of blood and fabrics doped with substances for which modern techniques commonly give false positives. Observations have revealed a noticeable difference between thermal absorption-desorption characteristics of blood and that of fabrics. This suggests blood may absorb and release steam energy at a unique rate which can provide a basis for distinguishing between clean fabrics and blood-doped fabrics when observed using an infrared camera. Additionally different adsorption-desorption rates between blood and other substances which commonly cause false positives with current techniques have been observed. This study shows high potential for the simple use of steam to detect dilute blood stains as well as differentiate between blood and common interfering substances at crime scenes.  


**Scan and Analysis of Neutrino Events in Water Cherenkov and Liquid Argon Detectors**

*Andrew Svenson*, Physics - Junior  
*Mentor: Dr. Sanjib Mishra, Physics and Astronomy*

We conducted an analysis of electron neutrino appearance sensitivity in a 100kT Water Cherenkov detector with events simulated from the LBNE neutrino beam at Fermilab. 500 charged current and 1800 neutral current neutrino events were generated randomly across the fiducial volume of the detector and visually scanned to determine the detector efficiency. Kinematic and fiducial volume cuts were applied to the body of scan data to optimize this efficiency which was determined to be around 50%. This is less than the other proposed type of detector Liquid Argon. Following Fermilab's decision to pursue a Liquid Argon style detector a followup study was conducted to confirm the LAr efficiency using a hand scan similar to WC and a simulation geometry inherited from the MicroBooNE project. This efficiency was confirmed at about 80%.

**Design and Construction of Solar Boat**

*Patrick Thigpen*, Mechanical Engineering - Senior  
*Mentor: Dr. Jamil Khan, Mechanical Engineering*

EMCH 428 is one of the cornerstones of the Mechanical Engineering curriculum colloquially referred to as Senior Design. The objective of the course is to provide students with both the theory and the practical experience of implementing an engineering design project. The course continues over two semesters during which student's work in teams of six on a specific engineering project. Eight projects were presented to our class during the first week of school by different companies and USC professors. After reviewing the projects I chose to work on USC's Solar Powered Boat Project. Our main goal is to design and construct a Solar Powered Boat capable of winning the 2013 Solar Splash Competition. Solar Splash is the Collegiate Championship of Solar-electric-boat competition. After reassembling last year’s boat we spent the remainder of the first semester testing the boats capabilities and comparing our boat design with design concepts that our competitors were using. By the time the first semester had concluded our team had engineered several design concepts which we would construct during the second semester. We are in the final stage of our project and are implementing the design concepts that we engineered last semester. By the end of this semester our boat will have a new steering system an HMI screen for the boat operator a bow chine to improve the boats hull to surface efficiency and a skegg to prevent lateral translation. Solar-Splash here we come!
Early Corrosion Detection and Monitoring in Steel Reinforcing Strand
Grace Beaty, Civil Engineering - Senior
Mentor: Dr. Paul Ziehl, Civil and Environmental Engineering
Corrosion of steel reinforcement is significant concern in areas such as coastal regions or regions where de-icing salts are frequently used. The methods currently used to detect corrosion are inadequate to accurately assess this problem but AE (acoustic emissions) could provide a better method of detection. The objective of this project is to corrode medium scale t-beams and monitor acoustic emissions throughout the project to determine the ability of AE to detect damage. This was achieved by monitoring a number of t-beams with AE and traditional methods throughout wet and dry cycles using a 3% NaCl solution. The specimens were then loaded to failure. The results showed that AE has the capability to detect corrosion initiation with the same sensitivity as the traditional methods.

Effect of Coarse Aggregate Properties on the Modulus of Elasticity of High Performance Concrete
Grace Beaty, Civil Engineering - Senior
Mentor: Dr. Dimitris Rizos, Civil and Environmental Engineering
High performance concrete (HPC) is defined as concrete with higher structural capacity. This concrete is often used for bridge decks and road rail ties. The modulus of elasticity of this concrete is low which leads to cracking in many loading cases. A possible cause of this is the coarse aggregate used in the concrete. This study investigates the literature available on the subject to determine potential ways to improve the modulus of elasticity of HPC. The main contributing factor for the modulus of elasticity is the interface between the aggregates and the cement paste. From this study several potential aggregates to improve this concrete have been suggested and further research is being done to test these materials as part of the ongoing project.

Fourier Transform Infrared Spectroscopy and its Application to Determining Bloodstain Age: Preliminary Study with Emphasis on Method Development
Tanya Jones, Biological Sciences - Senior
Alena Bensussan, Chemistry - Freshman
Mentors: Dr. Stephen Morgan, Chemistry and Biochemistry
Ms. Brianna Cassidy, Chemistry and Biochemistry
Mr. Zhenyu Lu, Chemistry and Biochemistry
Determination of bloodstain age would help pinpoint when a crime was committed. Valuable information like this would greatly add to the already high integrity of bloodstain evidence. We propose the application of rapid non-destructive attenuated total reflectance Fourier Transform infrared spectroscopy (ATR-FTIR) to determine the age of bloodstains. Spectral profiles of blood exhibit absorption bands in the mid infrared region most significantly from amide absorptions. Changes of absorption in these regions may correlate with the age of blood; this provides a basis for examination of infrared spectral signatures of blood with particular interest in stains of unknown age and even those that are invisible to the naked eye. We have observed spectral differences from different ages of bloodstains on fabric substrates. Additionally sample preparation techniques using quartz fiber filters which are highly transparent in the mid-IR region are currently being implemented to allow observation of blood aging without substrate interference. This will allow direct observations of spectral changes due only to the aging of blood so that bloodstain age may be more accurately identified in more complex matrices. Previous studies have tried to resolve bloodstain age using high pressure liquid chromatography (HPLC) UV-Vis spectroscopy and real time-polymerase chain reaction (RT-PCR). These methods are more invasive to the sample and/or rarely give specific enough age estimation to be useful for forensic casework.

Fabrication of a nano-micro interface using electricity and silica coating of elastin-like nanoparticles for cancer detection and treatment applications
Romel Menacho-Melgar, Biomedical Engineering - Senior
Mentor: Dr. Guiren Wang, Mechanical Engineering
This project can be divided into two parts one aiming at detection of cancer and another aiming at treating cancer. Regarding the first aspect it has been observed that concentration of molecules occurs at a micro-nano channel interface. This phenomenon can be used to pre-concentrate biological markers for early cancer detection. To manufacture a micro-nano interface starting from a micro-channel a device using electricity was made. Apart from this nanoparticles have been shown to accumulate in tumors and thus can be used to better target cancer cells. Elastin-like nanoparticles (ELPs) have the advantage of having negligible size and molecular weight differences as well as being easy to produce. In this project we investigated different methods to coat the ELPs in silica to increase their half-life inside the body and obtain a better control over their release characteristics.

Innovative Gallium Chalcogenide Semiconductor based Schottky Diodes for Room Temperature Radiation Detection
Rahmi Pak, Electrical Engineering - Senior
Mentor: Dr. Krishna Mandal, Electrical Engineering
Layered anisotropic detector grade gallium selenide (GaSe) and gallium telluride (GaTe) single crystals up to 10 cm in length and up to 2.5 cm diameter have been grown by a modified vertical Bridgman technique from high purity Ga (7N) and zone refined Se, Te (7N) precursor materials. The resistivity of the grown crystals has been characterized through current-voltage (I-V) characteristics and bulk carrier concentration through Hall Effect measurements. Innovative Schottky diodes have been fabricated using high and low work function metals (Au, Ag, Pd, W, Ni, and Al). High resolution radiation detectors in various charge sensing geometries (guard ring, Frisch grid, coplanar, and pixilated) have been fabricated and tested under Am-241(60 keV) and Cs-137 (662 keV) radiation sources. The results clearly show that the fabricated detectors can be used as an effective tool for hand-held low power rating devices for Homeland security, nuclear nonproliferation treaty verification, radioactive waste monitoring, and nuclear power plant security applications.
Live imaging and optimization of nanoparticle self-assembly on magnetic recording media

**Tanner Pearson**, Physics - Sophomore  
Mentor: Dr. Thomas Crawford, Physics and Astronomy

We employ ultra-high magnetic field gradients to assemble magnetic ferrite nanoparticles on the surface of magnetic recording media used in disk drives. The nanoparticles assemble in patterns defined by the architecture of the media and these patterns can act as diffraction gratings. We use high-resolution optical microscopy in combination with live imaging techniques to capture pattern formation as the nanoparticles coat on the media’s surface through controlled ferrofluid layer. We pump the ferrofluid via syringe through a sealed fluid cell with optical access which allows for real-time observation. We interpret our data in terms of intensity contrast within the patterns and compare with previous techniques in order to attain the efficacy and efficiency necessitated by any viable nanomanufacturing process. We also adjust parameters including flow speed ferrofluid concentration and ferrofluid pH for further optimization of our process. Our results reveal information pertaining to the nature of interaction between colloidal nanoparticles how these magnetic particles are affected by large magnetic gradients as they self-assemble and the potential uses of our nanomanufacturing process in related bio-applications.

High efficiency direct electrochemical conversion of carbon dioxide to liquid fuel

**Francesco Risalvato**, Chemical Engineering - Junior  
Mentor: Dr. Xiao-Dong Zhou, Chemical Engineering

Electrochemical reduction of CO2 using renewable sources provides a reaction akin to photosynthesis. This poster displays a design of an electrochemical cell based on a proton exchange membranes (PEM) for the direct conversion of CO2 to liquid fuels at high efficiency. The configuration of the electrochemical cell is a modification to the current PEM fuel cell structure through the addition of a buffer layer between the Naﬁon membrane and Sn gas diffusion electrode (GDE). The liquid fuel, formate/formic acid, was produced with an overpotential lower than 0.2 V with Faradaic and energetic efficiencies towards formate production at ~95% and ~62%, respectively, on a Sn GDE. Formate production rates of ~18 μmol min⁻¹ cm⁻² were obtained at a potential of ~3.2 V in the PEM electrochemical cell. In contrast, PEM electrochemical cells running without a buffer layer produce a nearly pure hydrogen product, suggesting the unique cell design is key for the electrochemical conversion of CO2 to fuels. The potential implications of this project include being able to allow fossil fuel burning power plants to reduce their carbon footprint and net energy costs by converting their waste gasses back into viable fuel sources. With highly efficient cells the net process could become carbon neutral which is not only of value in reducing CO2 emissions but can also decrease our dependence on fossil fuels from the Middle East.

Creation of Dehaloperoxidase Mutants to Increase Detoxification of Haloaromatics

**Ryan Sankovic**, Exercise Science - Junior  
Mentor: Dr. Lukasz Lebioda, Chemistry and Biochemistry

Approximately 71% of the Earth’s surface is composed of water, which is vital for all life forms. Halophenol water contamination is a severe problem in places with animals which metabolize these toxins as their primary protection from predation. When species, such as Amphitrite ornata (a type of sea worm) dwell underground, the sediment can seep into water leading to its contamination. Ingesting or inhaling halophenols replaces oxygen in the body for an anaerobic metabolism leading to suffocation of the body’s cells. Dehaloperoxidase (DHP) is an enzyme found in Amphitrite ornata that has a dual functionality of oxygen transport throughout the sea worm and peroxidase activity which detoxifies haloaromatic compounds. Previous research has shown that such findings can be applied to ‘clean’ halophenol contaminated water waste. The practical application of water detoxification inspired the creation of mutant DHP-M86E in attempt to increase peroxidase activity. Real life scenarios involving DHP mutants such as detoxifying an area to build a park or decontaminating the village of a third world country’s drinking supply create a need to better understand this enzyme. Current progress includes successful creation of the mutant DHP-L100F, over-expression and puriﬁcation of the protein. Kinetic data will be collected to determine the impact of the mutant on peroxidase activity of the enzyme and the rate at which haloaromatic compounds can be oxidized into quinones. Additionally protein crystallization protocols will be executed to crystallize the purified DHP-M86E for determination of the proteins structural conformation.
Criminal Law and Regime Transition: The Case of Nicaragua
Angel Acebes, International Business - Senior
Mentor: Dr. Lee Walker, Political Science
One of the most ignored aspects of the transition from authoritarianism to liberal democracy is the manner in which criminal law is enforced in new democracies. Both the courts and the police in democracy have different roles than courts and police in authoritarianism or in regime transition. Using Nicaraguan Supreme Court data coded by a group of USC undergraduate students I examine how the Supreme Court rule against the government and for the accused person across different regime periods. The idea is that under the populist/socialist Sandinista government the courts should defer to the government more. Instead I find that decision making by the Court is remarkably consistent across regime type and issue area.

Recent Election Data From Brazil
Melissa Bone, Business Administration - Freshman
Nik Ortiz Lambert, International Business - Sophomore
Mentor: Dr. Lee Walker, Political Science
Do men and women differ in the manner in which they respond to constitutes request? Literature suggests that women are more responsive and that a feminine representation impacts the manner in which national parliaments work. Using data from Brasil that we coded for Paolo Spada of Harvard University we examine gender differences in level of responsiveness to request for information from Brazilian candidates for legislature office. We find that candidates (whether male or female) are more likely to respond to a male requester.

Hospitality Tax
Lindsey Culley, Tourism Management - Senior
Melinda Slaski, Tourism Management - Senior
Marquis Palmer, Hospitality Management - Senior
Thomas Pennington, Tourism Management - Junior
Caitlin Shea Jones, Tourism Management - Senior
Mentor: Dr. David Cardenas, Hotel Restaurant and Tourism Management
The purpose of this research is to gain more knowledge about the perceptions of business owners in regards to the hospitality tax. Do they feel that this tax is a vital asset to the city of Columbia? Is it being allocated properly and fairly? Is the tax affecting sales negatively or positively at local restaurants? No concrete data has been collected on this topic and we hope to begin some qualitative data on the hospitality tax in Columbia South Carolina. We initially researched how the hospitality tax is utilized and allocated in other destinations. We focused on how businesses perceive the tax in relation to its primary function (to encourage tourism growth) and its effect on stakeholders in the community. Next we plan to conduct interviews with restaurant and other business owners in Columbia to gain insight into their perceptions on the topic. Our hope is that this study can be utilized by the City of Columbia to further their knowledge regarding public opinion and to cultivate better stakeholder cooperation between the government businesses and the citizens of Columbia. We hope to find a way for the hospitality tax to generate maximum revenue without hurting local businesses and to allocate this revenue in an appropriate and fair manner. Results are forthcoming.

Ecotourism in an Urban Environment
Nikhil Patel, Finance - Senior
Mentor: Dr. David Cardenas, Hotel Restaurant and Tourism Management
The purpose of this study is to determine if ecotourism can be a viable option in an urban environment. “Urban green tourism is defined by the GTA as: “Travel and exploration within and around an urban area that offers visitors enjoyment and appreciation of the city’s natural areas” (Gibson Dodds Joppe & Jamieson pg. 1 2003). However limited research has been conducted to see if urban destinations can attract ecotourists. This study will examine current business owner’s perceptions of ecotourism in an urban environment. The research question that guided this study is “Are business in Greenville building the city to be an ecotourism destination for travelers and business ventures and does ecotourism have a place in this growing urban environment?” Data will be collected by conducting in-depth interviews with current business owners. Results forthcoming once interviews with owners are conducted.

Smartphone and Connected Devices Security Threats: Impact on North and South Carolina Small Businesses
Jeshua Rains, Integrated Information Technology - Senior
Mentor: Dr. Karen Patten, Technology Support and Training Management
Smartphones and connected devices have become popular tools for business of all sizes since they allow for collaboration outside of the traditional workspace and add flexibility and mobility to business processes. However security risks associated with these devices such as data loss from stolen or lost devices security flaws in mobile operating systems or applications and insecurities inherent in the use of Wi-Fi and cellular data must be addressed to justify the benefit of adopting smartphones and connected devices for work purposes. The potential security risks and business threats are especially critical for small and medium-sized enterprises. An increasing amount of research is being done on mobile business security but there are few research studies that specifically address the unique challenges faced by small businesses. Determining awareness of smartphone and connected devices security concerns as well as current security practices in small businesses is necessary in order to educate small business owners and target future research. This research study assesses small business owners’ awareness of the security threats that arise from the use of smartphones and connected devices (including tablets eReaders PDAs gaming consoles) in the workplace and the impact these threats may have on their business. Future research is planned to then develop business mobility security solutions appropriate for SMEs based on their current awareness and security practices.
The Impacts of Online Shopping on the Tourism Industry with Perceptions of College Students

Camryn Scaffe, Tourism Management - Senior
Autumn Lamontagne, Tourism Management - Senior
Erika Wazney, Tourism Management - Senior
Lauren Morrison, Tourism Management - Senior

Mentor: Dr. David Cardenas, Hotel Restaurant and Tourism Management

The purpose of this study is to explore the impact of online shopping on the travel and tourism industry. Shopping is one of the most popular activities while traveling. However with technology on the rise amongst consumers online shopping is on the rise as well. This pilot study will focus on college student’s perception of online shopping and tourism. Qualitative research will be conducted to determine how many college students purchase online what they buy and how often they buy online. The research will include discussions with the college students about how they believe their online shopping has affected things such as gas usage restaurant revenue airline travel and hotel reservations. In conducting our research focus groups and interviews will be used to gain more insight and knowledge about the effects of online shopping in the travel and tourism industry. Results are forthcoming.

Lean Performance Measurement Systems

Kun Yin, Finance - Junior
Mentor: Prof. Stan Smith, Accounting

Our research hopes to shed light on the role that the performances measurement system plays in the firm-level evaluation of the impact of lean practices. We hope to identify the qualitative factors of different performance measurement systems and the impact of each factor on the correct assessment of progress in the implementation of lean practices. We designed interview guidelines and interviewed 8 US companies and 3 Asian companies. By analyzing the data of the research we identified the linkages between the metrics and underlying causal factors driving overall firm progress toward lean improvement goals. We found the correlation between the success and failure of a company’s lean initiatives and effectiveness of its lean performance measurement system. Additionally we are currently helping Sonoco Product Company with a process improvement project by providing insights to Sonoco based on the results of our research. Our research findings can serve as valuable resource for companies looking to improve their lean practices to refer to.

Movin’ On Up: The Effects of Getting Left Behind

Alison Bair, Psychology - Senior
Mentor: Dr. Brad Smith, Psychology

According to the National Household Education Surveys Program (NHES) in 2007 about ten percent of kindergarten through eighth grade students had been retained in a grade. This decision should not be taken lightly as the effects of holding a student back can have serious repercussions so grade retention should be used as a last resort. When it comes to deciding whether or not a student should be retained from his or her grade four key considerations should be examined: the subject the student is falling behind in if there is a truancy issue the student’s maturity and social skills and how non-promotion will affect the student in the future. The retention decision making process should include collaboration amongst administrators the parents of the student and a school counselor. This study examined the peer reviewed literature of consequences of grade retention in the elementary school setting and alternative strategies that could be implemented to improve a student's performance before being retained. The review considered demographics and other contributing factors that cause the likelihood of non-promotion in elementary-aged students This review also looked at how the involvement of an after-school program such as the Challenging Horizons Program (CHP) can serve as a buffer and bolster academic achievement and decrease the possibility of retention or the negative consequences of retention. The CHP serves a high-poverty school with low test scores that also has a low retention rate (about one percent) but retained students are disproportionately represented in the CHP after-school program.

Black Girls Make Movies!: Bridging the Gap between Race Gender and Technology

Alia Baker, Art Education - Senior
Mentor: Dr. Olga Ivashkevich, Art

Together with my mentor Dr. Ivashkevich I have been working with a group of five 5 to 9-year-old African-American girls at the local St. Lawrence Place shelter for homeless families. We have been meeting with the girls one hour a week since August 2012 and we plan to finish our project before the Discovery Day. Our participants have no previous experience with video recording or editing. Our project invited them to create a film about their interests dreams and aspirations. In this process they learned how to use Flip video camera write short scripts and direct act out and film their video episodes. Most recently they have begun editing their film using iMovie software. Our project is grounded upon an idea of emerging curriculum that allows for children's scripts and stories to gradually evolve in the process of production. Our research highlights an importance of the media literacy and digital storytelling for the population of girls who don’t have access to the new technologies in their daily lives.
NO BULLYING! A Study of Intervention Outcomes  
Jamie Bowen, Psychology - Junior  
Caroline Young, Psychology - Junior  
Mentor: Dr. Brad Smith, Psychology

Bullying is a widespread problem with potentially devastating consequences for all persons involved. Media outlets often report on bullying that subsequently leads to serious injury or death by suicide. A national conversation is currently taking place on how to stop bullying which is happening at schools and at home by way of the Internet. This study concentrates on performing effective interventions to prevent children from engaging in bullying behaviors. Additionally students will be taught strategies to safely and effectively respond to bullying situations. The sample in this study is drawn from an after-school program serving students in a high-poverty school with low test scores. A group of randomly selected sixth-grade students will receive an intervention program that will emphasize problem solving skills and conflict resolution while at the same time enhancing the child’s character traits of kindness and empathy. This study utilizes the strategies that have been developed by professionals in the field of bully research including Dr. Dan Olweus and Dr. Allan Beane. Outcomes will be assessed using program data with particular emphasis on negative interpersonal behavior. Also students will complete a bullying questionnaire. Students who participate in the bullying intervention are expected to have lower rates of negative behavior higher rates of positive behavior and changes in the bullying questionnaire indicative of reductions in bullying behavior.

Correlations Between Amount of Family Time and School Performance  
Amanda Brown, Psychology - Senior  
Mentor: Dr. Brad Smith, Psychology

The purpose of this research is to determine if there is a correlation between the amounts of time that a child spends with their family and their performance at school. School performance is measured in terms of academic outcomes as well as behavioral conduct. The participants in this study a group of sixth grade students in the Challenging Horizons Program at Irmo Middle School. Once a week the group of students will be asked how much time they spent with their family and how much of that time included their parents. This information will be compared with the students’ grades as well as their individual demerit points.

Electronic Learning Modules  
David Corso, Biological Sciences - Senior  
Mentor: Prof. William Morris, Educational Studies

This project is developing innovative and engaging educational tools that efficiently promote learning on hand-held devices. These tools are electronic learning modules which are all-in-one packages for digital devices. Each electronic module will contain text graphics animations videos and self-paced assessments. As well these modules will be available on a variety of devices such as tablets smartphones laptops and desktop computers. Specifically this project is designing and developing an electronic module for EDPY401 which covers cognitive neuroscience and education. These electronic learning modules have great potential in both traditional and non-traditional classroom environments. By providing information in a more accessible and affordable manner these modules will allow for learning at a higher quantitative level; as well the enhancement of interactive features will increase the quality of this learning. Together these electronic learning modules will provide students with a richer learning experience. Additionally these modules will facilitate instructors as to how they organize and teach their course.

Magic Snack Bars  
Aubrie Frye, Psychology - Junior  
Mentor: Dr. Brad Smith, Psychology

Over the past several decades there has been a substantial decline in the amount of Omega-3 fatty acids consumed by Americans. Omega-3 fatty acid deficiencies have been links with learning behavior and mood problems; particularly in low income families. This study will investigate the effects of Omega-3 fatty acids on children’s mood behavior and academic achievement. Participants will be 90 children from Irmo Middle School’s Challenging Horizons After-School Program (CHP) that serves students who qualify for free or reduced lunch. In the pilot study during the spring of 2013 students will try various “magic snack bars” (i.e. snacks high in Omega-3’s) and staff will practice measuring intake of Omega-3s students’ liking of the snacks and measures of mood and behavior. This will prepare for a study in the fall of 2013 in which 45 would be in the experimental group that receives a fatty acid supplement as a snack bar. While the other 45 students will be the control group and received a regular snack. The students are going to be given a baseline mood and behavior survey before the experiment starts and after the experiment. The amount of rule calls the students receive before the experiment started will be documented and the amount of rule calls during and after the experiment will also be documented. The ultimate goal of this study is to decide if Omega-3 fatty acids have a positive effect on the children’s mood behavior and academic achievement.

Increasing Participation in the C.H.P  
Thi Lam, Psychology - Junior  
Ashley Grayson, Psychology - Junior  
Mentor: Dr. Brad Smith, Psychology

This study aims to examine increased participation through self-led discipline strategies in a group of middle school students. A group of 20 students in the Challenging Horizons Programs at Irmo Middle School will be exposed to an observational study that measures the amount of rule calls at the beginning of the semester compared to the amount of rule calls at the end of the semester. The counselors would hold weekly meetings to lead the students in a group discussion to examine what types of guidelines the students would put in place for themselves to increase their participation. It is hypothesized that when students guiding their own discipline there will be an increase in positive behavior among the students and a decrease in number of rule calls. The study will examine the change in number of rule calls among individual students as well as the group as a whole.
Music Therapy: Measuring Interest at the University of South Carolina
Erinn Whiteside, Psychology - Senior
Victoria Willingham, Biological Sciences - Freshman
Mentor: Dr. Kate Flory, Psychology

We believe that offering a music therapy degree would have a significantly positive impact on the Columbia community; however the University of South Carolina does not currently offer a degree in music therapy. To start such a program a significant student desire to participate in such a program must be proven. To measure the level of undergraduate student interest in a potential music therapy undergraduate degree program we developed and administered a survey to USC undergraduate students. The survey which is supported by an Honors College Exploration Grant was distributed to students by hand during class periods. Although the research has not yet concluded there are currently 650 responses that have been collected and documented. While students of all majors were surveyed a focus was put on the responses of psychology and music students. Of all who participated 15% of indicated that they would be very interested in participating in a music therapy degree program if it were offered. With significant interest shown in a potential music therapy program the next step is to pursue the establishment of a music therapy program at USC. The results of this survey support the establishment of this program indicating that such a program would be both welcomed and pursued by undergraduate students at USC. We will be presenting the conclusion of our research to date the motivation and goals of the research a sample of the survey and testimonies from students and community members that have either been surveyed or interviewed.

Assessment of student perceptions attitudes and skills regarding interprofessional behaviors
Emily Willett, Pharmacy - Senior
Mentor: Dr. Betsy Blake, Pharmacy

With growing emphasis on team-based care in clinical practice interprofessional education is expected to be incorporated in educating health professionals. A required introductory interprofessional course was implemented for first-year pharmacy and medical students on the University of South Carolina campus in spring 2012. The primary outcome was to assess students’ perceptions of teamwork professional identity and responsibilities in accordance with IPEC Competencies. Students participated in online discussions regarding cultural competency social determinants of health evidence-based medicine and healthcare systems. Students met three times including a final meeting for a root cause analysis presentation. Students enrolled in the course completed pre- and post-course assessments to determine if a required interprofessional course could positively affect knowledge and attitudes regarding interprofessional collaboration. Response rates were high 96% and 99% for the pre- and post-course assessments respectively. Results were similar for both assessments and across both professions with positive responses to most questions. After completion of the course 88.9% of students agreed or strongly agreed that the course enhanced the student’s ability to work with other health professional students. The majority of students (75%) reported feeling more confident working with other health professionals with a great interest in IPE activities (74%) if more health professions were involved. The most common suggestions for improvement included more in-person interactions and more real world situations to discuss. While first-year medical and pharmacy students on a comprehensive university campus have high initial perceptions attitudes and skills regarding interprofessional behaviors the implementation of an interprofessional course encouraged those opinions.
Girls Incorporated of Greater Columbia the Portraits of Promise Program and the Stand A Little Taller Exhibition
Kayla Caston, Political Science - Senior
Mentor: Dr. Suzanne Swan, Psychology
I have had the opportunity this semester to be part of an amazing and empowering organization Girls Incorporated of Greater Columbia (GIGC) to meet the internship requirement for my Women and Gender Studies major. The mission of Girls Inc. “To inspire all girls to be Strong Smart and Bold” truly says it all. The primary focus of GIGC is to reach underserved girls in the Columbia area between the ages of 6 and 18 and help them to envision a brighter future and realize their potential through research-based programs and experiences. These programs cover a broad range of topics including economic literacy violence awareness and prevention media and financial literacy leadership and community action etc. The particular program that I had the opportunity to work was the Portraits of Promise (POPI) gallery. This program was created to help the girls through original dance photography and partnership with a mentor in a career of their choosing identify the power of promise existing within themselves. The gallery I worked with was the result of that program the actual exhibition of the girls’ photography. The exhibit Stand a Little Taller featured photography of 15 of the girls who participated in the program along with photographs taken of the girls and their mentors by photographer Michaela Pilar Brown throughout the program. Not only this particular program but Girls Inc. itself is vital in the growth of a generation of girls who are becoming with just a little help “Strong Smart and Bold.”

Nourishing Our Community
Tyler French, Baccalaureus Artium et Scientiae - Senior
Mentor: Dr. Allison Marsh, History
Every meal we eat involves a number of choices: conventional or sustainable; local or global; healthy or unhealthy. The consequences of these choices cover almost every aspect of our lives effecting the environment the economy and our social relations through every level of community. Yet the current food system takes choice out of the equation for many individuals and communities by limiting access to sustainable local healthy foods for low-income households. I created a traveling exhibit that has been displayed at farmers markets and food events around Columbia SC. The exhibit examines two primary structural inequalities (ability and assets) which limit the food choices of low-income households. The exhibit empowers viewers to help with the creation of a more equitable food community that allows every member access to healthy sustainable food. They are encouraged to support the initiatives already underway in South Carolina such as the Farm to School program and the Food Policy Council as well as push for more novel initiatives and partnerships such as the Right Choice Fresh Start farmers market in Orangeburg or sliding-scale CSAs. To develop the exhibit content I interviewed a number of individuals across a diverse range of professions and from farmers to public health professionals food bank organizers and social workers. I found that our current food system needs a radical reworking with input from such a diverse set of individuals in order to be socially equitable and provide enough nutritious food for every member of our community.

Reaching Underserved Populations in Rural and Coastal Regions of South Carolina: Our Service-Learning Experience
Morgan McCaskill, Management - Sophomore
Meghan Rock, Psychology - Sophomore
Richy Phongsavath, Biology - Junior
John Turner, Mechanical Engineering - Sophomore
Eric Justin Mercado, Nursing - Sophomore
Alyce Ni, Nursing - Junior
Mentor: Dr. Dottie Weigel, Student Engagement
“Service Learning in South Carolina” is a course designed to help students develop a better understanding of service as it relates to the college experience and after graduation. Through the course we have had the opportunity to learn about and develop our service leadership skills. We have also discussed poverty (specifically rural poverty) homelessness and the role higher education plays in addressing some of these issues. Over spring break we participated in a service trip to reach underserved populations along the I-95 “Corridor of Shame” and the South Carolina coast. We learned first-hand about food disparities affordable housing for the working poor and education. This presentation will offer some of what we learned through our service trip and over the course of the semester.

Chemistry Explodes in Lancaster: The USCL Chemistry Club Goes Beyond the Classroom
Drashti Patel, Biological Sciences - Sophomore; USC Lancaster
Jamie Rembert, Pharmacy - Sophomore; USC Lancaster
Petter Rophael, Biological Sciences - Freshman; USC Lancaster
Mentors: Dr. Fernanda Burke, Chemistry; USC Lancaster
Dr. Bettie Obi Johnson, Chemistry; USC Lancaster
The USC Lancaster Chemistry Club was founded in fall 2008 to give students the opportunity to become better acquainted with chemistry to secure the intellectual stimulation that arises from professional association and obtain experience in preparing and presenting technical material before an audience. Through chemistry demonstrations and interactions with the community our students raise public awareness and stimulate interest for chemistry and the sciences amongst K-12 students and adults. Over the past five years the club has become one of the most active organizations on campus with over 35 energetic members who meet monthly and participate in a variety of events on and off campus each semester. These events include celebrating National Chemistry Week at local high schools chemistry magic shows for students of all ages chemistry challenges for junior and senior students in the honors/AP programs field trips to government and academic institutions science fair chemistry demonstrations and a lecture series that hosts professionals and past students who have chosen to pursue careers in the sciences. The USCL Chemistry Club members are an integral part of the on-campus and off-campus activities as they are the ones conducting the demonstrations and hands-on activities. Community members are thrilled by
the experiments and very impressed with the students’ knowledge and skill in presenting them. For further information about the USCL Chemistry Club please visit our website at http://usclancaster.sc.edu/studentlife/chemclub/index.html.

Davontae Singleton-ePortfolio-USC Connect
Davontae Singleton, English - Sophomore
Mentor: Dr. Irna Van Scoy, USC Connect
This semester I have been working on a dynamic e-portfolio through USC Connect. This e-portfolio displays my engagement with various beyond the classroom experiences and how they have enhanced my learning through the course of my undergraduate career thus far. For example I am an English major with an emphasis on secondary education and in my spare time I am the co-director of the Waverly Afterschool Program in which I and a number of USC volunteers provide tutoring assistance and mentoring for students who live in a predominantly low socio-economic class. Creating an e-portfolio has many personal and professional benefits including providing references for any future employer as well as providing a detailed visual of the work I have been that graduate schools will be able to look at. I developed my e-portfolio using software through Blackboard and it is housed online to make it easily accessible. In order to develop my e-portfolio I took the following steps: looked through all the volunteer work I have participated in created pages to outline them and explain what they were and how they have impacted me. Through my experience the connections between Waverly and my secondary education degree became much clearer and I identified new ways to apply the things I have learned both in class to my real-world experiences. Overall creating an e-portfolio has helped me to reflect upon my own experiences and helped me to share them with others who may be interested in doing similar work.

Creating a Green Mind Space
Alexandra Spahr, French - Senior
Mentor: Dr. David Whiteman, Political Science
Through funding from the Office of Undergraduate Research at USC a “Green Mind Space” was designed in the upstairs landing of Green Quad’s Learning Center for Sustainable Futures (West Quad D). This area is open to students faculty and staff members who are looking for a space to practice mindful meditation. The space is equipped with a screen for privacy meditation pillows a journal to record thoughts and read others’ thoughts and a few educational materials about mindful meditation and green values in general. The Green Mind Space was completed during the Spring 2011 semester by the Greening the Mind project team at Sustainable Carolina. The specific focus for this research project was to create a space that is conducive for mindful meditation and also to expose the USC community to green values and philosophy. The Green Mind Space has been a great stepping-stone in broadening the understanding of green values and encouraging a sustainable pace and lifestyle among the students faculty and staff at USC. Although use of the space appears to be fairly limited it provides a starting point for encouraging a more balanced lifestyle among the members of the USC community. We hope to further encourage use of the Green Mind Space and possibly create a number of other Green Mind Spaces around campus.

An Exploration of the Research Process
Susan Todd, Psychology - Junior
Mentor: Dr. Kate Flory, Psychology
In April 2012 I was awarded an Honors Exploration Grant to work in Dr. Kate Flory’s lab at the USC Parenting and Family Research Center. With the grant I was exposed to the methods and procedures associated with working on a large grant-funded research study. The study focuses on the social and academic impairment related to children with ADHD. I was interested in expanding my experience in the field of psychology by getting hands-on experience with a major research project and working in a lab. I became familiar with what the study would entail over the summer and had my lab orientation in August. By October we started running our first participants. I learned the challenges of shifting from reading a manual to working directly with a child. I found that there is a lot of technical and behind-the-scenes work that goes into planning for and running a large research study. I learned how to be flexible with the many little changes that are constantly being made. I also became familiar with the detailed protocol of every daily task that is done with the research study. I learned that although I really enjoy working in the lab doing research is not something that I plan to primarily pursue in my career plans. I am now much more familiar with the research side of psychology. For my Discovery Day presentation I will present some of my journal entries about my experience in the lab and what I learned this year.
<table>
<thead>
<tr>
<th>Name</th>
<th>Magellan Scholars</th>
<th>Index of Presenters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jeremy Aaron</td>
<td>Andrea Eggleton</td>
<td>Benjamin Brummel</td>
</tr>
<tr>
<td>Rahoul Ahuja</td>
<td>Fides Elampano</td>
<td>Kenyanah Bryant</td>
</tr>
<tr>
<td>Tyler Alion</td>
<td>Johnathon Elkes</td>
<td>Shrayva Budidi</td>
</tr>
<tr>
<td>Lauren Allen</td>
<td>Caroline Enoch</td>
<td>Christina Bullard</td>
</tr>
<tr>
<td>Christen Armstrong</td>
<td>Kali Esancy</td>
<td>Jessica Bunting</td>
</tr>
<tr>
<td>Brianna Arnone</td>
<td>Elizabeth Farmer</td>
<td>Courtney Burkhalter</td>
</tr>
<tr>
<td>Spencer Babb</td>
<td>Michael Finnegan</td>
<td>Lauren Burner</td>
</tr>
<tr>
<td>Connon Bain</td>
<td>William Forsgach</td>
<td>Alexs Burns</td>
</tr>
<tr>
<td>Alika Baker</td>
<td>Tyler French</td>
<td>Rachel Byrd</td>
</tr>
<tr>
<td>Victoria Barker</td>
<td>Amanda Gainey</td>
<td>Travis Byrd</td>
</tr>
<tr>
<td>Grace Beatty</td>
<td>Taylor Garrick</td>
<td>Kendra Calhoun</td>
</tr>
<tr>
<td>Amadeo Bellotti</td>
<td>Kara Garrott</td>
<td>Austin Canfield</td>
</tr>
<tr>
<td>Chris Bevirt</td>
<td>Elliott Gibbs</td>
<td>Anna Capps</td>
</tr>
<tr>
<td>Austin Blackwell</td>
<td>Jennifer Gilmore</td>
<td>Kayla Caston</td>
</tr>
<tr>
<td>Caitlin Boling</td>
<td>Lacey Goulding</td>
<td>Matthew Caudle</td>
</tr>
<tr>
<td>Melissa Bone</td>
<td>Emily Graczyk</td>
<td>Candra Chaisson</td>
</tr>
<tr>
<td>Brandy Bosile</td>
<td>Job Grant</td>
<td>Eshwar Chandrasekar</td>
</tr>
<tr>
<td>Tara Gail Bostwick</td>
<td>Thomas Greziinger</td>
<td>Noelle Chasmar</td>
</tr>
<tr>
<td>Derek Brenner</td>
<td>Jasdeep Guram</td>
<td>Jacob Chavis</td>
</tr>
<tr>
<td>Zach Brenton</td>
<td>Brandon Hanna</td>
<td>Jonathan Chay</td>
</tr>
<tr>
<td>Megan Brown</td>
<td>Adrian Hayes</td>
<td>Britanny Cheeks</td>
</tr>
<tr>
<td>Benjamin Brummel</td>
<td>John He</td>
<td>Ivory Chen</td>
</tr>
<tr>
<td>Shrayva Buddhidi</td>
<td>Lauren Hehan</td>
<td>Pooja Choudhari</td>
</tr>
<tr>
<td>Christina Bullard</td>
<td>Leila Heidari</td>
<td>Victoria Choudhari</td>
</tr>
<tr>
<td>Rachel Byrd</td>
<td>Jake Hennett</td>
<td>Justin Baumgartner</td>
</tr>
<tr>
<td>Kendra Calhoun</td>
<td>Aimee Herron</td>
<td>Grace Beatty</td>
</tr>
<tr>
<td>Anna Capps</td>
<td>Katherine Hicks</td>
<td>Amadeo Bellotti</td>
</tr>
<tr>
<td>Candra Chaisson</td>
<td>Catherine Hodierne</td>
<td>Amanda Bennett</td>
</tr>
<tr>
<td>Eshwar Chandrasekar</td>
<td>John Hollingsworth</td>
<td>Alena Bensussan</td>
</tr>
<tr>
<td>Jonathan Chay</td>
<td>Logan Hood</td>
<td>Chris Bevirt</td>
</tr>
<tr>
<td>Britanny Cheeks</td>
<td>Michael Hood</td>
<td>Austin Blackwell</td>
</tr>
<tr>
<td>Pooja Choudhari</td>
<td>Christine Hsieh</td>
<td>Morgan Blankenship</td>
</tr>
<tr>
<td>Purva Choudhari</td>
<td>Paul Jansch</td>
<td>Austin Blake</td>
</tr>
<tr>
<td>Evan Clark</td>
<td>Harvey Jessup</td>
<td>Jessica Blosch</td>
</tr>
<tr>
<td>John Gegg</td>
<td>Alexander Jurka</td>
<td>Caitlin Boling</td>
</tr>
<tr>
<td>David Corso</td>
<td>Emma Kelley</td>
<td>Melissa Bone</td>
</tr>
<tr>
<td>Axton Crolley</td>
<td>Bridgette Kennedy</td>
<td>Elhaam Borhanian</td>
</tr>
<tr>
<td>Brendan Croom</td>
<td>Olivia Keyes</td>
<td>Brandy Bosile</td>
</tr>
<tr>
<td>Melanie Crouch</td>
<td>Ahmed Khawaja</td>
<td>Tara Gail Bostwick</td>
</tr>
<tr>
<td>Borja De la Cerva</td>
<td>Ashleigh Kimberlin</td>
<td>Jamie Bowen</td>
</tr>
<tr>
<td>Sara Deal</td>
<td>Zack King</td>
<td>Jake Bowling</td>
</tr>
<tr>
<td>Garrett DeBruin</td>
<td>Andrew Koftun</td>
<td>Lynn Boyd</td>
</tr>
<tr>
<td>Emily DeFouw</td>
<td>Han Lin</td>
<td>Riley Brady</td>
</tr>
<tr>
<td>Mary Blair Delliger</td>
<td>Kaitlin Little</td>
<td>Derek Brenter</td>
</tr>
<tr>
<td>Drew DeLorenzo</td>
<td>Tiffany Livingston</td>
<td>Zach Brenton</td>
</tr>
<tr>
<td>Maggie Discher</td>
<td>Rebecca Marasco</td>
<td>Amanda Brown</td>
</tr>
<tr>
<td>Ryan Dolewski</td>
<td>Steve Marcus</td>
<td>Megan Brown</td>
</tr>
<tr>
<td>Sabrina W. Driggers</td>
<td>Esmel Mayar</td>
<td>Rick Brown</td>
</tr>
<tr>
<td>Joseph DuRant</td>
<td>Erica Mazur</td>
<td></td>
</tr>
</tbody>
</table>
Index of Presenters

Patrick Duff ................................. 59
Aubrey Duggar .............................. 179
Joseph DuRant .............................. 46
Andrea Eggleston .......................... 109, 143
Fides Elamparo .............................. 76
Johnathon Elkes ............................. 134
Yasmine Elrabeh ............................ 91
Amber Engel ................................. 76
Caroline Enoch .............................. 88
Kali Esancy ................................. 62, 72, 125
Jennifer Fadimba ........................... 170
Elizaberta Farmer ........................... 164
Brian Fazzoneare ........................... 146
Clara Fella ................................. 52
Olivia Figary ................................. 119
Michael Finnegan .......................... 37
Anna Fischer ................................. 151
Taylor Ford ................................. 154
William Forgach ............................ 73
Margaret Fortenberry ..................... 123
Shandra Foster .............................. 130
Cole Franky ................................. 103
Tyler French ................................. 14, 186
Aubrie Frye ................................. 183
Amanda Gainey .............................. 89
Laura Galanti ............................... 102
Taylor Garrison ............................ 113
Kara Garrott ................................. 77
Victoria Gates ............................... 126
Ross Geiger ................................. 119
Elliott Gibbs ................................. 60
Kaelie Gielf ................................. 67
Merita Gilard .............................. 24
Jennifer Gilmore ............................ 45
Sheimalove Glover .......................... 48
Melanie Goff-Utsey .......................... 179
Gerald Gordaner ............................ 46
Lacey Goulding ............................. 147
Emily Graczyk .............................. 166
Kleve Granger .............................. 89
Job Grant ................................. 114
Ashley Grayson ............................. 183
Julian Greer ................................. 31
Tom Griesinger ............................ 38
Daniel Grierson ............................. 30, 14
Laquita Grissett ............................ 143
Jasdeep Guram .............................. 135
Benjamin Haggard ........................ 14
Taylor Hanayik ............................. 102
Brandon Hanna ............................. 73
Andrew Hargest ........................... 117
Allison Harlee .............................. 122
Adrian Hayes ............................... 60
John He ................................. 170
Jane Hearn ............................... 12
Lauren Hehman ............................ 85
Leila Heidari ............................... 27
Caroline Hendricks ........................ 135
Jake Hennett ............................... 139
Trevor Herrig ............................... 159
Aimee Herron .............................. 106
Katherine Hicks ............................ 81
Kendell Hills ............................... 119
Catherine Hodierne ........................ 31
John Hollingsworth ........................ 139
Logan Hood ............................... 140
Michael Hood .............................. 164
Nicole Hornung ............................. 19
Christine Hsieh ............................ 171
Kerstin Hudon .............................. 117
James Hull ................................. 103
Alyssa Ives ................................. 98
Stephania Jackson ........................ 159
Paul Jansch ................................. 62
Laura Jeftcoat .............................. 121
Gabrielle Jenkins .......................... 130
Harvey Jessup .............................. 67
Christopher Johnson ........................ 63
Kyndra Johnson ............................ 13
Ross Johnson ............................... 82
Caitlin Shea Jones ........................ 178
Tanya Jones ................................. 174
Alexander Jurek ........................... 131
Jacob Kaufman-Waldron .................. 20
Philip Karse ............................... 58
Emma Kelley ............................... 86
Bridgette Kennedy ........................ 99
Olivia Keyes ............................... 43, 68, 126
Nidha Khan ............................... 156
Ahmed Khawaja ............................ 110
Ashleigh Kimberlin ........................ 171
Justice Kindell ............................ 13
Zack King ................................. 93
Emily Ritter ............................... 114
Lauren Knottke ............................. 13
Marla Koch ................................. 93
Andrew Koutun ............................ 38
Kathryn Krajnic ............................ 156

Discovery Day 2013

Index of Presenters

Matthew Kuhn .............................. 20
Layveleta Laann Walker  .................. 13
Rachael Lackner ........................... 49
Thi Lam ................................. 183
Autumn Lamontagne ........................ 180
Tristan Lawson ............................ 35
Katherine Layne ........................... 54
Anthony Le ................................. 115
Emily Learner .............................. 136
Han Lin ................................. 69
Ari Lindenbaum ........................... 43
Kaitlin Lillie ............................... 147
Tiffany Livingston  ...................... 24
Khaliagh Logan ............................ 148
Andrew Lorick ............................. 167
Kathryn Lucas ............................. 94
Erik Lybeck ................................. 69
Aryel Lyra ................................. 74
Edwina Mack ............................... 13
Meredith MacLeod  ....................... 123
Peter Magness ............................. 168
Amanda Mahler ............................ 13
Rebecca Marasco ........................... 34
Steve Marcous .............................. 77
Shelley Maxwell ........................... 103
Esmail Mayar ............................... 151
Shaina Mayekar ............................. 123
Erica Mazur ............................... 107
Morgan McCaskill  ....................... 187
Kimberly McCormack  ..................... 144
Margaret McCoy ............................ 52
Raymond McElroy  ......................... 171
Sandra McFadden  ......................... 144
Contessica Mckinney ..................... 74
Emrys McMahon ........................... 111
Emin McParland ........................... 35
Romek Menacho-Melgar ................... 175
Eric Justin Mercado  ....................... 187
Amber Merfeld ............................. 53
Elizabeth Messman  ....................... 28
David Mettens .............................. 14
Roger Michael ............................. 63
Jessica Michal ............................. 94
Hannah Milks ............................... 25
Cassandra Miller ........................... 12
Debra Miller ............................... 39
Hannah Miller .............................. 39
Jason Mohi ................................. 119
Christopher Molony  ...................... 63
Kitra Monnier .............................. 47
Charkeisha Moore  ......................... 13
Casey Morgan .............................. 122
Lauren Morrison  ......................... 180
Jesse Moyer ............................... 107
Samantha Mueller  ......................... 168
Taylor Mueller ............................. 55
Vilora Mueller ............................. 117
Erim Mulligan .............................. 90
Colleen Myers ............................. 108
Michelle Nations  ......................... 90
Danya Nayfeh .............................. 14
Isabel Neven ............................... 13
Mary-Catherine Newell ................... 165
Buns Newson ............................... 82
Sara Newton ............................... 162, 168
Alyce Ni ................................. 187
Patrick Niehaus ........................... 140
Keaten North ............................... 118
Stevan Novakovic  ......................... 118
Amy O’Brath ............................... 154
Elisabeth Oliver  ......................... 103
Hilde Oliver ............................... 83
Nik Ortiz Lambert ......................... 178
Giselle Outten ............................. 55
Randi Page ................................. 159
Rahmi Pak ................................. 175
Marquis Palmer ........................... 178
Christina Papadimitriou ................... 61
Drashi Patel ................................. 187
Kedar Patel ................................. 156
Nikhil Patel ................................. 179
Priyanka Patel .............................. 75
Geetanjali Pathak  ......................... 104
Logan Peake ............................... 78
Tanner Pearson  ......................... 176
Benjamin Pencil  ......................... 151
Alan Peh ................................. 99
Daravie Pel ................................. 157
Jorge Penalba Moreno ..................... 152
Thomas Pennington ....................... 178
Caleb Phillips ............................. 86
Richy Phongsavath ......................... 187
Kristian Pickrel  ......................... 56
Greg Pielarski .............................. 108
George Plasko ............................. 136
Kristen Polinski  ......................... 91
Madeleine Pressley ......................... 91
Kayla Price ................................. 89
<table>
<thead>
<tr>
<th>Presenter Name</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elizabeth Pugh</td>
<td>63</td>
</tr>
<tr>
<td>Priya Purohit</td>
<td>164</td>
</tr>
<tr>
<td>Haley Rabic</td>
<td>151</td>
</tr>
<tr>
<td>Jeshua Rains</td>
<td>179</td>
</tr>
<tr>
<td>Caroline Rearden</td>
<td>117</td>
</tr>
<tr>
<td>Jamie Rembert</td>
<td>187</td>
</tr>
<tr>
<td>Marta Ribao Gil</td>
<td>119</td>
</tr>
<tr>
<td>Christine Rice</td>
<td>21</td>
</tr>
<tr>
<td>Caroline Richardson</td>
<td>119</td>
</tr>
<tr>
<td>Keifer Richardson</td>
<td>56</td>
</tr>
<tr>
<td>Francesco Risalvato</td>
<td>176</td>
</tr>
<tr>
<td>Nathan Robinson</td>
<td>148</td>
</tr>
<tr>
<td>Meghan Rock</td>
<td>187</td>
</tr>
<tr>
<td>Tayler Rodgers</td>
<td>47</td>
</tr>
<tr>
<td>McCall Rogers</td>
<td>131</td>
</tr>
<tr>
<td>Petter Ropael</td>
<td>187</td>
</tr>
<tr>
<td>Patrick Sajovec</td>
<td>123</td>
</tr>
<tr>
<td>Arjamand Sami</td>
<td>100</td>
</tr>
<tr>
<td>Ryan Sankovic</td>
<td>177</td>
</tr>
<tr>
<td>Camryn Scaife</td>
<td>180</td>
</tr>
<tr>
<td>Katherine Schmidt</td>
<td>123</td>
</tr>
<tr>
<td>Ibrahima Seck</td>
<td>57, 115</td>
</tr>
<tr>
<td>Lauren Seder</td>
<td>117</td>
</tr>
<tr>
<td>Victoria Sharpe</td>
<td>100</td>
</tr>
<tr>
<td>Karen Shebuski</td>
<td>169</td>
</tr>
<tr>
<td>Andrew Sherman</td>
<td>119</td>
</tr>
<tr>
<td>Hao Shi</td>
<td>172</td>
</tr>
<tr>
<td>Mary Short</td>
<td>44</td>
</tr>
<tr>
<td>John Sieracke</td>
<td>78</td>
</tr>
<tr>
<td>Ivana Simić</td>
<td>140</td>
</tr>
<tr>
<td>Priscilla Simon</td>
<td>132</td>
</tr>
<tr>
<td>Alexander Sims</td>
<td>142</td>
</tr>
<tr>
<td>Stefan Singer</td>
<td>111</td>
</tr>
<tr>
<td>Azissa Singh</td>
<td>119</td>
</tr>
<tr>
<td>Davontae Singleton</td>
<td>188</td>
</tr>
<tr>
<td>Melinda Slaski</td>
<td>178</td>
</tr>
<tr>
<td>Stephen Smoak</td>
<td>115</td>
</tr>
<tr>
<td>Brittany Snee</td>
<td>79</td>
</tr>
<tr>
<td>Samruddhi Somani</td>
<td>64</td>
</tr>
<tr>
<td>Alexandra Spahr</td>
<td>188</td>
</tr>
<tr>
<td>Becky Spitzer</td>
<td>160</td>
</tr>
<tr>
<td>Richard Spivey</td>
<td>53</td>
</tr>
<tr>
<td>Kyle Sprow</td>
<td>160</td>
</tr>
<tr>
<td>Logan Steckel</td>
<td>13</td>
</tr>
<tr>
<td>Ashley Stepp</td>
<td>152</td>
</tr>
<tr>
<td>Emily Stewart</td>
<td>145</td>
</tr>
<tr>
<td>Emory Straube</td>
<td>172</td>
</tr>
<tr>
<td>Emily Street</td>
<td>123</td>
</tr>
<tr>
<td>Savannah Strom</td>
<td>151</td>
</tr>
</tbody>
</table>