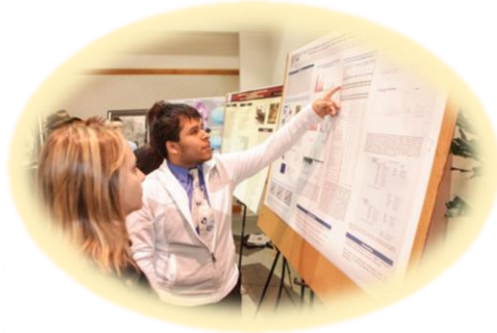
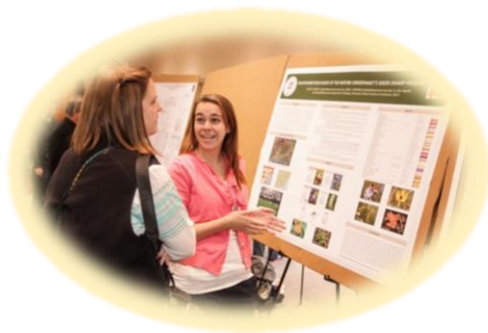


8th Annual UNC Pembroke Undergraduate Research and Creativity Center Symposium



April 2, 2014
Program with Abstracts

Dear Students and Colleagues,

Welcome to the eighth annual UNC Pembroke Undergraduate Research and Creativity Center Symposium. Today you will see the academic accomplishments of some of our best and brightest students, displayed in various formats, from across the academic spectrum. This year's symposium includes 101 presentations representing 136 students, 47 mentors across 16 academic departments.

No matter what the discipline, the opportunity for an undergraduate student to work with a professional in their chosen field will have a significant impact on the student. Working with a faculty member provides a student the opportunity to actually practice their chosen profession. Such research or shared scholarship engages the student and enables him/her to actually experience the subject, not simply read about it in course textbooks. Such activities can also be viewed as one of the first "hands-on" experiences in a student's chosen field, providing them with the skills and experience required by many post-graduate academic programs and most employers. In other words, by participating in research or shared scholarship our students will be better prepared for their professional life after UNC Pembroke. At PURC, it is our goal to stimulate, support, and promote inquiry, discovery, and creativity in scholarship and the arts through mentored research experiences with faculty and other regional, national, and international scholars and professionals.

Today's event would not be possible without the contributions of many people. I would like to acknowledge the tireless efforts of the faculty and staff mentors represented today as well as the PURC Council, the hard working facilities staff, and the PURC administrative assistants.

The PURC Center is most grateful for the generous financial support of Duke Energy as well as financial assistance from the UNCP Chancellor's Office, Office of Academic Affairs and a grant through the Department of Education- Native American Serving Non-Tribal Institutions (DOE-NASNTI). Duke Energy's continued commitment to the PURC Symposium provides our students with this opportunity to display their hard work and talents.

Thank you for attending today. I encourage you to spend time speaking with students and faculty from outside your own discipline. I am always very impressed with the quality and diversity of our student presenters. Now students...I challenge you to be Brave and present your work at a state, national or international event!

Sincerely,



Timothy M. Ritter, Ph.D.
Director – Pembroke Undergraduate Research & Creativity Center

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8th Annual
Pembroke Undergraduate Research and Creativity Symposium

Wednesday April 2, 2014
Main Gym – Jones Center

Schedule of Events

9:00 – 9:15 Greetings – with morning refresher
Dr. Kyle R. Carter, Chancellor – UNC Pembroke
Dr. Rebecca Bullard-Dillard, Dean, School of Graduate Studies and Research
Dr. Timothy M. Ritter, Director, PURC Center

9:30 – 10:30 Morning Poster/Exhibit Session (*First authors' last names: A – L*)
Posters and Exhibits will be on display until 4:00 pm. Authors will be present during this time.

10:30 – 12:00 Morning Oral Presentations/Performance

10:30 – 10:45 *Outsourcing*
Kristi Carter, Business

10:45 – 11:00 *Five Nations that Define Quality Healthcare*
Edgar Guzman, Business

11:00 – 11:15 *Voices of the Lumbee*
Constance Faulk, Mass Communications

11:15 – 11:30 *Health Linked to Economic Development in Trinidad and Tobago*
Brandon McCree, Business

11:30 – 11:45 *The Effects of Gravity on the Cori Cycle*
Molly Musselwhite, Biology

11:45 – 12:00 *Group Papers in the Writing Center: Where Theory and Practice Collide*,
Zachary Lunn, Biology

12:00– 1:00 Deli Lunch Service

12:15 – 1:00 Keynote Address

Things You Might Not Know Your Research Experience is Teaching You
Dr. Courtney H. Thornton
Associate Vice President for Research and Graduate Education
UNC General Administration

1:00 – 2:00 Afternoon Poster/Exhibit Session (*First authors' last names: M – Z*)

Posters and Exhibits will be present until 4:00 pm. Authors will be present during this time.

2:00 – 3:15 Afternoon Oral Presentations / Performance

2:00 – 2:15 *Medical Tourism: Cost/Benefit Analysis*
Brandy Jacobs, Business

2:15 – 2:30 *UNC Pembroke Student Food Insecurity Project*
Jesenia Morales, Sociology & Criminal Justice

2:30 – 2:45 *Business Intelligence in Higher Education Administration*
Carson Cone, Business

2:45 – 3:00 *Development of a Calibration Scheme for In Vivo Microiontophoresis*
Marsalis Smith, Chemistry & Physics

3:30 – 4:00 Awards Presentation and Closing Remarks

Keynote Speaker 2014



Dr. Courtney H. Thornton, Associate Vice President for Research and Graduate Education at the University of North Carolina General Administration

Dr. Courtney H. Thornton, Associate Vice President for Research and Graduate Education at the University of North Carolina General Administration, interprets and implements academic program planning policies as related to graduate degree programs. Dr. Thornton provides administrative direction for the implementation and maintenance of system wide electronic research administration tools and related business intelligence systems. She supports other initiatives of strategic importance to the Office of Research and Graduate Education.

Dr. Thornton holds bachelors degrees in Chemistry and in Science Education, and master's and doctoral degrees in Higher Education Administration, from North Carolina State University. Dr. Thornton's work experiences span K-12 education, private industry, and higher education. Her research on higher education engagement and student civic responsibility has appeared in the Journal of Higher Education, Research in Higher Education, and the Journal of College Student Development.

Exhibit & Poster Presentations

1 - Silence Speaks Volumes

Janae Aiken, *English Education*

Mentor: **Susan Cannata**

Presentation Format: Poster

In Laurie Halse Anderson's *Speak* the protagonist, Melinda Sordino, struggles with her freshman year of high school due to a secret that she cannot fathom speaking about. Throughout the novel Melinda faces catalysts that trigger weakness such as lack of parental involvement, interactions with "friends", and her rape, which is central to everything in the novel. My paper will focus on the conditions that influence Melinda's weakness and conditions that ultimately lead to her recovery. Through research and critical conversations, I will explore certain factors such as Melinda's art, her closet, as well as her physical and emotional healing, which are demonstrated in this novel that lead to Melinda speaking.

2 - Speak Up

Brittani Allen, *English Education*

Mentor: **Susan Cannata**

Presentation Format: Poster

In Laurie Halse Anderson's *Speak*, the main character, Melinda, endures the traumatic experience of being raped. She chooses not to tell anyone about her troubles, which results in her facing many challenges and fears. The emotional, social, and psychological impact that the rape has on Melinda is apparent to the reader by her thoughts and actions. I will research articles about how adolescents process, cope, and face their fears following a traumatic event, such as rape to explore how young adult males and females respond to rape and cope with trauma. My research will focus on the process by which the characters, particularly Melinda, discover their identities. This will include the defining of adolescents as a generalized population, as well as the gender identity and sexual identity of these adolescents.

3 - Lumbee Tribe Historical Murals

Joan Blackwell, *Art*

Mentor: **Tulla Lightfoot**

Presentation Format: Exhibit

These three large scale murals are depicting the past, present and future of the Lumbee Tribe community. They are 4 ft. tall and 2.5 ft. wide. Non-toxic paints were used. The historical research was verified with UNCP professors to show the accurate past and present traditions/customs of the Lumbee Tribe culture.

As a Lumbee and Art Education major, I was sensitive to the matters displayed. The murals will be presented formally to the Lumbee Tribe Boys and Girls Club in Pembroke for permanent display. I am honored to have the vision to design and complete this large project and very delighted I was sponsored by UNCP faculty, the Art Department, many UNCP art students, the Lumbee Tribe, and members of the Lumbee Tribe Boys and Girls Club. I ensured every step of the process was approved by Lumbee Tribe representatives and my advisor. The end result: “everyone is delighted with the progress and results”. These murals will encourage the children to learn more about their rich history and hopefully attend UNCP to learn how to become an artist or teacher. I look forward to unveiling this collaborative effort on April 2, 2014. From the bottom of my heart I thank you for supporting this project. Time invested: countless with love.

4 - Snake Gourd

Joan Blackwell, *Art*

Mentor: Tulla Lightfoot

Presentation Format: Exhibit

Medium: Snake Gourd. Non-toxic acrylic paints, varnish & embellishments

Dimensions: Approximately three feet

Long ago, when buffalo/bison were free to roam on the prairies, before the written word, symbols were used to send messages, converse and record information. During class instructions with Native American students, I used this example to show some of the symbols used by various Native American Tribes many years ago. My art work usually tells a story, or I have a clear vision for the design. This art work is used as a teaching guide for those that have trouble determining a design. When I show them the Snake Gourd the students are delighted and want to know more about the symbols. I also tell the children to think about what they like or I can help them paint a simple form such as a feather or flower.

5 - Bioactivity of purified antibacterials secreted by entomopathogenic bacteria *Xenorhabdus nematophila* and *Photorhabdus luminescens*

Matt Bowen, *Chemistry & Physics*

Mentors: Floyd Inman III, Len Holmes

Presentation Format: Poster

Xenorhabdus nematophila and *Photorhabdus luminescens* are Gram-negative, entomopathogenic enteric bacteria that associate, symbiotically, with *Steinernema carpocapsae* and *Heterorhabditis bacteriophora* nematodes, respectively. Both bacterial species significantly depend on their nematode companions as effective routes to gain entrance into the insect host. During exponential growth, these bacterial symbionts produce and secrete a series of insecticidal proteins, hydrolyzing enzymes and antimicrobial metabolites. These microbial toxins, enzymes and compounds exterminate, bioconvert, and protect the insect host/cadaver for nematode growth and reproduction, respectively. It is known that *X. nematophila* and *P. luminescens* secrete antibacterial compounds *in vivo*. Additionally, it has been found that they secretion

the same compounds in vitro. Recent research has shown that heat stable and heat labile antibacterials are secreted by *X. nematophila*. Moreover, the secreted antimicrobials from both bacteriological species exhibit wide-range antibacterial activity against both Gram-positive and Gram-negative bacteria. In the present study, each bacterial symbiont was scaled-up using a complex liquid medium in a fermentation system for 24 h. After cultivation, bacterial cultures were subjected to cross-flow filtration to obtain cell-free culture permeates. Cell-free permeates were passed through resin columns for 12 hours, eluted and desiccated. Approximately 5 g of bioactive metabolites per liter of medium was produced by each bacterial species produced. Metabolite bioactivity was assayed employing a disk diffusion technique involving growth inhibition of *Bacillus megaterium*.

6 - Simulated Microgravity and its Effects on Feeding Habits of the Giant Amoeba *Chaos carolinensis*

Matt Bowen, *Chemistry & Physics*

Mentors: **Floyd Inman III**, **Len Holmes**

Presentation Format: Poster

The Giant Amoeba, *Chaos carolinensis*, is a macroscopic (3-5 mm), unicellular animal-like protist that is capable of locomotion through its environment. *C. carolinensis* along with other amoeba use pseudopodia (i.e. “false feet”) to move within their environment; in contrast to most other motile microorganisms that utilize other structures such as cilia and flagella. Additionally, *C. carolinensis* typically scavenges for food; however, it is also carnivorous and can phagocytize other unicellular protists for nutrition with the employment of their pseudopodia. This study investigated the effects of simulated microgravity feeding habits of *C. carolinensis*. In the study, a clinostat was utilized to simulate microgravity conditions. Simultaneous cultures under normal gravitational conditions served as controls. To observe the effects of different gravity conditions on feeding habits of *C. carolinensis*, *Paramecium* spp., a ciliated protist, was used as the food source. In addition to data obtained from *C. carolinensis*, similar measurements of the food source (*Paramecium* spp.) was also obtained.

7 - Translating Digital and Positive Plate Lithography into Bookbinding

Lateesha Caswell, *Art*

Mentor: **Brandon Sanderson**

Presentation Format: Exhibit

In this USA, I combined positive plate lithographic techniques in the creation of a series of eight 9 x 12" hand-sewn books on the topic of aquatic creatures. These hand-made books will serve as the basis for a later series of children's books on the topic. In the first part of the project, I planned value structure and composition with traditional and digital drawing tools. Next, I tested, exposed, and printed the positive plate lithographic images. Finally, I used bookbinding techniques to bind and sew the finished products.

8 - A Global Perspective of Pharmaceutical Stability

Victor Cole, *Chemistry & Physics*

Co-Authors: **Kaleb Morris** *Chemistry & Physics*

Mentor: **Meredith Storms**

Presentation Format: Poster

While pharmaceutical companies in the United States are required to adhere to regulatory requirements set by agencies such as the Food and Drug Administration and the United States Pharmacopeia, these stability requirements are not necessarily viewed with the same importance in other countries. In Africa, for instance, a pharmaceutical company aims to make drugs economically and more readily available by packaging bulk generic drugs rather than importing the finished product. While it is important to produce their own drugs, it is essential for pharmaceutical manufacturers in Africa to understand the importance of drug stability in producing safe and effective products when extreme heat, humidity, and inconsistent voltage can easily destroy drugs. With such a large number of “street meds” sold from “stalls” or “kiosks”, it is also important for consumers to be aware of the environmental impact on the quality of drugs. Therefore, the purpose of this research is to explore the environmental factors which contribute to drug degradation in Africa with the overarching goal to educate pharmaceutical manufacturers, retailers, and consumers in Sierra Leone and Cameroon about the importance of stability in providing safe and effective drug products. A service-learning component was integrated into the project to encourage students to consider the impact of chemistry with an enhanced global perspective.

9 - Drug discovery efforts to enhance neuroprotective endocannabinoid signaling through dual inhibition of FAAH and MAGL enzymes

Armando Corona, *Biology*

Co-Authors: **Pamela Quizon** *Biology*, **Lyndsie Elliott** *Biology*, **Christopher Long** *Biology*, **Kathlyn Stephens** *Biology*

Mentors: **Heather Romine**, **Vinogran Naidoo**, **Ben Bahr**

Presentation Format: Poster

Excitotoxic brain injuries such as seizures and strokes are challenging with respect to the slow recovery of normal brain function. The endocannabinoids anandamide (AEA) and 2-arachidonoylglycerol (2-AG) are members of the endogenous cannabinoid system, a system with on-demand response that protect against excitotoxic injuries. To modulate the endocannabinoid response during events of excitotoxicity in vivo, a non-covalent dual fatty acid amide hydrolase (FAAH) and monoacylglycerol lipase (MAGL) inhibitor, AM6642, was screened to test for neuroprotection from kainic acid (KA)-induced seizures. KA is an agonist of ionotropic glutamate receptors and KA injection lead to excessive glutamatergic activity, mitochondrial dysfunction, and low brain function. KA-exposed rats were treated immediately with vehicle or AM6642 injections, resulting in reduced seizure severity mediated by AM6642. Behavioral paradigms conducted 24 to 48 h after all injections consisted of rotarod test. AM6642-treated mice exhibited dramatic recovery of rotarod, performance time, and performing similar to the level as in non-seizure control rat. Brains were then dissected and further evidence of AM6642-mediated protection was found when measuring spectrin breakdown product and pre and post synaptic products. In conclusion,

FAAH and MAGL inhibition after excitotoxic brain injuries leads to recovery in synaptic markers, cytoskeletal damage, and behavior integrity.

10 - Forest Impacts and Ecology Alteration in Southeastern North Carolina

Justin Duncan, *Geology & Geography*

Mentor: **Jesse Rouse**

Presentation Format: Poster

Land use patterns in southeastern North Carolina are a varied quilt made up of agricultural, urban, industrial, and residential areas. As these areas of human land use expand, forests are impacted and reduced changing the environment in numerous ways. In addition, between areas impacted by forest fires, logging, and the creation of new neighborhoods, it would seem that the fragmentation of forests is becoming more wide spread. The forests in this region hold an important place in the local economy, ecology, and recreation. In this research we look at deforestation in southeastern NC through remote sensing analysis of archived Landsat data. The derived data provides the opportunity to compare and contrast vegetation changes based on reflected energy bands over the span of three decades.

11 - Disclosing a Criminal Record in a Job Interview: Is Disclosure the Only Thing that Matters or is that Wishful Thinking?

Demetrius Edwards, *Psychology*

Co-Authors: **Melanie LaBeau** *Psychology*

Mentor: **Kelly Charlton**

Presentation Format: Poster

In a continuing effort to study the effects of revealing criminal history in a job interview, participants read about a black or white job applicant who did or did not disclose an embezzlement or larceny conviction prior to a background check. We predicted that an explanation might ameliorate the negative effects a negative criminal background sets in motion. Results are consistent with a previous study and indicate that only disclosure predominantly affected evaluations and hiring assessments. Interestingly there was no effect for the race of the applicant and stereo-typicality of the crimes committed.

12 - Trauma and the Feminist Subtext of Laurie Halse Anderson's Speak: The Progression to Recovery

Jasmine Edwards, *English, Theatre & Foreign Languages*

Mentor: **Susan Cannata**

Presentation Format: Poster

Young adult literature such as *Speak* captures the substantial awareness of teenage suffering and distress. Within *Speak*, the protagonist Melinda Sorvino, endures depression, solitude, seclusion, and rejection, which are the many challenges that must be faced due to an incident of rape by a fellow student whom she must face at school each day. Laurie Halse Anderson's *Speak*, conveys the account of Melinda Sorvino's rape, recovery, and life after being a victim of rape. The various strategies that Melinda encounters are solely internal as she fights not only for her full recovery, but an innovative and strong voice to help her speak the truth. This trauma leads her to store and lock up her voice and depression. My research will focus on the several internal conflicts and understandings that Melinda becomes aware of that question the current assumptions of gender, identity, and trauma. Research will consist of teenage trauma, social constructs, along with feminist criticism of Anderson's novel that explores these gender roles and the objectification of woman. By understanding what each of these concepts bring to the text, I will better understand the actions and internal resolutions of Melinda Sorvino that guide her to creating her own identity.

13 - Experimenting with Goldpoint and Advanced Techniques in Pen and Ink Drawing

Lauren Ellerbe, *Art*

Mentor: **Brandon Sanderson**

Presentation Format: Exhibit

I used this grant to study the works of Lucas Van Leyden and Hendrik Goltzius and created two drawings based upon it in pen and ink and goldpoint. Van Leyden and Goltzius worked in pen and ink, engraving, and metalpoint. Metalpoint includes silverpoint and goldpoint, techniques whereby you draw on a prepared wooden surface with a small rod of 2mm .999 silver or 24 Karat gold. The metals oxidize on the drawing surface and cannot be smeared. This allows watercolor to be applied to these drawings with no degradation of the drawing material (as opposed to graphite). Goldpoint is a softer material and its use requires a sensitivity to the medium and an advanced degree of skill.

14 - Creating Drawings after Bruegel, Durer, and Bosch

Lauren Ellerbe, *Art*

Mentor: **Brandon Sanderson**

Presentation Format: Exhibit

The work in gold point is about the idea of the open door through death, and the belief that nothing on the earth is eternal; someday all things will cease to be. The clock on the door represents the ending of time because of death, and the key turned in the lock symbolizes the girl's life. Her dress deteriorates and the walls around her begin to crumble and rot because they are temporary. The scene is of a spiritual release and transcendence in death as the body is separated from the spirit. The use of the gold point is to reinforce the heavenly imagery. From the Carnality Series based on biblical scriptures, this work deals with the subject of bitterness, and the way that it is a condition of extreme wickedness which many do not see in themselves. The woman in the mirror reflection represents how she views herself and her physical

appearance, while the decrepit room outside of the mirror is showing her inner turmoil and grotesqueness as she rots away due to her own vanity. The red color in her lips represents the lust that brought her to such a state, the only thing that still matters to her while all else deteriorates around her, and still she sees only a glimpse of her true self.

15 - Pan

Eddie Fisher, *Art*

Mentor: **Brandon Sanderson**

Presentation Format: Exhibit

In this piece I tried to illustrate the desolation of what some would consider the “wild places” of our planet. Pan was a faun and the Greek god of the wild. By showing a skull with rams horns and including Greek columns I hope to make the reference to the mythology clear, and by including a tree stump with new growth I had hoped to show how resilient the wild can be. The tree stump with new growth and the banner with the words “The Great God Pan is Dead” is also meant to give a sense of how the “wild” is always in a cycle of rejuvenation and reincarnation.

16 - Is Casimir Pressure Related to the Electric Potential of a Planck Charge?

Alex Foster, *Chemistry & Physics*

Mentor: **Bill Brandon**

Presentation Format: Poster

The Casimir effect, which involves the mutual of attraction two neutral parallel conducting plates in empty space, is one of many “strange” predictions of quantum electrodynamics. This effect has been experimentally verified and is a topic of great interest in contemporary fundamental physics research. Conventional calculations of the Casimir pressure (i.e. energy density) are based on either quantum mechanical zero point field effects or radiation reaction of charges making up the plate material. The underlying physics of these calculations is related via the dissipation fluctuation theorem. Here a different approach is taken. Essentially, the electric potential at a distance equivalent to the separation distance of the conducting plates from a single Planck charge is calculated. A subsequent calculation of energy density associated with this scalar potential provides a result within 3.2% difference of that obtained by the conventional theoretical methods described previously. It will be interesting to see if technological advances in the near future will provide experimental resolution of such low disagreement between the conventional theory and this proposed, alternative theory.

17 - Novel Approach to a Generalized Theory on Nanostructure Devices

Alex Foster, *Chemistry & Physics*

Mentor: **William Brandon**

Presentation Format: Poster

Nanoscience comprises a significant area in science's immediate frontier. Because of its prospects and its relevance to a wide variety of research fields, it is important to engage this area head-on, and from a variety of perspectives. In this investigation, some fundamental properties of modern quantum devices (i.e. quantum dots, wells and wires) will be expounded upon. From there it will be shown that a generalized, yet very simple, model may be constructed without straying far beyond the rudimentary assertions made in classical rotational dynamics. The approach is not only simple, but cogent enough to provoke deeper and purposefully unconventional thinking for both physics and chemistry majors. 1D-confined quantum wells, 2D-confined quantum wires, and 3D-confined quantum dots will ultimately be described mathematically, resulting in a basic framework with which to consider nanoscale devices.

18 - A Strange Gentleman

Elizabeth Gagne, *English, Theatre & Foreign Languages*

Mentor: **Susan Cannata**

Presentation Format: Poster

In *The Strange Case of Dr. Jekyll and Mr. Hyde* by Robert Louis Stevenson the novella explores the construction of good versus evil. The text exemplifies social expectations versus being your own person. These dichotomies are shown through the actions and Dr. Jekyll and Mr. Hyde, who personifies them. Dr. Jekyll is an upstanding member of society. He holds charity events and is a well liked man. However he has isolated his inner “demons” and therefore created Mr. Hyde. This is where the personification of good versus evil is strictly related to Dr. Jekyll and Mr. Hyde. The idea of “isolating” your bad qualities to where all you have left is your good qualities and that is what is presented to society. Mr. Hyde is the direct opposite of Dr. Jekyll. He is not well mannered, has committed murder, and is ugly in form and appearance by society’s standards in the Victorian Era. We see how Dr. Jekyll and Mr. Hyde function together as essentially being in the same body. My paper will focus on the theme of good versus evil and what it is meant to be a proper gentleman of Victorian society. This is directly related to how Dr. Jekyll is supposed to act in society and how he chooses to act through Mr. Hyde. I will explore how the time period, in which R.L. Stevenson published *Dr. Jekyll and Mr. Hyde*, affected what people thought, especially concerning social standings and how an upstanding member of society is supposed to act.

19 - Progress

Mark German, *Art*

Mentor: **Carla Rokes**

Presentation Format: Exhibit

Progress is a mixed media drawing. It is my response to a news article about Iran banning stoning as a death penalty punishment for adultery. In my drawing, I created a scene where a woman is buried all the way up to her neck with her arm breaking free holding a bloody rock. Furthermore, bloody rocks surrounds her and in the background are text in Iranian, which translate to cruel and inhumane, and silhouettes of people walking away. In Iran, the convicted men and women have the opportunity to be pardoned if they are able to freed themselves during the stoning before they die. However, women are punished harshly more than men due to the fact that men are only buried through their waist while women are buried up to their neck or shoulders. In other words, men have more of a chance to break themselves free than women. The main concept of the drawing is to depict the inhumane capital punishment in Iran and the progress they are making in deciding to ban stoning. Also, I want it to serve as a sign of relief, liberation, and to evoke emotions. The medias that I used are sand, acrylic ink, transfers, and graphite pencil. It adds to the mood and the seriousness of the drawing and what I am trying to convey.

20 - Pollen Transport in freshwater streams and on bees in the Southeastern Region of North Carolina

Olivia Greene, *Biology*

Mentor: **Rita Hagevik**

Presentation Format: Poster

Palynology, the study of pollen, can be used in many areas including anthropology, forensic science, and the study of climate change. The goal of this project is to study how pollen travels, ways in which pollen can be used as an environmental indicator, and to create a curriculum guide for teachers to use to teach their students how to study pollen. To start the project I along with Graduate student David Wimert collected approximately five gallons of water samples from area streams each month and we have proceeded to filter the water as it is being collected. These water samples have been filtered using vacuum filtration to collect any pollen and other particulates in the water. When a majority of the water samples have been collected and filtered we can start the analysis of the pollen in each sample. To collect the pollen from the bees, we have determined that the most successful method is to use a pollen trap on a beehive. The pollen trap is placed at the entrance of the hive and the pollen falls off the bees into a collection tray. Pollen will also be collected from honey of local beekeepers. The pollen from the water and the bees will be identified and entered into the North American Pollen Database. A curriculum guide is in draft form titled, Interdisciplinary Investigations into Pollen: a study of scale. Sections include plant dissection, flower investigation, microscopes, water collection and filtration, bee anatomy, pollen collection from bees, and the effects on climate change.

21 - Designing, Building and Testing a PID Controller for Laser Diode Stabilization

Austin Griffin, *Chemistry & Physics*

Co-Authors: **L. R. Wardell** *Chemistry & Physics*

Mentor: **W. D. Brandon**

Presentation Format: Poster

Undergraduate physics research students at UNCP are currently developing a high precision Faraday rotation apparatus in an attempt to measure the Verdet constant of air. One of the major problems is a fluctuating light source, which introduces noise. For the apparatus to work properly a highly stable continuous wave laser diode source is required. There are two methods used for stabilizing laser diodes – current control and temperature control. This work focuses on current control. A PID (proportional-integral-derivative) current controller was designed and built toward that aim. The laser beam is split and the reflected portion (about 8%) of the beam is used for feedback control via a photodiode. The signal is processed, in analog form, by an op-amp network to modulate the laser. The op-amp network parameters are then tuned to minimize the standard deviation of the laser diode intensity. The final working version is compared to a commercially available current control unit (Thorlabs LDC205C). Finally, the feedback methodology as well as the prototype module lends itself seamlessly to other applications.

22 - How deep are Eastern Box Turtles (*Terrapene c. carolina*) burying to escape severe winter conditions?

Carlisha Hall, *Biology*

Mentor: **John Roe**

Presentation Format: Poster

The diversity of the longleaf pine ecosystem is maintained in part due to natural and management fires, known as prescribed burns. However, Eastern Box Turtles (*Terrapene c. carolina*) may be at a higher risk of being harmed by fire due to limitations of mobility. Turtle responses to prescribed burns are poorly understood, presenting an opportunity to study turtle behavior and develop management strategies to minimize the potential negative impacts of fire. Overwintering is a critical time in the annual cycle of turtles. This time of inactivity could pose unique challenges or opportunities for fire management. Turtles bury underground to escape severe winter conditions, and this behavior could reduce exposure to fire if the turtles bury deep enough to escape fire. Alternatively, if the turtles bury only in the surface litter they may be more susceptible to fire. Here, we observed box turtle overwintering behavior in a fire-prone habitat compared to turtles at a site that does not employ fire management. We attached a transmitter to the shell and located turtles with radio tracking equipment. To estimate burial depths we used iButtons (temperature loggers) to record the temperatures of the turtles and compared temperature profiles with air, under litter, and at soil depths of 5, 15, and 30cm. The iButtons recorded data in three hour intervals from Dec 1st to April 30th. Eastern Box turtle populations are declining in North America, and this research has the potential to help sustain box turtles in fire managed systems by providing land managers with site- and region specific information that will help the timing and locations of prescribed burns.

23 - Heliswing

Christian Happel, *Art*

Mentor: **Adam Walls**

Presentation Format: Exhibit

Inspired by both the Robinson R22 helicopter, my work has aspects of both simplicity and interactivity that are intended to capture the audience's attention and imagination. This is a fun sculpture that will bring out the inner child in all who interact with it. This sculpture was planned with the anticipation that people would climb, play, and interact with it because my view on sculpture reflects the idea that art isn't only intended to be looked at, people should also be entertained by it and should be able to use it as temporary escape from the many trials of life.

This piece is constructed from a mixture of fabricated steel parts and plastic components. To begin the fabrication process, I started with the construction of the steel frame. Then, once the frame was complete, I moved my focus towards the internal components; which eventually led towards the completion of the sculpture. During the construction, I wanted to create something that reflected me in several ways. The more obvious way was that as a child I was an enormous fan of video games; which caused me to incorporate some of the interactive components that encourage the use of your imagination, as a child would. A less obvious reflection goes a little deeper. The swinging aperture represents how life can often be unstable, but through the instability there will always come balance in time. The "swing", in time, will eventually stop swinging if life decides to stop pushing and balance will be found. Finding a balance is an important part of what can often be a hectic life.

24 - "Sideways Sally"

Tori Helpingstine, *Art*

Mentor: **Adam Walls**

Presentation Format: Exhibit

This piece is a twist on the spring riders at playgrounds and vintage style mannequins. The singer, Madonna, and her wardrobe inspire the spiral breasts. Also there's a seductively placed heart beneath her rib cages. This sculpture is kinetic, and viewers can interact with it by tapping on the top and see Sally dance!

25 - Atomic Jelly Fish

Emily Hester, *Art*

Mentor: **Brandon Sanderson**

Presentation Format: Exhibit

The piece I am entering is both a print and a sculptural piece. It's a series of beauty coming out of destruction in nature. The purpose of creating this work was to practice the skills I have learned in the class room and improve on them. What inspired me to create this art work was the pictures of a field after a lava flow; even after so much destruction nature uses that to start over and grow anew.

26 - Atomic Jelly Fish

Emily Hester, *Art*

Mentor: **Brandon Sanderson**

Presentation Format: Exhibit

These pieces I am entering are both a print and a sculptural piece. It's a series of beauty coming out of destruction in nature. The purpose of creating this work was to practice the skills I have learned in the class room and improve on them. What inspired me to create this art work was the pictures of a field after a lava flow; even after so much destruction nature uses that to start over and grow anew.

27 - The Impact of Grape Flavoring on the stability of Omeprazole

Tammy Hoang, *Chemistry & Physics*

Co-Authors: **Jared Chavis** *Chemistry & Physics*

Mentor: **Meredith Storms**

Presentation Format: Poster

A high-performance liquid chromatography method has been optimized for the determination of omeprazole. The separation and quantitation are achieved on a Synergi Hydro-RP column (4.6x150mm) using a mobile phase of 65:35% v/v 6.0 mM sodium phosphate buffer (pH 7.4) and acetonitrile at a flow rate of 1.0 mL/min with UV detection at 302 nm. The optimized HPLC method will be validated and subsequently employed to determine the stability of a compounded omeprazole suspension prepared with grape flavoring.

28 - Multiple Media in Drawing After Art Werger

Rachel Hockett, *Art*

Mentor: **Brandon Sanderson**

Presentation Format: Exhibit

I studied Ohio artist Art Werger's series of "Submerged" etchings and thoroughly analyzed the pieces individually. After gaining the knowledge and understanding of this style, I took a series of aquatic photographs in preparation for this project. I then used image editing tools to manipulate these aquatic photos to resemble Werger's work. Based upon these references, I created a series of watercolor and prisma-color drawings.

29 - Creating Goldpoint and Silverpoint Drawings while Further Experimenting with Watercolor

Rachel Hockett, *Art*

Mentor: **Brandon Sanderson**

Presentation Format: Exhibit

The technical approach of this SSS was derived from Silver Linings by Benji Nicolas. I created a series of gold and silverpoint drawings on panel using Leonardo Da Vinci's figure drawings as a point of departure. I combined the human figures with aquatic symbolism to accentuate the work's content. Finally, watercolor and ink was minimally used to create interest.

30 - Applying Martial Arts Discipline to Visual Arts Classes

Rachel Hockett, *Art*

Mentor: **Tulla Lightfoot**

Presentation Format: Poster

On October 4th – 6th a group of UNC Pembroke Art Education Club members attended the annual conference of the North Carolina Art Education Association for art educators. The club continuously raises money to help assist members who are not able to afford the trip by conducting an art/bake sale. Two years ago, club members also painted “diversity rocks” for the Multicultural Center and raised money in this way.

31 - Representations of Female Identity in Laurie Halse Anderson's Speak

Rachel Hockett, *English, Theatre & Foreign Languages*

Mentor: **Susan Cannata**

Presentation Format: Poster

I learned of the novel *Speak* (1999), by Laurie Halse Anderson, through a reading assignment. I immediately became intrigued by its contents due to the fact that the story focuses on modern-day problems that pre/teenagers face. Anderson wrote the novel in a way that allows readers to put themselves in the main character's shoes and understand what this ninth grader is going through mentally and physically. When further reading, it becomes clear that Melinda, the main character, had been raped and that she kept silent the entire time not because she was “weird,” but because she was emotionally confused and traumatized by the dramatic events. For my research, I will compare and contrast the ideas/events from the novel by researching how women have changed in looks, mentality, rights, etc. over the past 100 years. I will focus on not only how others have viewed women throughout time, but how women also perceive themselves and debate how society is a major influential factor of this. Throughout my research, I will also include other feminist's point of views and argue for and/or against them as to why *Speak* is an accurate depiction of females during the story's time period.

32 - Box Turtle Site Fidelity in Habitats with and without Prescribed Fire

Gareth Hoffmann, *Biology*

Mentor: **John Roe**

Presentation Format: Poster

Prescribed burning is a land management practice used for its many positive benefits including the ability to preserve natural ecosystems such as *Pinus palustris* dominant communities. Many species positively benefit from frequent fire, but how fire impacts the eastern box turtle, *Terrapene carolina carolina*, remains unknown. This slow reproducing, long living species may be particularly vulnerable to fire, in part because individuals typically range over small areas and exhibit strong annual home range fidelity – a behavior that may not allow them to easily travel to new areas following fire. We studied populations of box turtles in Weymouth Woods Nature Preserve (WEWO) where prescribed fire is employed and Lumber River State Park (LRSP) where fire is not used to gain insight into the impacts of fire regime on annual site fidelity. We radio-tracked 8 turtles in WEWO and 6 turtles in LRSP for over a year and a half (May 2012 – Jan 2014). At each location, GPS co-ordinates were taken and positions were mapped in a geographic information system (ArcGIS) to represent each turtles known movements. Annual home ranges were calculated using the minimum convex polygon method and fidelity was assessed by the degree of overlap between years. The understanding of how turtles use resources and move about the landscape following disturbances such as fire will help reshape burn management methods while limiting negative impacts to box turtles.

33 - 3 Steps to a Successful Alternative Break Trip

Danielle. Holloway, *Psychology*

Co-Authors: **Robert Sam** *Business*

Mentor: **Christina Poteet**

Presentation Format: Poster

College students all over the country are spending their breaks from school serving others. These trips have the potential to be life-changing for participants and help them gain valuable skills that can be practical and applicable in any career field. However, to fully engage students in an experience that is transformative, it is vital for trip leaders to provide the participants with intentional opportunities to be fully engaged in the service process. This interactive workshop will provide participants with best practices and tips for successfully planning, implementing, and evaluating student led, educational Alternative Break trips. From the application process to reflections, the workshop presenters will share their experiences as student leaders for several trips.

34 - Adaptive Surface

Alfredo Irra, *Art*

Mentor: **Brandon Sanderson**

Presentation Format: Exhibit

This piece was inspired by the thought that people's personality tend to adapt to the environment around them although they have completely different personalities within. The eagle part above the surface of the water represents an aggressive and defensive personality because of the hostile environment around it. The cross-hairs aiming at the eagle represents how life tends to shoot different challenges at you. The lower half of the eagle under the surface is the bottom half of a baby duck that represents a peaceful and innocent personality. I wanted to create a print that successfully utilized three different etching techniques; line etching, hard ground, and aquatint.

35 - A Deeper Look into Curiosity: The Suppression of Victorian Gentlemen Behavior

Kelli Jacobs, *English, Theatre & Foreign Languages*

Mentor: **Susan Cannata**

Presentation Format: Poster

In his novella, *The Strange Case of Dr. Jekyll and Mr. Hyde*, Robert Louis Stevenson creates a tone of suspense and peculiarity, revealing the underlying theme of the suppressed behavior of men in the Victorian era. Stevenson's novel takes place in 19th century London, as an upright gentleman, Mr. Utterson, becomes increasingly concerned with the unusual behavior of his dear friend, Dr. Jekyll. As his curiosity increases, Utterson secretly desires to thoroughly investigate the reasons for his friend's odd disposition; however, he is bound by the social protocol of Victorian gentlemen, which prevents any type of erratic or irrational behavior. Stevenson uses the concept of curiosity to briefly introduce the idea that there may be more to Victorian men than initially meets the eye. Though Dr. Jekyll is the ultimate product of curiosity gone awry, hints of curiosity may also be seen in the character of Mr. Utterson. I plan to research and analyze the essential characteristics of Victorian gentlemen as well as the reoccurring idea of curiosity in the novel in order to better understand the suppression of personality traits in middle-class men during the 19th century.

36 - Printmaking, Sculpture and Fashion Design Exploration and Execution

Daniela Jimenez, *Art*

Mentors: **Brandon Sanderson, Adam Walls**

Presentation Format: Exhibit

This project incorporates printmaking and sculpture into a cohesive form. I created sculptural furniture that implements a variety of printmaking techniques. I also printed on and fabricated clothing using sewing and woodcut techniques. Assemblage, wood and metal furniture making processes were used

throughout the project. From a compositional standpoint, I attempted to design and produce wooden furniture that was simultaneously functional and sculptural. Vivian Beer, Stephan Goetschius, and Tom Huck were the primary references for this project.

37 - They Weren't Mainly "Peasants": The Egyptian Villiage of Philidalphia

Mary Johnson, *Philosophy & Religion*

Mentor: **Sharon Mattila**

Presentation Format: Poster

It has been very common in research on the Greco-Roman world to depict the large majority of the people who lived in the rural areas as a homogenous mass of self-sufficient “peasants,” living just at or slightly above subsistence-level after taxes were paid. According to this conventional wisdom, very few people existed in between these “peasant” masses on the one hand and the elite based in the cities on the other. The actual data from rural contexts in both Greco-Roman Palestine and Egypt, however, consistently contradict this common view. Tess and Dr. Mattila have been working together on analyzing the documentary data from Egypt. The example presented here is derived from a private-land register of 216/17 CE from the village of Philadelphia. As the Excel-generated charts derived from these data show, while absentee urbanite landowners from both Alexandria and the metropolis of Arsinoe did own significant quantities of land near the village, it was the villagers themselves who owned the majority of it. The land in the hands of the villagers was furthermore very unequally distributed among them. One can estimate the net product of each holding in grain equivalent after subtracting taxes and seed grain, and then incorporate a conservative estimate for the basic subsistence requirements for a family of four in grain equivalent. The result is that the villagers’ holdings varied from one tenth that required for subsistence to almost 35 times subsistence-level (a factor of 350!), with a graduated range of sizes in between these.

38 - The Effects of Societal Influences Present in R.L. Stevenson’s, The Strange Case of Dr. Jekyll and Mr. Hyde

Petulia King, *English, Theatre & Foreign Languages*

Mentor: **Susan Cannata**

Presentation Format: Poster

In Robert Louis Stevenson's *The Strange Case of Dr. Jekyll and Mr. Hyde*, the character of Dr. Jekyll finds himself facing the dilemma of upholding his good gentlemanly reputation and his desire to indulge in his own selfish pleasures. While feeling obligated to maintain his good stature in the community as a Victorian gentleman, Dr. Jekyll could not abstain from participating in the behaviors viewed by others as unfavorable, such as his encounter with the child he trampled and the murder of Sir Danvers Carew. Although aware of the consequences of both lifestyles, he could not commit totally to either. This failure to commit to one lifestyle leaves his character in a battle of good versus evil, bought on by Dr. Jekyll's

own actions. I will research expectations of middle class Victorian men during the early 19th century, using some of the tenets of new historicism to analyze what caused Dr. Jekyll to attempt to have the best of both worlds and live the life of good and evil.

39 - James Joyce's *The Dead*: Life As We Know It

Courtney Lamb, *English, Theatre & Foreign Languages*

Mentor: **Susan Cannata**

Presentation Format: Poster

In my recent readings I became interested in the work of James Joyce, especially in his short story, “The Dead”. In reading “The Dead”, I came up with the ideas of understanding death and being alive. In other words I am interested in analyzing the idea of what it means to be dead versus being alive. My research will focus on the main character of the story, Gabriel, who goes through the story thinking he is living his life to the fullest, only to discover he has actually been dead the entire time. This led me to the idea of being alive versus being dead. In this story, I would like to explore the two ideas and bring them together to see how they co-exist. I plan to research resources that have been written on “The Dead”, and that have literal evidence to help support ideas and give me a theory. Along with the character of Gabriel I will collect information of how he presents these ideas in his role in the short story.

40 - Synthesis of PADK Derivatives for the Treatment of Alzheimer’s Disease

Robert Lamb, *Chemistry & Physics*

Mentor: **Cornelia Tirla**

Presentation Format: Poster

Alzheimer’s disease is a progressive neurodegenerative disease that slowly destroys memory, thinking capacity, body function, and eventually leads to death. No cure is currently known for this disease and the best medications only slow its inevitable progression. The most prominent theories about the root cause of the disease are the accumulation of either B-amyloid or tau protein plaques. Research is currently underway to develop methods of reducing plaque buildup and hopefully reversing the disease. Previous research endeavors have shown that derivatives of the lysosomal modulator phe-ala-diazomethylketone (PADK) can confer some level of protection against typical Alzheimer’s protein accumulation pathology in transgenic mice. We have synthesized derivatives of PADK that will be tested for biological activity after confirming that they are structurally different than previously synthesized compounds.

41 - Public Relations Student Society of America National Conference

Chanel Langley, *Mass Communications*

Co-Authors: **Kaitlyn Kelly** *Mass Communications*

Mentor: **George Harrison**

Presentation Format: Poster

Our presentation will reflect the knowledge gained at the 2013 Public Relations Student Society of America (PRSSA) National Conference held October 25th-October 29th in Philadelphia, PA. This conference granted us the opportunity to attend a wide variety of seminars tailored to our career goals as well the chance to network with prominent public relations professionals and PRSSA peers from around the country.

42 - Silence is Power; A Literary Analysis of the novel Speak

Samantha Langley, *English, Theatre & Foreign Languages*

Mentor: **Susan Cannata**

Presentation Format: Poster

The novel *Speak* is about a young girl, Melinda, who gets raped at a party. She calls the cops and because she broke up the party she is bullied greatly. Melinda doesn't tell anyone what has happened to her and begins speaking as little as possible. Her silence is seen as defiant, anti-social and others around her see her silence as a sign of being powerless. I argue that her silence, however, is what gives her power. She is making the choice to be silent and this choice her power. Throughout the novel there are several people who try to get her to talk. Her classmates, parents, teachers, and principal all try to get Melinda to say more than just answering questions sometimes. However, Melinda refuses. By refusing she is taking control of her own actions, body and life; something that had been taken away from her when she was raped. Another way that it gives her power is that she is able to find creative ways to speak. For example when she tries to draw a tree for homework she explains that the reason why she wants to do so is because that's how she feels inside. Situations such as this allow Melinda to communicate with the world in her own way, in her own terms. This is a sign of power. This is important in the novel, because Melinda seems not to have any power. She is silent and her rapist seems to have taken away everything regarding her life. By showing that she does have power it brings a different tone to the novel, one where Melinda is empowered by the choices that she is making. In order to survey this I will research psychological journals that explain the empowerment of being silent to better understand Melinda's authority.

43 - Teaming up for student success: A pilot study on the relationship among engaged learning, civic development and psychosocial well-being in public relations students

Samantha Langley, *Mass Communications*

Mentor: **Dandan Liu**

Presentation Format: Poster

Student success should be defined in a holistic approach, including excellence in academics, active engagement in both campus and community, mature attitude in career exploration and planning, and positive mental health. This research project explores the partnerships among academic departments and student affair offices to facilitate student success through incorporating service-learning projects and career development activities in public relations major courses. A service- learning project requires students to apply their skills to a real world situation through serving the community. Career development activities usually include workshops improving students' career planning skills. This research project aims to test the effectiveness of service-learning projects and career development activities on students' civic engagement, engaged learning and psycho-social well-being. Public relations undergraduate in fall 2013 and spring 2014 have participated in this study. This project has collected data through both quantitative and qualitative approaches, including surveys, students' journals and self-evaluation reports, class discussion transcripts and the instructor's observation notes in the semester.

44 - Our Journey of Preparing for the BOC Exam; Final Destination: Certified Athletic Trainer

Kenny Lassiter, *Health, Physical Education & Recreation*

Mentors: **Susan Edkins**, **Beverly Justice**

Presentation Format: Poster

Since first deciding to pursue a career in athletic training, we've known that the final hurdle before becoming a certified athletic trainer is the BOC Exam. This final academic semester for us serves as a culmination of all of the skills and knowledge gained during our educational experience but ultimately has two primary purposes: to evaluate our readiness to enter the world as a competent entry-level athletic trainer and to help us prepare to successfully challenge the BOC exam. Our class goal (and that of our faculty mentors) is to have a 100% first-time pass rate on the exam. The benchmark set by our accrediting agency is a 3 year aggregate 70% first-time pass rate. Our preparatory strategies began in the fall with a primary focus on attending the 29th Annual Southeast Athletic Trainers' Association Student Symposium in February. We joined a group of over 300 other students in Atlanta, Georgia for a two day workshop entitled "Competencies in Athletic Training". The BOC presented a session on exam format, registration procedures, and other exam specifics with us, whereas other sessions covered each of the five domains of athletic training and the content within each domain. Our trip to the symposium was supported in part by funding from the Pembroke Undergraduate Research and Creativity Center. Additional preparatory activities we have participated in this semester include weekly remediation sessions with faculty mentors, completion of computerized mock exams, and completion of clinical integration proficiencies.

45 - Wood Carving in the Print, in the 2-Dimensional, and in the Round

Vivienne Leaven, *Art*

Mentor: **Brandon Sanderson**

Presentation Format: Exhibit

This SSS investigates three distinct cultures in the art of wood carving: Medieval, Australian/Aboriginal, and African with their respective artists/tribes/cultures, Jost Amman, Jackson Robertson, and West Africa. With this information, I created three works; a wood relief, a wood print, and a 3-Dimensional wood sculpture. This was achieved with the Proxxon Reciprocating tool.

46 - The Multiple Faces of Facebook

Destinee Lewis, *Psychology*

Mentor: **Shilpa Regan**

Presentation Format: Poster

The purpose of this study was to investigate undergraduate college student's use of social media. Specifically the study examined how students may falsely self-present themselves on Facebook and what factors (e.g., self esteem, control, personality traits) influence false presentations. Kramer and Winter (2008) found that those using social networking sites with low self-esteem were likely to falsely self-present to a larger audience. Participants were 230 male and female Introduction Psychology students. They voluntarily completed a social media measure, self-esteem measure, control measure and a personality traits measure. Results indicated that a smaller percentage of the sample reported false self-presentation (e.g., editing photos, numerous profiles) on Facebook. In contrast to previous research, there was no significant difference between those who falsely present and those who do not on control, self-esteem, and personality traits (e.g., integrity, honesty, impression management). These results may indicate that false self presentation may be the result of other factors.

47 - Assignment of C-13 Resonances in a Series of Compounds Containing 2,2-Bipyridine and 1,10-Phenanthroline

Brianna Locklear, *Chemistry & Physics*

Mentor: **Mark McClure**

Presentation Format: Poster

Quaternary carbon atoms are not usually observed in C-13 NMR due to very slow relaxation times. However, previous research revealed that quaternary carbon atoms can be observed when the compound is dissolved in dimethyl sulfoxide (D6-DMSO). In the current research two compounds were studied which contain 2,2-Bipyridine and 1,10-Phenanthroline. Bipyridine contains one set of quaternary carbon atoms while 1,10-Phenanthroline contains two sets of quaternary carbon atoms. Both compounds studied contain a symmetry axis. Therefore, 2,2-bipyridine was observed to exhibit five signals and 1,10-phenanthroline was observed to exhibit six signals. Spectra were compared to those of the same compound dissolved in D2O, which allowed identification of the quaternary carbon atoms.

48 - A Two-Dimensional NMR Study of [Co(phen)₂(NO₂)₂]Cl

Brianna Locklear, *Chemistry & Physics*

Mentor: **Mark McClure**

Presentation Format: Poster

The compound [Co (phen)₂(NO₂)₂]Cl was synthesized and studied by one and two-dimensional NMR methods. The symmetry of this compound is different than those previously studied; while the two phenanthroline molecules are equivalent, within a given phenanthroline molecule each carbon and hydrogen gives a unique chemical shift. This had the effect of dividing the C-13 spectrum into sets of closely spaced signals. Assignments of these signals were possible after making a few assumptions and using a combination of COSY and HETCOR techniques.

49 - A Clearance Pathway for Treating Age-related Diseases: Enhancing the Lysosomal Pathway with PADK Promotes Protein Clearance in Models of Alzheimer's and Parkinson's Disease.

Christopher Long, *Biology*

Co-Authors: **Sarah Ruiz** *Biology*, **Karen Farizatto** *Biology*, **Michael Bullock** *Biology*

Mentors: **Heather Romine**, **Ben Bahr**, **Samuel Ikonne**

Presentation Format: Poster

Lysosomes are sacks of enzymes in the cell that clear out old and damaged proteins. Alzheimer's diseases (AD), Parkinson's disease (PD), and other age-related brain disorders linked to dementia have a key pathogenic similarity: abnormal protein accumulation events inside or outside of cells in the brain. Cathepsin-B (Cat-B) is an enzyme, which is activated in lysosomes, that has been shown to degrade AD-type proteins. Amyloid Beta (A β) is a protein that accumulates in the brain and forms plaques that are associated with AD pathology. Alpha-synuclein (α -syn) is a protein that also accumulates in the brain and is associated with PD. Therapies are being developed to treat a broad range of protein accumulations pathologies. The compound Z-Phe-Ala-diazomethylketone (PADK) is one of those treatments that have been shown to modulate lysosomes by promoting the maturation of Cat-B. Three separate mouse models were used to test the effectiveness of PADK: two models of AD and one model of PD. The mice in both of the AD mouse models were treated with PADK (ip, 18 mg/kg/d for 9-14 days) and mice in the PD mouse model were treated with PADK (ip, 18mg/kg/d for 11 days). A significant reduction of A β and increased levels of Cat-B were observed in the mice of both AD models. Also, a significant reduction of α -syn proteins and an increase of Cat-B were observed in the mice in the PD mouse model. In all three mouse models, visible improvements in clearance pathways and improved synaptic integrity were observed. PADK represents a novel class of therapeutic agents that can enhance the lysosomal degradation pathway's efficiency, with a strong potential to globally impact human health.

50 - Fight Hunger on Your College Campus

Evan Long, *Business*

Mentor: **christina Poteet**

Presentation Format: Poster

Over 50 million people in the United States struggle with hunger. Though many organizations and individuals are working to end this problem, one population that is often overlooked in receiving food assistance are those attending college. According to a recent survey conducted on the University of North Carolina t Pembroke campus, close to 8-% of the students polled have suffered from food insecurity. With the growing number of college students in need of food assistance, the need for food assistance programs on college campuses is more important than ever. In this workshop, one students will share how his for helping his peers has made a big impact on his campus by developing, implementing, and operating an on- campus food pantry and resource center. The workshop will include best practices for beginning a similar project on other campuses.

51 - Transforming from Traumatic Experience

Nicole Marple, *English, Theatre & Foreign Languages*

Mentor: **Susan Cannata**

Presentation Format: Poster

The novel, *Speak* by Laurie Halse Anderson, follows a freshman, Melinda, and her struggles with high school and her coping with being a rape victim. Melinda shuts out everyone, struggles artistically, and relives her rape silently in the beginning. Nearing the end of Anderson's novel, Melinda starts to address her rape, branches out to others, and improves greatly with her artwork. Throughout the story there is a theme of depression that continues and shows how a teenage girl handles her traumatic experience, which in this case is rape. I will examine this theme of depression in Anderson's novel and Melinda's coping mechanisms, for example, being able to connect with others, dismiss fake-friends, and her progress with her artwork. Anderson also metaphorically ties Melinda and a tree together showing her progress throughout the novel which is important to show her coping. I will explore how Melinda is able to move from silence to speech and also delve into the assumed truth of rape victims and how they cope, using Melinda. My research will consist of coping mechanisms for rape victims and assumed truths society has of rape victims and how they aren't entirely true.

52 - Humanimal

Frida Mejia, *Art*

Mentor: **Brandon Sanderson**

Presentation Format: Exhibit

In this intaglio print, I compare a cat with a human: adventurous, curious, dominant, hunter, and proud. The rats represent the bad people around us, those that infest our life. I used hatching and cross hatching to develop value within the piece and adjusted my etch times to reflect the desired line depth.

53 - Beyond Looks

Morris Melvin, *Art*

Mentor: Scott Ziegler

Presentation Format: Exhibit

When one looks in the mirror, do they like who they see? The responses can vary depending on the variables of whom, when, where, etc. Living with a diagnosis of facial paralysis is called Bell's Palsy, I've found myself battling with the ever changing emotions that arise when I see my image in the mirror. Interacting with people everyday, wondering what they are thinking when they talk with or look at me is often a distraction for me from the conversation.

I create works of art to aid my ability to feel comfortable with this condition, relax in social interactions, and express an appreciation of life despite the challenges that I face daily. The works that I created are the final products of my invaluable experience in ceramics! The small forms are organic shaped human figures that are designed with the intent of exaggerating or distorting the human body. Whether big, small, wide or thin, physical disability or not, I encourage the viewer to see the human form as a beautiful temple! I've learned to cope with this condition realizing that there are far more life threatening conditions than what I am living with. Manipulating the form in this manner allows me the feel comfortable with spreading the message of accepting people for who they are regardless of the physical or mental challenges they may struggle living with.

54 - journey Towards Discovering an Identity #2

Melvin Morris, *Art*

Mentor: Joseph Begnaud

Presentation Format: Exhibit

The Trans-Atlantic slave trade was a major yet horrific moment in U.S. history. After reading about several situations that occurred during that historical period, I felt compelled to produce a work that paid homage to hundreds of individuals that lost their life without recognition. This could be described as a dramatic incident; therefore, the choice of material (plaster, chains, digital print, glaze) was important in giving this painting a realistic quality. The painting is one in a series of, currently, five works that explore stories from African American history.

55 - Beauty of Pain

Melvin Morris, *Art*

Mentor: **Adam Walls**

Presentation Format: Exhibit

When we experience a physical wound, we understand, the wound heals but can leave a scare that is a constant reminder of the experience. Part of the recovery process is learning why you were wounded in the first place and growing from the painful experience.

This sculpted work was Raku fired and sprayed with water immediately after being ejected from the firing. This caused crackling in the glaze in order to achieve an aged looked.

56 - The Effects of Gravity on Human Biochemical Processes

Molly Musselwhite, *Biology*

Co-Authors: **Tiffany Scott** *Chemistry & Physics*, **Trae Griffin** *Biology*, **Georgianna Revels** *Education*

Mentors: **Siva Mandjiny**, **Timothy Ritter**

Presentation Format: Poster

Since the beginning of manned space flight NASA has extensively studied the effects of microgravity on human biomechanisms. Two such biomechanisms are: i) the Cori Cycle, which produces Adenosine triphosphate (ATP) during anaerobic glycolysis in order for muscle cells to use as an energy source during intense muscular activity, and ii) the human specific immune response, which occurs when an antibody binds with an antigen. During the Cori Cycle experiment, Nicotinamide adenine dinucleotide (NADH) is consumed as Pyruvate is converted to Lactate in the presence of Lactate dehydrogenase (LDH). In the Immune Response experiment, Human Immuno Globulin G (IgG) and Goat derived Anti-Immuno Globulin G (A-IgG) bound together while in the presence of distilled water and Polyethylene Glycol (PEG). During previous flights on board NASA's microgravity research aircraft, we found that performing the experiment in a reduced gravity environment had an effect on both reactions. While our results show that both reactions are altered in microgravity, we believe that the dominant gravitational effect on the processes observed is a reduction in convective flow within the fluid samples while in 0-g, not gravitational effects on the actual biochemical process. In order to better understand the convective effects on our experiment we will be flying a modified version of both experiments, during which we will visually observe and record the diffusion process as our biochemical reactions occur in the presence of dye. Having a better understanding of the convective effects on the mixing process will allow us to re-interpret our results, focusing on the chemical reaction.

57 - Body Modification: A look at Fashion Norms and Positional Externalities

Victoria Newkirk, *Business*

Mentor: **Lydia Gan**

Presentation Format: Poster

Body modification is rarely a topic associated with Microeconomics; however, the two areas are more related than you would think. The number of people engaging in tattoos, scarification, tongue splitting, corset piercing, and 3-D implants, to name a few, are on the rise! Therefore, the art of body modification has entered what economists call a positional arms race, which is created when other competitors seek to gain an advantage by using performance enhancers. In this case the competition is self-expression, and body modifications are the performance enhancements. As more and more people opt to get body modifications, the extent to which people get such modifications has increased as people strive to push the limits of the trend. In their haste, many people have failed to adhere to the fashion norms of the time, which are socially constructed ideals of what society deems appropriate. These fashion norms are used as positional arms control agreements and are meant to help regulate the trend and prevent positional arms races. Not only are positional arms control agreements being overlooked but other economic principles such as cost-benefit analysis and opportunity cost are also being pushed aside as individuals clamor to push the envelope. But how far will the trend of body modification expand, and what will be its long-term effects? How can we use Microeconomics to help answer these questions?

58 - The Spatial Distribution of Dominant Lumbee Last Names in Robeson County

Victoria Newkirk, *Geology & Geography*

Mentor: **Nathan Phillippi**

Presentation Format: Poster

The purpose of this study is to evaluate whether or not Lumbee families with the same last name tend to typically live in close proximity to one another. The hypothesis is tested by analyzing the spatial distribution, within Robeson County, of individuals with last names that have historically been associated with the Lumbee Tribe. The resulting findings suggest that Lumbee peoples with the same last name tend to live in clusters. This trend has resulted in areas that have a dominant population of individuals with a certain last name.

59 - First Oral Dosing Study with a Lysosomal Modulatory Compound Being Developed for Alzheimer's Disease and Other Dementias.

Morgan Pait, *Biology*

Co-Authors: **Sarah Ruiz** *Biology*, **Karen Farizatto** *Biology*, **Michael Bullock** *Biology*

Mentors: **Heather Romine**, **Ben Bahr**, **Samuel Ikonne**

Presentation Format: Poster

Lysosomes are cellular components involved in removing misfolded/aggregating proteins, but with aging lysosomes become less effective. Protein accumulation disorders, including Alzheimer's disease (AD), Parkinson's disease (PD), and other dementias, are suspected to involve imbalances between protein production and protein clearance. Strategies targeting the lysosomal system to enhance protein clearance are prime candidates for drug discovery efforts to reduce protein accumulation pathology and prevent the onset of dementia. The positive lysosomal modulator Z-Phe-Ala-diazomethylketone (PADK) enhances

the trafficking and maturation of the lysosomal enzyme cathepsin B (CatB), thus eliciting protective clearance of toxic proteins in the brain. In this study, we examined the effect of orally administered PADK in Sprague-Dawley (SD) rats for the first time, measuring active CatB in brain regions as well as in other organs (liver, kidney, heart). We also tested if enhancing CatB levels through oral administration had any adverse effects on synaptic markers. The SD rats were fed an appropriate amount of P-cookies to administer (3-18 mg/kg) PADK twice a day for 11 days. Another group of SD rats received a similar amount of C-cookies (control) mixed with an inactive compound (3-18 mg/kg) Z-FA twice a day for the same length of time. The rats that were fed PADK showed increased levels of CatB across brain regions as well as in other organs and no reduction of synaptic markers. For the first time PADK administered by feeding was found to produce effective modulation of the lysosomal system. Oral dosing of PADK may be a viable avenue of treatment to enhance lysosomal efficiency.

60 - Monetary Policies of Three Central Banks

Nicholas Palmer, *Political Science & Public Administration*

Mentor: **Lydia Gan**

Presentation Format: Poster

In the U.S., money supply and inflation rates are influenced by monetary policies executed by the Federal Reserve. This is the case with many other countries and their respective central banks; however, approaches to controlling the money supply and inflation may vary across central banks. The objective of this study is to examine three central banks (the Bank of Japan, the Bank of England, and the Bank of Canada) and to study how monetary policies of these central banks affect the money supplies of these economies. Additionally, these policies are compared with those of the U.S. Federal Reserve in order to observe any interdependent relationship. This research highlights inflation rates and money supply, and shows how they are affected by monetary policies such as open market operations (OMO's) and the adjustment of interest rates. The study also observes the validity of Fisher's effect which is the trending similarity between inflation and nominal interest rates. It further confirms that various central banks have different methods of conducting monetary policies. For example, the Bank of Canada influences the interest rates whereas the Bank of Japan focuses on open market operations. At the same time, the Bank of England emphasizes both the use of OMO's and the adjustment of interest rates.

61 - Teddy

Chelsey Parsons, *Art*

Mentor: **Brandon Sanderson**

Presentation Format: Exhibit

My artwork generally contains themes of self-portraiture portrayed abstractly, of relationships, or of fairytales/history. This work in particular took two things that I enjoy, printmaking and sewing, and meshed them together into a physical "3D Print."

“Teddy” is a fabric teddy bear with a linocut gun printed multiple times on the pieces used to construct it. It is printed with an oil based, copper colored ink. It has a camouflage vest and bright orange bow to tie in contemporary hunting paraphernalia with the history of hunting. The bear is symbolic of its history: Theodore “Teddy” Roosevelt was out on a hunting trip with some companions. The companions happened upon a bear and captured it, holding it so that Roosevelt would be able to shoot it. He would not shoot it, however, because he said it was unsportsmanlike to shoot an animal that had been captured. When they returned, the teddy bear received its name for Teddy’s compassion for the animal.

62 - Behavioral response of insect larvae to bioluminescence produced by the bacterium *Photobacterium luminescens* cultivated by in vitro and in vivo methods

Walter Patterson, *Chemistry & Physics*

Mentors: **Floyd Inman III, Len Holmes**

Presentation Format: Poster

Galleria mellonella is a model insect used to produce and study entomoparasitic nematodes and their bacterial symbionts on a laboratory scale. Bacterial symbionts are useful to their nematode partners as they kill and bioconvert the insect host for nutrition. Symbiotic bacteria also provide optimal environments within the insect carcass for nematode growth and reproduction. *Photobacterium luminescens*, the bacterial symbiont of *Heterorhabditis bacteriophora*, is a Gram-negative, enteric bacterium that expresses the peculiar trait of bioluminescence. To date, *P. luminescens* is the only known terrestrial species to produce high intensity luminosity. Currently, no explanations exist explaining the physiological role of bioluminescence to *P. luminescens* or how luminosity is exploited by the nematode. Research suggests that luminosity produced by *P. luminescens* is exploited by *H. bacteriophora* as a method for host attraction. Both in vitro and in vivo bacterial culturing methods produced various intensities of luminosity which resulted in linear curves when distances from insect larvae to bacterial cultures were graphed against relative luminosity (RLU). Results indicate that distances of larva from the light source decreases linearly as RLU increases. The rates of these linear functions in both methods (in vivo & in vitro) were found to be $-0.75 \text{ mm}/1.0 \times 10^5 \text{ RLU}$ and $-7.5 \text{ mm}/1.0 \times 10^5 \text{ RLU}$, respectively. Results also suggest that the amount of light produced by both methods was sufficient to attract larvae to within 10 mm of the light source. This study is evidence that luminosity produced by *P. luminescens* can be exploited by nematodes to attract host insect larvae.

63 - Obesity and health care costs

Aaron Ray, *Business*

Mentor: **Lydia Gan**

Presentation Format: Poster

The topic of this research paper will focus on obesity and the health care costs associated with it. Another issue this paper will focus on is the quality of life that comes with obesity. This topic sparks the interest of many because it is a rising issue that is costing people money and quality/quantity of life. On average, obese people spend more time in a hospital than the non-obese. According to a recent study, “obesity-

related medical treatment costs between \$147 and \$210 billion a year, or nearly 10 percent of all annual medical spending (based on 2006 data). The majority of the spending is generated from treating obesity-related diseases such as diabetes.” This quote is an example of what this research paper will cover. Equipment to support obese patients is more expensive than the standard hospital equipment. The standard hospital bed supports 500 pounds and is 1,000 dollars, while a hospital bed equipped for an obese patient (bariatric bed) is 4,000 dollars. This research will also examine three questions. Do obese people really spend more time in the hospital than non-obese people? If so, how much more are the obese financially affected? Then finally, what kind of effect does obesity and its costs have on the economy?

64 - To Speak or Not to Speak: Adolescent Identity and Trauma Recovery in Laurie Halse Anderson's Speak

Wendy Robinson, *English Education*

Mentor: **Susan Cannata**

Presentation Format: Poster

In Laurie Halse Anderson's *Speak* the protagonist, Melinda is entering her first year of high school carrying a big secret and a closed mouth. Melinda was raped just months before entering high school and instead of her being vocal and telling someone what happened, she closes her mouth, physically bites her lips and turn into an outsider or someone who doesn't participate in the normal practices as the other students in her high school. She has been ignored, picked on, and ostracized by her closest girlfriends and by most of the entire high school student population. Various characters in *Speak* go against the norms of society while others comply. In my paper I will explore how these characters interactions with Melinda contributed to her finally speaking. I will research the concepts of adolescent identity behavior as well as the various responses to trauma, and then I will use the results of my research to analyze Melinda's character.

65 - Muted Influence

Aimee Ruiz, *Art*

Mentor: **Brandon Sanderson**

Presentation Format: Exhibit

Powerless and voiceless, children are victims of their parent's whim even before they enter the world. This period of life should be full of the joy of innocence, yet children today are plagued with burdens, the weight of which, many adults would cave beneath. The little girl rendered here plugs her ears in what would seem as a immature gesture of avoidance, but for her it is a momentary oasis from injustice she cannot escape.

66 - **Cartoon Culture of the 30's**

Aimee Ruiz, *Art*

Mentor: **Richard Gay**

Presentation Format: Poster

This project was implemented to catalog and archive a donation to UNCP of 240 original drawings primarily by the artist A. John Kaunus. I'll be identifying the drawings, preserving information, and devising a system for keeping track of the objects to provide a foundation for further research. As the project develops, time permitting, I will search publications/journals to locate the drawings in print, record their locations and accompanying material to contextualize them.

67 - **The Cutting Floor: Recovering Female Activists**

Torres Sandra, *Social Work*

Mentor: **Michele Fazio**

Presentation Format: Poster

In transcribing interviews for the documentary, *Voices of the Lumbee*, the names of important historical figures such as Henry Berry Lowery were mentioned during several filmed segments, but there were also lesser-known names of individuals who made an impact in the community over the years. Unfortunately, due to time constraints and the film's focus on regional economic development, these stories wound up on the "cutting floor." From Helen Maynor Scheirbeck with her efforts in passing many legislative acts through Congress to help the American Indian community to Janie Maynor Locklear who led the Save Old Main movement, these women's stories carry a meaningful message about female leadership and political advocacy that resonates in the present. My research will document various contributions of key activists and related topics to be included in the film guide and companion website.

68 - **Darwinian Evolution in Robert Louis Stevenson's "The Strange Case of Dr. Jekyll and Mr. Hyde"**

Ethan Sanford, *English, Theatre & Foreign Languages*

Mentor: **Susan Cannata**

Presentation Format: Poster

Robert Louis Stevenson's captivating novella, *The Strange Case of Dr. Jekyll and Mr. Hyde*, is a Victorian piece of literature that simultaneously supports and condemns aspects of Victorian society. On the one hand, Stevenson expresses a deep doubt of the rigid social structure of the period; on the other hand, he reinforces the opinion of many Victorians who viewed the rapid scientific progress of the time with trepidation. One of the most controversial advances in science in the Victorian period was Charles Darwin's theory of evolution, which threatened the fundamental elements of beliefs about the human experience. Stevenson's work demonstrates this fear in the dichotomy of Dr. Jekyll and Mr. Hyde. The

idea that even the most respected middle-class Victorian gentleman possessed an inherent animalistic quality brought into question the durability of the social ethics the Victorians held to be so important. This research will use a new historicist approach to examine the ways that Stevenson's Strange Case explores the implications of rapidly advancing Victorian science, and how Darwin's theory of evolution contributes to Stevenson's conclusions.

69 - Has Offensive Become Acceptable? The Influences of Social Media and Gaming

Anna Schweitzer, *Psychology*

Mentor: **Kelly Charlton**

Presentation Format: Poster

The use of video games and social media in society is ubiquitous and many times both media types portray women in a derogatory manner. As more people are exposed, in increasing amounts, to these unrealistic portrayals of women, attitudes towards women and their roles may be subject to change as a result of socialization via video games and social media. The role these media types may play in perpetuating negative stereotypes could prove important in the ongoing efforts for gender equality. The current study sought to investigate the impact such media has on our attitudes and perception of women. Two hundred and ten college students participated in a survey study that included the Ambivalent Sexism Inventory (AIS) and a questionnaire regarding acceptable behaviors towards women. Results indicated that those who play video games and social media are more likely to find sexist behavior acceptable.

70 - Cost-Effective Positive-Resist Photolithographic Processes for the University Printmaking Studio

Kayla Seedig, *Art*

Mentor: **Brandon Sanderson**

Presentation Format: Exhibit

The combination of photosensitive aluminum plates and traditional lithographic processes allowed me to produce multi-plate prints that conceptualize both personal and relevant trials that focus on myself as a changing, growing woman. I am able to achieve these prints using an exposure unit that yields concentrated light to etch the photosensitive plate, developing the etched plate, and printing the images on each plate by following a registration method and hand-mixing lithographic inks. Through parallels between the metastasis of cancer and intimate changes within self, my work depicts rapid, uncontrollable adaptations that have affected parts of my life. The color choices I made reflect the idea of thermal heat in that the closer the biomorphic forms are to the figure, the warmer the color. Chronologically, each piece depicts a different point in time: the start of change, the take over, the fight, and acceptance. I attempted to create dynamic compositions by integrating hand drawn elements with digital imagery into each piece, as well as use scanned photos of old drawings to represent my past. The lines in the background assist in creating a distinction between figure and ground, as well as symbolize the idea of living a linear life. As each piece progresses, the lines either disappear or become overwhelming to show the emotion of the

figure's face. I enjoy the endeavors associated with printmaking processes and through it I become all the more connected to my art and my artistic practice.

71 - Utilitarian Steel Container Etchings

Kayla Seedig, Art

Mentor: **Brandon Sanderson**

Presentation Format: Exhibit

I was inspired by the techniques that visiting artist Linda Lucia Santana of the University of North Texas used during my Intermediate Printmaking course in Spring 2013. Linda used traditional stone lithography to create detailed portraits and printed them on different types of metal. In this SSS, I combined printing on alternative materials by integrating metalworking and printmaking utilizing etching with copper sulphate or ferric chloride and steel. I purchased inexpensive steel containers, fused drawn toner printouts to the metal, and used a copper sulphate bath to etch the image into the steel. Not only are the containers etched with personal imagery that relates to the current content of my work, but they will also be useful for storage purposes.

72 - Progression of the Hive

Kayla Seedig, Art

Mentor: **Brandon Sanderson**

Presentation Format: Exhibit

In this series, I compare the progress women have made to the system of survival that bees practice. The majority of the population of a hive is female: the queen, the workers, the pollinators, ect. The only purpose the males serve is to impregnate the queen and expire. I wanted to depict women's strength in the form of a socially hard working animal as a reflection of the struggle women have endured by working together to gain equality.

73 - Utilitarian Steel Container Using Etching Processes

Kayla Seedig, Art

Mentor: **Brandon Sanderson**

Presentation Format: Exhibit

Creating utilitarian containers with personal designs is a useful skill set to have for a future artist by enabling them to create desirably functional pieces for consumers. Using etching processes such as hard ground line etch, transfer and fusing techniques, and stenciling, each steel container plated with tin was placed in a ferric chloride bath that disintegrated the parts of the container that were exposed to the liquid chemical compound. The effect that the ferric chloride has on the container creates the image and the areas of the piece that are raised and/or sunken in. The depth of the recessed parts of the image is based on the amount of time that the containers were suspended in the bath, as well as how many 'steps' were used. Steps are the different amounts of time used for each exposed piece of the container. The parts of the image that the individual wants to prevent from being broken down can be 'stopped out' by brushing on a mixture of asphaltum and lithotine, which assists in creating the different steps. The end result is an aesthetic, functional piece of art that used labor intensive and time consuming chemical processes to achieve the end result.

74 - Colony Social Form of Invasive Fire Ants in Natural and Human Modified Ecosystems

Mycah Sewell, *Biology*

Mentors: **Lisa Kelly**, **Jeremy Sellers**

Presentation Format: Poster

Colony social form (monogyne or polygyne) of the invasive fire ant, *Solenopsis invicta*, is paramount to the reproductive biology of fire ants, but little is known regarding the incidence of the two social forms in natural areas. To study the relationship between social form and environments, we collected fire ants in four natural ecosystems and in several human-modified sites during two consecutive seasons (summer, fall). We used multiplex PCR to determine social forms based on genotype at the General protein-9 (Gp-9) gene. According to the literature, the monogyne form (one egg-laying queen) is more common than the polygyne form (multiple egg-laying queens) in the United States. Interestingly, our limited samples (5-6 colonies per site) show that both social forms occur in both natural and modified sites. Social form did not change between seasons. Additional samples from numerous colonies in two of our natural ecosystems were collected in the spring. Approximately 54% of the samples were monogyne, and the remaining samples were polygyne. Polygyne colonies were clustered near the forest rims. The dispersion of the polygyne ants into natural areas bears further study. In future work, we hope to relate social form to ant diet and trophic ecology.

75 - Thermal Biology of Eastern Box Turtles

Jordan Smink, *Biology*

Co-Authors: **Kristopher Wild** *Biology*, **Carlisha Hall** *Biology*, **Catherine Wilson** *Biology*

Mentor: **John Roe**

Presentation Format: Poster

As the only terrestrial turtle species found in North Carolina there is a keen interest in maintaining and growing the population of NC's state reptile. Eastern Box Turtles, *Terrapene carolina*, are slow growing

and yield few young making turtle populations especially susceptible to population decline. Wildlife rehabilitators in North Carolina regularly treat *Terrepepe carolina* for ear infections, road injury, and dog attacks often requiring surgery. One of the keen goals in Wildlife medicine is to treat the animal quickly and with as little human interaction as possible so that it can be released back into the wild. The longer an animal remains in captivity the lower its chances of survival become following its release. As ectotherms, turtles rely on the external environment to control their internal body temperature. Maintenance of an optimum body temperature is crucial to a swift recovery so that most of the animal's energy can be focused on recovery. No such optimum temperature standards exist in the literature or in veterinary textbooks for this species. The goals of this project are to understand the preferred temperature range of *Terrepepe carolina* both in our study sites at the Lumber River State Park and the Weymouth Woods Nature Preserve as well as in a laboratory setting. The information in this study will assist wildlife veterinarians and rehabilitators in the swift treatment of *Terepepe carolina* increasing its probability of survival following its release from captivity.

76 - Examining Best Practices for Success Among Gay, Lesbian, and Bisexual Pre-licensure Nursing Students

Justin Smith, *Nursing*

Mentors: **Dena Evans**, **Brigman Lee**

Presentation Format: Poster

Educational research has shown that there is a positive correlation between non-discriminatory classroom environments and learning outcomes (Rankin, 2006). However, there is no empirical research that has assessed how classroom, departmental and campus environments impact the educational success of gay, lesbian and bisexual (GLB) students enrolled in baccalaureate pre-licensure programs. Therefore, the purpose of this study is to review closely related research to determine best practices prior to engaging in a research study. After completion of a comprehensive literature review for best practices, a multidisciplinary team will be formed to design and pending IRB approval, a pilot study will be conducted using a newly devised measure based on best available evidence. The survey will be designed to assess the presence of a positive, inclusive classroom, departmental and campus environment which fosters success in GLB pre-licensure nursing students. Given the lack of research in this area, creation of such a measure could be of benefit to all college and university campuses seeking to ensure an atmosphere conducive to the success of all students, regardless of sexual orientation.

77 - Optimizing whole animal auditory measurements

Marsalis Smith, *Biology*

Mentor: **Anthony Ricci**

Presentation Format: Poster

Hearing impairment is the largest growing health problem worldwide. Screening whole animal hearing function is an important tool for identifying hearing loss and also for testing potential therapies for preventing loss or restoring hearing. Maximizing the sensitivity of these hearing tests is critical for

identifying subtle changes in hearing function and also to identify changes earlier in their onset. The auditory brainstem response (ABR) along with distortion product otoacoustic emissions (DPOAE), measure the threshold of hearing as indicated by inner hair cell (IHC) output and cochlea amplification as indicated by outer hair cell (OHC) function, respectively. Both methods used by the Ricci lab show large intra measurement variance, which make detection of minor changes in hearing less reliable. Thus, previous experiments were not capable of detecting subtle changes in hearing experienced by a gradual onset of hearing loss, but could only identify major hearing impairment. It is hypothesized that reducing electrical and mechanical noise, as well as ensuring more reproducible probe placement will allow for more precise measurements, making detection of subtle changes in hearing thresholds possible. This study located and reduced different sources of mechanical and electrical noise, achieved less intra measurement variance, and employed new techniques to greatly increase the signal to noise ratio. The outcome of the project will aid in studies aimed at preventing hearing loss for many worldwide.

78 - Coloured High Impact Polystyrene Printing

Rebecca Spruill, Art

Mentor: **Brandon Sanderson**

Presentation Format: Exhibit

This work represents my research into the process and product of High Impact Polystyrene printing. High Impact Polystyrene engraving is a relatively new printing process, which required an incorporation of a basic knowledge of chemistry with formal elements and historic processes to create colour. The content of these pieces reflects both the universal difficulties of watching a loved one fight cancer and the unique responses of my grandmother in her struggle with the inundation of pain and anxiety that so often accompanies these diagnoses.

79 - Buddhist Themes and Narratives in Lithography

Rebecca Spruill, Art

Mentor: **Brandon Sanderson**

Presentation Format: Exhibit

This project focuses primarily on incorporating detailed research in Buddhist practices and texts and a working knowledge of lithographic processes. Merging traditional iconography, colour and personal imagery, these pieces reflect parables, people and concepts that are intrinsic to both my personal practice and to many Mahayana schools of Buddhism, such as Zen and Pure Land. While my research was in part limited by access to fellow Buddhists and a diversity of texts, I feel confident that the majority of these visuals are congruent with their concepts.

80 - Investigating Mutant suppressor of synthetic lethality between *htz1* and RPB2-2SL in *Saccharomyces cerevisiae*

Caleb Stubbs, *Biology*

Mentor: **Maria Santisteban**

Presentation Format: Poster

Histone H2A.Z is a H2A variant form of the highly conserved Histone H2A.Z/F family, which is found among most vertebrates. In yeast *Saccharomyces cerevisiae* H2A.Z (encoded by the HTZ1) is not necessary for life, but *htz1* mutants exhibit many different phenotypes in several cell processes including transcriptional regulation, gene silencing, and preventing the spread of heterochromatin, and mitotic chromosome transmission. Transcription regulation by Htz1 has been the focus of numerous studies. Htz1 containing nucleosomes have been shown to poise quiescent genes for activation and transcriptional initiation. We have also provided evidence for a role of Htz1 in transcription elongation. In order to elucidate the mechanism involved in regulating transcription elongation, we are using a dominant allele of the RNA Pol II gene, RPB2-2SL identified in an unbiased screen for mutations synthetic lethal with deletion of the histone H2A.Z gene. Extragenic suppressors of the double mutant were isolated and efforts to identify them by complementing the suppressor phenotype have yielded the SET2 gene. SET2 encodes a histone methyltransferase, which has shown to play roles in transcription elongation. We are working to formally prove or disprove that a mutation in SET2 is indeed suppressing the synthetic lethality of *htz1*/RPB2-2SL. We are also investigating if *htz1*/RPB2-2SL may display a cryptic initiation phenotype, and if it does, what effect the suppressors have on it.

81 - Immobilization of Lactate Dehydrogenase

Samantha Suggs, *Chemistry & Physics*

Co-Authors: **Marcus Sherman** *Chemistry & Physics*, **Karen Fagan** *Chemistry & Physics*

Mentor: **Siva Mandjiny**

Presentation Format: Poster

The reaction kinetics of lactate dehydrogenase (LDH) is commonly measured in free state. The purpose of this research is to encapsulate LDH in calcium alginate beads in order to simulate the enzyme activity in vivo and measure the difference with the free state. In this work, a commercial LDH enzyme was used. A new technique was developed to increase calcium retention in the calcium alginate beads in order to encapsulate/reticulate the LDH enzyme, using Tris as a buffer. Results show that the calcium alginate beads maintain their rigidity and storage stability. Utilizing a continuous flow method, containing a NADH and pyruvate solution, column results show that the immobilized state activity is limited by diffusion, when compared to the free enzyme.

82 - Evolution

Chelsea Summers, Art

Mentor: Carla Rokes

Presentation Format: Exhibit

When I was creating the piece 'Evolution' I was thinking about my growth as an artist and what has changed within me between the beginning of my freshman year and my sophomore year or college. I was also looking to create a piece that was strong in personal symbolism as well as create a piece in which others could find their own personal meaning. The first thing that I thought about when creating this piece was growth and my mind immediately went to nature. As I began researching images I discovered the Indian tradition of Mehdi, which is a form of body art that is done on a bride before her wedding ceremony. This is when I decided to adapt some of these patterns for my piece to represent growth and new beginnings, which is what was offered to me when I enter college. The woven pattern that is created in the background is used to represent the people and the ideas that have become an integral part of this stage my life.

83 - Crimson

Desiree Thomas, Art

Mentor: Brandon Sanderson

Presentation Format: Exhibit

Crimson was originally a project for my Intro to Printmaking class where we had to create a currency using HIPS. My inspiration for Crimson was based on the Latin reminder of death which is memento mori meaning "remember that you will die." I was also inspired by a few ancient mosaics for my boarder. This coin is a symbol of the balance of both life and death. Everyone is allotted the chance to live but few actually survive. It's a play on the concept that everyone leaves this world through the grave because the reality is no one gets out of life alive. Just as the flower blooms in the Spring, it is sure to wither away in the Winter.

84 - Etching and Engraving in the Manner of Albrecht Durer

Kara Todd, Art

Mentor: Brandon Sanderson

Presentation Format: Exhibit

Ever since I delved into the world of printmaking I had an immediate fascination with the Old Masters etchings, mainly, Albrecht Durer. His work has this elegance and drama that I admire. When I started thinking of an idea for the Undergraduate Scholar Assistantship I automatically knew I wanted to recreate Albrecht Durer's work but with a twist, I wanted it to be my style. From there I created three copper plate

etchings, and and three larger etchings on the surface of a carbon steel motorcycle gas tank. This research was a challenge because I was taking famous pieces of artwork and turning it into my own, as well as, etching and engraving on a three dimensional object. From experimentation and spending an abundance of time drawing, redrawing, trashing this idea, and keeping that idea I think I was fairly successful with the final products. I plan on trying to etch on more complex three-dimensional surfaces to further enhance my knowledge of etching.

85 - Microwave Production of Biodiesel using Phase-Transfer Catalysts

Arieana Van Allen, *Chemistry & Physics*

Mentor: **Rachel Smith**

Presentation Format: Poster

This project's objective was to identify optimal reaction conditions for the transesterification reaction of food-grade vegetable oil with methanol in the presence of the phase-transfer catalyst choline hydroxide. A chemical microwave was used to heat the reaction in order to generate fatty acid methyl esters, better known as biodiesel. Chemical reactions conducted with microwave heating can be more efficient since less energy is required and typically reaction times are shorter and in many cases, higher yields are obtained. Reaction time, temperature, ratio of methanol to oil and amount of catalyst used were varied in order to generate nearly complete conversion. Analysis of the reaction products was done using gas chromatography with a flame induction detector, nuclear magnetic resonance spectroscopy and infrared spectrometry. Although excess methanol seems to be required for complete conversion, microwave reactions showed >99% conversion in as little as 5 minutes reaction time at 50°C compared to 45 minutes to 1 hours for complete reaction when traditional heating is used.

86 - An Inexpensive and Reliable USB Powered Diode I-V Characteristic Trainer Kit

Lynn Wardell, *Chemistry & Physics*

Co-Authors: **Richard Wilson** *Chemistry & Physics*

Mentor: **William Brandon**

Presentation Format: Poster

As part of a project challenge assignment in the UNCP electronics course (PHY 3560), a nearly fool-proofed electronics device (i.e. a kit) allowing students a quick and straightforward method to obtain I-V characteristics of various types of signal and light emitting diodes has been designed, constructed and tested. Following an adopted instrumentation philosophy of "exploiting ubiquitous hardware" the USB powered unit was designed to minimize cost (less than fifteen dollars) while providing students with a device to learn about the behavior of diodes in an efficacious manner without the annoying distractions associated with conventional esoteric testing and measuring equipment.

87 - Toward High Precision Magneto-Optical Measurements: The Faraday Rotation of Air

Lynn Wardell, *Chemistry & Physics*

Co-Authors: Austin Griffin *Chemistry & Physics*, Christopher Hudson *Mathematics & Computer Science*

Mentor: William Brandon

Presentation Format: Poster

On account of the number and usefulness of practical applications, the ongoing evolution of magneto-optical polarimetric measurement techniques has continued to attract attention over that past several decades. Applications include sensing very weak magnetic fields and measuring the Faraday rotation of thin films and/or materials with small Verdet constants, to name a few. This investigation is an attempt to measure the Faraday rotation of air utilizing phase sensitive detection of polarized light modulated via alternating current magnetic fields. Intrinsic signal to noise ratios approaching 1/100,000 associated with our instrument parameters ensures that this measurement is indeed a very difficult one to carry out. Nevertheless, preliminary results indicate that we are sensing the Faraday rotation but not yet able to provide a numerical result due to noise levels that are at least partially in phase with our signal. Presently we are attempting to fit the acquired data with a numerical algorithm allowing extraction of phase parameter, which appears to be dependent on signal intensity, along with the Faraday rotation. In spite of our present struggles, it appears likely that we will eventually achieve the first measurement of the Faraday rotation of air in an undergraduate physics research lab.

88 - Abduction

Allyson Watts, *Art*

Mentor: Brandon Sanderson

Presentation Format: Exhibit

This piece is a pen and ink drawing. The idea of this piece was to find old master drawing and copy the way they make their marks and make changes to the piece. I chose “The Abduction” by Albrecht Durer. The original piece showed a man abducting a woman while on a horse. I decided to twist the reins and create a comical representation of marriage. In my drawing the man and woman are both dressed in wedding attire. The sexes of the figures are reversed from the original, so that the woman is now “abducting” the man into marriage.

89 - Robeson County Teen Court: A Program Overview

Donte West, *Sociology & Criminal Justice*

Mentor: Renee Lamphere

Presentation Format: Poster

Robeson County is the poorest county in the state of North Carolina, which also bears the highest crime rate within the state. Many offenders began lives of crime before the age of 18; many of these offenders were not offered a second chance. This poster outlines the structured events of Teen Court in Robeson County and how it effectively works to give underage offenders a “second chance” as long as they complete the teen court guidelines. Robeson County Teen Court is a non-profit organization funded by the CDC. Teen Court is for the youth, between the ages 10-17 years-old, who commit misdemeanors. Teen Court is a court trial ran by teenagers who play the roles of prosecutor, defense attorneys, jury, bailiff, clerk, and the defendant.

90 - Anticipating Hibernation Emergence of Eastern Box Turtles in Southeastern Fire-managed Systems

Catheryn Wilson, *Biology*

Mentor: **John Roe**

Presentation Format: Poster

Prescribed fire is an essential tool to maintain environmental balance within certain ecosystems; by reducing the accumulation of hazardous fuels, recycling nutrients back into the soil, and promoting growth of diverse vegetation. In spite of the advantageous outcomes, prescribed fires pose challenges to species that are not the target of the burn, such as Eastern Box turtles (*Terrapene carolina*). The development of any management plans to alleviate fire impacts on the Box turtle populations are hindered by the paucity of data on the subject. We studied the overwintering behavior of Box turtles to determine what seasonal cues they use in order to time critical behaviors like burial, surfacing, and emergence to resume activity. Additionally, we tested whether turtles at sites that have been exposed to fire (Weymouth Woods-Sandhills Nature Preserve) behave any differently than those that are not (Lumber River State Park). From December 2012 to March 2013, we used radiotelemetry to follow turtles and equipped them with ibutton temperature dataloggers; placed on the shell. We measured air and soil temperatures at various depths (0, 5, 15, and 30cm) to compare with turtle temperature profiles. Understanding the timing and conditions of critical overwintering behaviors may give land managers target times for burn implementation that minimizes turtle exposure to fire. To further this study, we are currently investigating overwintering behavior to gain additional insight into annual variation of emergence, as well as to identify predictability of turtle behaviors.

91 - Production and evaluation of nisin secreted by the lactic acid bacterium *Lactococcus lactis* for use as an antibacterial food preservative

Lan Yao, *Biology*

Mentors: **Len Holmes, Rinu Kooliyottil**

Presentation Format: Poster

Nisin is a commercially important bacteriocin that is commonly used as an antimicrobial food preservative. To add to its effectiveness, nisin can also be utilized in conjunction with other chemical preservatives. Nisin is a Class I antibiotic that negatively interacts with phospholipid components of

bacterial cytoplasmic membranes. In industry, nisin can be produced in different growth media and can be easily quantified with the use of various methods such as turbidometry, colorimetry or bioluminometry. However, the most commonly used assay is through the employment of agar well diffusion. In the present study, the lactic acid bacterium *Lactococcus lactis* and its production of nisin was studied. *L. lactis* was cultured in complex media under various batch conditions utilizing a two liter fermentation system. For each batch, nisin production was determined and compared to a dose-response calibration curve. For this study, nisin calibration curves consisted of bacterial inhibition areas, determined by agar well diffusion, and their relation to nisin concentrations. This study aims to optimize the process parameters required for maximum production of nisin.

Oral Presentations

1 - Outsourcing

Kristi Carter, *Business*

Mentor: **Lydia Gan**

Presentation Format: Oral

The United States has experienced an economic shift for many years. This shift has affected a large portion of the population especially individuals who were employed in the furniture and the textile Industry. This shift has been determined by many factors, the most significant factor is outsourcing which is a microeconomics concept. Many people are unaware of the history of outsourcing and assume that it is a phenomenon created by the North American Free Trade Agreement (NAFTA). This is a misconception, outsourcing began hundreds of years ago as a means of specialization, and if done properly it can greatly improve society. A company that specializes in a specific product and service is able to have a comparative advantage over a company that is involved in many products and services. One reason for that is a company that specializes in a specific product can reduce its opportunity cost therefore improving its comparative advantage leading to a higher overall profit. It is also important to realize that outsourcing does not only affect corporations and industries it also affects our school system. The goal of this paper is to inform people on outsourcing as a whole, and illustrate how much outsourcing has evolved from its original intention of specialization

2 - Business Intelligence in Higher Education Administration

Carson Cone, *Business*

Co-Authors: **LaShaude James** *Business*

Mentor: **Richard Cosentino**

Presentation Format: Oral

Business Intelligence (BI), the visual depiction of complex data, is pervading throughout higher education. This is due in part to the availability of BI software, but is largely driven by organizations instructed to perform more with fewer resources. It has been discovered that traditional presentations of dull data have become insufficient for higher education administration. The purpose of this research is to identify the relationship between a higher education institution using BI and the variances in administrative spending. Using BI has the potential to prevent future unfavorable variances, thus allowing for better budgeting decisions. In order for higher education institutions to optimize available funds, it is beneficial to know if the use of BI will yield better results. By reviewing financial statements, the authors will compare higher education administrator's spending variances before and after the implementation of BI. This quantitative study should reveal a positive correlation between utilizing BI and the efficiency of budgetary decisions. Support for the continued implementation of BI will not explain which presentations resonate with particular administrators. Further study on this topic is warranted.

3 - **Voices of the Lumbee**

Constance Faulk, *Mass Communications*

Mentor: **Jason Hutchens**

Presentation Format: Oral

The work of a production assistant in the field of broadcasting varies widely. One of the more interesting aspects about this type of work is the diversity of tasks to which one is exposed. This presentation will touch on the variety of tasks undertaken during my assistantship as a production/research assistant for the upcoming documentary film, *Voices of the Lumbee*. I will discuss things that I learned while on location for video shoots, researching documents and historic regional photography about the topic, and post-producing animated photographs that will be featured in the film.

In addition to myriad practical skills that I have learned about video production, exposure to the subject matter has also enhanced my appreciation for the Lumbee Tribe and its culture and traditions. This presentation will summarize these observations in a way that lets audiences know about the background work that goes into creating documentary films, and how it can enhance one's understanding of new subject matter in profound ways.

4 - **Five Nations that Define Quality Healthcare**

Edgar Guzman, *Business*

Mentor: **Lydia Gan**

Presentation Format: Oral

In the United States health does not seem to be regarded as a priority when it comes to the budget discussion on Capitol Hill each year. While a remedy to the problem was introduced in 2009 and passed in 2010, the PPACA has faced as much opposition by legislators in state senate and house chambers as those in Washington D.C. My motivation has come from the empty minded rhetoric that is spoken by politicians, and my peers alike, because critics perceive the PPCA as not being the best option for addressing the U.S. health care system. The misconception is that the United States has the best health care in the world but when asked why supporters are unable to give conclusive answers. *InternationalLiving.com* has a Global Retirement Index, which has a health care category that considers the cost of care and the quality. Other indicators considered by *InternationalLiving.com* include the number of people per doctor, the number of hospital beds per 1,000 people, the percentage of the population with access to safe water, the infant mortality rate, life expectancy, and public-health expenditure as a percentage of a country's GDP. These are all important in concluding the best health care in the world, making France, Uruguay, Malaysia, Costa Rica, and Mexico the five best in the world in that order. When broken into categories the United States is not in the ranks of the top five. I intend to investigate in my paper the common link between the healthcare provisions of these five nations that makes them efficient in comparison to the United States.

5 - Medical Tourism: Cost/Benefit Analysis

Brandy Jacobs, *Business*

Mentor: **Lydia Gan**

Presentation Format: Oral

The aim of this study is to determine the factors that influence millions of Americans to participate in medical tourism. Americans are realizing that healthcare costs are rising and that shopping for procedures abroad is less expensive than having procedures done in the U.S. Two factors influencing the growing popularity of medical tourism are: lower costs due to regulations and better quality of care being provided. Regulations are a major factor in determining the cost of medical procedures and implants, e.g., knee and hip replacements. There are little governmental regulations in the U.S. towards controlling the cost of manufacturing medical implants and the charge of medical fees (e.g., physicians' consultations and surgery), compared to the Belgian government which regulates medical fees. The better quality of care that is provided by medical tourism destination countries also benefits the consumer as well. Better quality of care includes shorter waiting periods for surgery, high success rates, lower nurse-to-patient ratio, and Joint Commission International (JCI)-accredited healthcare facilities. Although lower cost and better quality of care are two major benefits of medical tourism, there are costs associated with medical tourism such as potential patients being unaware of their legal rights in destination countries, not being assured of continuity of care, and risk of infections and complications after surgery. These are the main barriers that prevent potential patients from participating in medical tourism.

6 - Group Papers in the Writing Center: Where Theory and Practice Collide

Zachary Lunn, *Biology*

Co-Authors: **Mari DeRuntz** *English Education*, **Haley Bean** *Social Work*, **Kelli Jacobs** *English Education*, **Kenley Patanella** *Biology*

Mentor: **Teagan Decker**

Presentation Format: Oral

Group papers can present logistical and pedagogical challenges for students, for instructors, and also for writing center tutors. Writing groups often don't work well together for a variety of reasons: time conflicts, personality conflicts, and various levels of interest and ability can make group papers hard on students. For instructors, achieving pedagogical goals can be frustrated by students who don't work well together or who don't understand the purposes of writing as a group. Writing center tutors working with group papers bear the brunt of this, working in the middle to facilitate learning goals under sometimes difficult or confusing circumstances. In our writing center, for example, we often encounter incomplete groups that expect us to review sections written by missing members. We conducted student surveys and collected observation reports from writing center tutors in order to provide insight on how writing centers can facilitate group-paper writing. Our research focused on purposes of group papers, the practices involved in writing group papers, and possible interventions writing center tutors can make to improve the process and the results. We presented our findings at the Southeastern Writing Centers Conference,

and with feedback from colleagues at the conference we continue to examine and adapt our writing center practices to better assist students.

7 - Health linked to Economic development in Trinidad and Tobago

Brandon McCree, *Business*

Mentor: **Lydia Gan**

Presentation Format: Oral

The objective of this paper is to inform the readers on the current state of health in Trinidad and Tobago and suggest ways in which they could improve health and development of the country. I decided to do the country of Trinidad and Tobago because I still have family who are citizens of the country and still live there. My father told me that his mother moved him to America for a better life and I could see why after visiting the country. In Trinidad and Tobago there are lists of health problems that have affected the country. The infant mortality rate was 24 per 1000 babies born in the country. The life expectancy of Trinidad and Tobago was 67.5 years for males and 72.6 for females. As of 2012 the Gross Domestic Product (GDP) and GDP per capita of Trinidad and Tobago was \$27.12 billion and \$20,400, respectively. The health expenditure accounted for 5.7% of the GDP. The unemployment rate for Trinidad and Tobago was 10.4%. Although the health industry of the country has been moving in the wrong direction since 2000, there are programs being implemented to help solve some of the healthcare issues facing the country. The conclusion of the paper shows that the healthcare industry in Trinidad and Tobago is linked closely to the economic conditions in the country. As the economy of the country move in the right direction, we can expect its healthcare system to improve the general health of the population.

8 - UNC Pembroke Student Food Insecurity Project

Jesenia Morales, *Sociology & Criminal Justice*

Co-Authors: **Sonya Hunt** *Psychology*, **Kiel Sampson** *Sociology & Criminal Justice*

Mentor: **Brooke Kelly**

Presentation Format: Oral

As part of an undergraduate service learning course on the sociology of poverty during the fall 2013 semester, students focused on gaining a better understanding of food insecurity of students on campus to share with the campus community. During the fall 2013 semester, our campus opened a food pantry due to the needs of students. When the pantry was in the process of opening, members of the campus community had trouble understanding how students could be hungry when there is so much food on campus. Our class project aimed to find out more about the extent of food insecurity on campus by surveying students across campus with a modified USDA self-administered food insecurity measure. The USDA defines food security as enough access by all people at all times to enough food for an active healthy lifestyle. A non-random sample of 200 students across campus found 82% of the students surveyed to be food insecure based on the USDA measure. The purpose of gathering data about food

insecurity on campus is to better inform the campus community and potential need for future programming or assistance.

9 - The Effects of Gravity on the Cori Cycle

Molly Musselwhite, *Biology*

Co-Authors: **Tiffany Scott** *Chemistry & Physics*, **Candace Langston** *Health, Physical Education & Recreation*, **Alejandra Mitchell** *Chemistry & Physics*

Mentors: **Siva Mandjiny**, **Timothy Ritter**

Presentation Format: Oral

With increased explorations into the outer realms of space, astronauts are put under new and unexplored stresses. Although there has been significant research conducted to investigate the effects of microgravity on many human biological mechanisms, there has been very little research conducted to better understand the effects of microgravity on the Cori cycle. The Cori cycle is responsible for the conversion of lactic acid in the muscle to pyruvate by way of the liver, which causes the production of the Adenosine triphosphate (ATP). ATP is used by muscle cells as an energy source for muscular contraction during muscular activity. In order to study this process we observed the reaction between Pyruvate and Nicotinamide adenine dinucleotide (NADH) in the presence of lactate dehydrogenase (LDH) to form Lactate and NAD⁺. Using a spectrophotometer, we measured the change in absorbance as NADH was consumed while the reaction occurred. Microgravity measurements were very recently made on board NASA's microgravity research aircraft as part of their Reduced Gravity Education Flight Program. This highly competitive program provides select undergraduate students the opportunity to fly experiments on their "0-g" aircraft. Flight data will be compared to ground truth measurements of the reaction made in 1-g. We present the findings of our investigation as well as future plans.

10 - Development of a Calibration Scheme for In Vivo Microiontophoresis

Marsalis Smith, *Chemistry & Physics*

Mentor: **Paul Flowers**

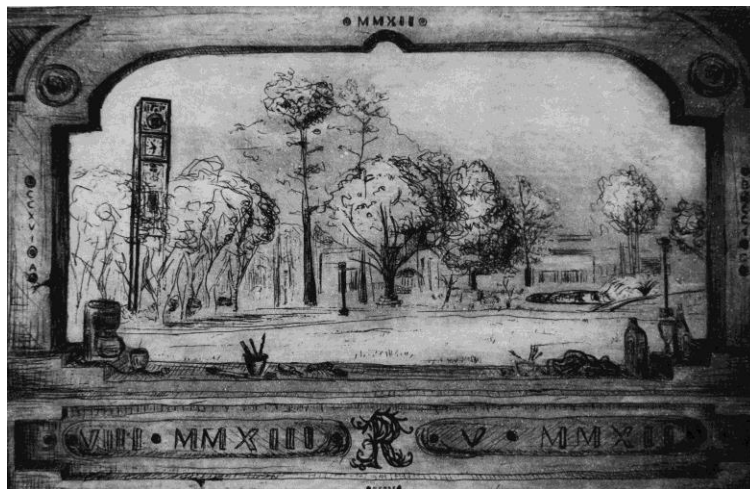
Presentation Format: Oral

Ionotophoresis is a technique for the transdermal administration of drugs that is commonly used in various clinical and laboratory settings. In neuropharmacology, the related technique of microionotophoresis utilizes very small implanted pipets to allow for precise ejection of drugs and related compounds into specific regions of the brain. Despite its many applications, microionotophoresis is a semi-quantitative approach to drug delivery since there is presently no means of directly measuring the amount of compound ejected. Research in our group aims to develop a calibration protocol suitable for in vivo applications of microionotophoresis using popular multi-barrel carbon fiber probes. In our approach, absolute ejection rates will be determined in vitro by photometric measurements and correlated with simultaneous voltammetric measurements. This protocol will allow accurate quantification of molecules ejected from the probes during in vivo use when photometric measurements are not possible. We have

used methylene blue to provide proof of concept for the photometric measurements, confirming the ejection rate varies linearly with time for a given iontophoresis current. Present work is directed towards characterizing the electrochemical traits of methylene blue at carbon-fiber electrodes, and future work will combine and correlate electrochemical and photometric measurements to construct an accurate and effective quantifiable model of microiontophoretic ejection. Support of this research by the UNCP RISE Program, funded by the National Institutes of Health, and the Pembroke Undergraduate Research and Creativity Center is gratefully acknowledged.

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