4-6-2016

11th Annual Focus on Creative Inquiry Poster Forum Program

Clemson University

Focus on Creative Inquiry

11th Annual
Poster Forum
April 6-7
2016

CLEMSON
CREATIVE INQUIRY

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11th Annual Focus On Creative Inquiry Poster Forum

The 2016 Focus on Creative Inquiry Poster Forum displays a selection of the projects accomplished by Clemson University students in their Creative Inquiry teams.

What is Creative Inquiry? It is small-group learning for all students, in all disciplines. It is the imaginative combination of engaged learning and undergraduate research – and it is unique to Clemson University.

In Creative Inquiry, small teams of undergraduate students work with faculty mentors to take on problems that spring from their own curiosity, a professor's challenge, or the pressing needs of the world around them. Students take ownership of their projects. They ask questions, they take risks, and they get answers.

Since its start in 2005, Creative Inquiry has supported more than 1000 projects enrolling approximately 25,000 undergraduate students.

Students may join Creative Inquiry teams as early as freshman year and continue through graduation and afterwards as graduate student mentors. They hone critical thinking and problem-solving skills as they learn to work in a team - sometimes as leaders, sometimes as followers. They develop communication skills as they present their work at professional conferences and to the external community, where they field questions from experts and decisionmakers.

Creative Inquiry alumni praise their experiences for exposing them to real-world work experiences not available in the classroom, providing hands-on research experiences, preparing them for their future careers and providing opportunities to work closely with faculty.

Indeed, Creative Inquiry is a campus-wide, cross-disciplinary culture that makes the Clemson experience relevant, engaging and extraordinary.

Learn more about Creative Inquiry in the annual Decipher magazine at clemson.edu/ci

CLEMSON
CREATIVE INQUIRY

ACKNOWLEDGEMENTS

CREATIVE INQUIRY COMMITTEE

Margaret Condrasky, Food, Nutrition and Packaging Sciences
Min Cao, Biological Sciences
Michael Henson, Biological Sciences
David Detrich, Art
Maribel Morey, History
James Gaubert, Marketing
Linda Gambrell, Teacher Education
Bob Brookover, Parks, Recreation, & Tourism Management
Bobby Hollandsworth, Library
Helen Adams, Administration & Advancement
Jeff Martin, Administration & Advancement
Suzanne Price, Student Affairs
Chris Trudell, Student Affairs
Kathy Woodard, Public Service & Agriculture
JoAnna Floyd, Research
Leah Boyd, Honors
Denny Lester, Watt Family Innovation Center
David Knox, Assessment
Shiva Mohan, Undergraduate Student - History
Roy Pargas, School of Computing
June Pilcher, Psychology

SCHEDULE OF EVENTS

6 APRIL WATT ATRIUM

8am-9:30am	Students Setup/Install Posters (Posters 1-52)
10am-12pm	Morning Poster Session
1pm-3pm	Afternoon Poster Session

7 APRIL WATT ATRIUM

8am-9:30am	Students Setup/Install Posters (Posters 53-101)
10am-12pm	Morning Poster Session
1pm-3pm	Afternoon Poster Session
3pm-4pm	Plenary Session, 106 Watt Center Welcome - Dr. Barbara Speziale Featured Speaker - Dr. Michael Childress, *Biological Sciences* Award Announcements - Cora Allard-Keese
4pm-5pm	Students Remove Posters

SPEAKERS

Michael J. Childress

Associate Professor of Biological Sciences

Dr. Childress is a behavioral ecologist studying the evolution of social behaviors in marine animals and the impacts of climate change on marine resources. He and his students conduct field research in the Florida Keys National Marine Sanctuary and the ACE Basin National Estuarine Research Reserve in South Carolina. Much of this work focuses on the relationship between climate, drought, habitat loss, and the behavioral response of marine life in coastal ecosystems, with the support of various NOAA agencies. Dr. Childress teaches courses in Behavioral Ecology, Marine Ecology and Biological Inquiry as well as his creative inquiry course in the Conservation of Marine Resources. He has supervised the research of seven graduate students, six Calhoun Honors students, and over 50 undergraduate CI students. He and his wife, Dr. Margaret Ptacek, enjoy organic gardening, and training Dalmatians to compete in conformation, obedience, lure coursing, and disc dog events.

Barbara J. Speziale

Director, Creative Inquiry

Dr. Barbara J. Speziale earned her Ph.D. in Zoology from Clemson University, a master's in Botany at the University of Minnesota and a bachelor's degree in Biology and in English Literature at the State University of New York at Binghamton. She has served Clemson University in public service, teaching, and administrative roles. She holds the rank of full professor in the Department of Biological Sciences, and directs Clemson's Creative Inquiry program. Dr. Speziale's research, funded by more than $13,000,000 in external grants, includes limnological studies of algae in freshwater lakes, water quality educational materials, and science education activities that encourage students, K-12 through college, to pursue science studies and careers. A National Science Foundation grant created the FIRST program to recruit and retain first-generation college students in science careers. The SC Life project, funded since 1998 by the Howard Hughes Medical Institute Precollege and Undergraduate Science Education Program, provides life sciences education for K-12 students, their teachers, and undergraduate students.

Cora Allard-Keese

Associate Director, Creative Inquiry

Cora Allard-Keese earned her M.S. in Entomology at the University of Kentucky and a B.S. in Biology at Millikin University. Currently, she is working on her doctorate in Wildlife and Fisheries Biology at Clemson University studying the impact of microclimate variations on the breeding phenology of the wood frog, *Lithobates sylvatica* and the impact if local resident knowledge on research and conservation efforts in highly dissected mountain landscapes. Cora joined the Office of Creative Inquiry and Undergraduate Research as the Associate Director in the fall of 2015. She has been a collaborator on several funded grants to enhance the pre-college learning experiences in the state of South Carolina, including grants through the Howard Hughes Medical Institute Precollege and Undergraduate Science Education Program. Though diverse disciplines compose her professional background, a reoccurring theme of engaging students in science and research via diverse and innovative methods is prevalent.

PLENARY LECTURE

Adaptation in a Changing Climate: *Lessons from Creative Inquiry*

Changes in climate are having major impacts on coastal marine ecosystems. This is especially true in shallow water estuaries where freshwater feeds the productive marsh and seagrass habitats that serve as nurseries for many commercially important fisheries species. However, recent changes in the volume and quality of freshwater input have led to habitat loss, increasing disease, and a shift in the factors that regulate these populations. My Conservation of Marine Resources creative inquiry team has been conducting field and laboratory experiments to better understand how marine animals behaviorally respond to these changes, helping us to predict the best course of action for successful management. The resilience of animals to behaviorally adapt to a changing climate is not well understood but has the potential to identify strategies that have been selected throughout their evolutionary history. Lessons from creative inquiry go far beyond providing research experiences for our students; they provide us with the essential tools we all need to adapt to the changing climate of our society.

6 APRIL

Poster #1

The Clemson MakerSpace

Mentors: Todd Schweisinger, Mechanical Engineering, Rachel Anderson, Engineering & Science Educatio
Students: Tyler Rodgers, Peter Weigman, Nolan Hoolachan, Macquon Jones, Owen Phillips, Jonathan Hord

Our project goal is to assist in the development of a Clemson Makerspace, meant to provide access to prototyping equipment at little to no cost, which would provide students opportunities to work with cutting-edge technology and apply their knowledge in an interactive and exciting way. Our team first surveyed specific groups on campus asking about their previous experience with 3D printers. Survey results showed a large percentage of students are interesting in 3D printer, but few have access to them. With information from the surveys, we were ableto begin to design the space around the demand as well as determine possible funding and management plans of the space. The Clemson Makerspace is currently operating in the Watt Family Innovation Center with six 3D printers (with six more coming next semester thanks to the undergraduate student government). Our team is currently helping to document usage of the space and continuing to brainstorm operational and funding plans for the future. We would like to thank the Watt Family Innovation Center, The Spiro Institute, Undergraduate Student Government, and Creative Inquiry for their support.

Poster #2

Blood Pressure, Emotional Dampening, and Risky Behavior: A Model and Converging Methods

Mentor: James A McCubbin, Psychology
Students: Rachel Basiura, Sabreena Cole, Kyla Davis, Jesse Grady, Chelsea Green, Stephanie Kinard, Catilyn Priddy, Brooke Spencer, Jessica Tucker, Kenneth Whitesides

Young adults with mildly elevated resting blood pressure (BP) have reduced emotional responses. Our laboratory has been involved in a systematic series of studies to investigate the impact of BP-associated emotional dampening. Our recent work combines the stress appraisal and the health belief models to predict risk-taking behavior from resting BP. We have designed a series of studies to test this hypothesis, and now report preliminary findings. Results from a study of 91 young men and women indicate significant correlations between self-reported risk-taking and both resting systolic [r(89)=.278, p=.008] and diastolic BP [r(89)=.309, p=.003]. These results are stronger in men than in women. A second study, using a high fidelity driving simulator, found that pre-driving diastolic BP is associated with increased speeding and tailgating in women [F(2,17)=5.097, p=.018]. In contrast, post-driving BPs were unrelated to risky driving. Additional studies are now in progress to examine the relationship between BP and financial risk taking in women and men. We expect to provide some preliminary data from this ongoing study at the FoCI poster session.

Poster #3

Role of Ethanol on Healthspan of *C. elegans*

Mentors: Yuqing Dong, Biological Sciences, Min Cao, Biological Sciences
Students: Li-Chien Hsu, Anna Phillips, Emily Rypkema, Meera Shah

Moderate consumption of alcohol has been reported to protect against age-related dementia and type 2 diabetes. Intriguingly, our recent studies showed that low concentrations of ethanol significantly promote *C. elegans* lifespan. This finding triggered our interest to use *C. elegans* as model to comprehensively understand how ethanol may influence aging process and its underlying mechanisms. To this end, we first need to know the effects of varying concentrations of ethanol on different life processes of *C. elegans*. In the present study, we specifically analyzed *C. elegans* brood size, body bend movement, and lifespan, respectively, when exposed to varying concentrations of ethanol. We then studied the influence of ethanol on the gut colonization of *C. elegans* fed with diet *E.coli* OP50.

Poster #4

Going My Own Way: Testing Why Spiny Lobsters Are Becoming Less Social

Mentors: Kylie Smith, Biological Sciences, Michael Childress, Biological Sciences
Students: Ashley Ehlert, Thomas Guryan

Caribbean spiny lobsters are one of the most important fisheries in the Caribbean. Conspecific attraction facilitates localization of suitable crevice shelters which reduces predation risk. However, den sharing can increase exposure to a lethal pathogen, PaV1. Recent studies have documented a significant decline in conspecific attraction. In this study we tested two hypotheses why juvenile lobsters may be showing less attraction and whether this influences their behavior. Lobsters from high disease or low shelter locations would be at greatest risk when sharing dens and are expected to show higher aggression and less den sharing. We observed the behavior and den sharing patterns of 24 juvenile lobsters from three locations in Florida Bay. Surprisingly, we found that lobster den sharing did not differ significantly by location and was lowest when shelters were abundant and disease absent. Lobsters did not show much aggressive behavior, with most interactions being social. These observations suggest that local conditions may not be a strong influence in loss of conspecific attraction.

Poster #5

Low Intensity Physical Activity Reduces Autonomic Coactivation and Heart Rate Variability During Stressful Cognitive Tasks

Mentors: June Pilcher, Psychology, Drew Morris, Psychology

Students: Cameron Drummond, Sarah Limyansky, Vanessa Macpherson

The purpose of this study was to examine the effects of low intensity physical activity on stress, as measured by heart rate variability. Eleven students (5 males, 6 females), with an average age of 19.4 (± 0.9), completed two sessions as part of a counterbalanced within-subjects design. In one session, subjects used the FitDesk, a stationary bike with a desktop. In a second session, subjects used a traditional wooden desk. While using each desk, participants completed the OSPAN working memory task, Flanker's arrow choice reaction time task, and a word recognition task to induce psychological stress. Using a blood volume pulse oximeter to record interbeat interval, it was found that autonomic cardiac coactivation and heart rate variability, indices of physiological stress management, were significantly lower for FitDesk users ($p<0.05$). These results indicate that active workstations like the FitDesk may help users reduce stress associated with difficult cognitive tasks.

Poster #6

Beware of Dog: Sleep Deprivation and Night Driving

Mentors: June Pilcher, Psychology, Drew Morris, Psychology

Students: Eva Diaz, Margaret Wilkes

The purpose of this study was to examine the effects of sleep deprivation on driving behavior. During a night of sleep deprivation, participants engaged in a driving task on an automotive driving simulator. Twenty-two students (10 males, 12 females) with a mean age of 20.3 (±2.4) completed a drive simulator track five separate times over the course of the night. Analyses of the participants' attention were conducted by evaluating their braking, acceleration, and lane position following a simulation of a dog crossing the road. These variables were analyzed 500 meters before and after the dog crossing. It was found that participants were more likely to swerve and less likely to apply the brake/let off the gas over the course of a night without sleep. These results suggest that driving while sleep deprived both decreases situational attention and exacerbates driving variability in response to dangers.

Poster #7

Values of a General Education ePortfolio

Mentor: Benjamin R Stephens, Psychology

Students: Murphy Carter, Gabrielle Moss, Rebecca Pittman, Nettie Shull, Cierra Stanton

Clemson University used to require students to complete a general education ePortifolio prior to being eligible to graduate. Many students and faculty protested this requirement so it was removed from the curriculum. We are investigating why students did not find the general education ePortfolio beneficial. We surveyed students in introductory psychology courses. We showed participants examples of how learning goals were presented in an ePortfolio. We then asked students to rate the extent to which they felt three different types of learning goals (major specific, relevant general education, irrelevant general education) were valuable. Participants rated learning goals specific to their major and general education learning goals relevant to their major significantly higher than learning goals not relevant to their major. These findings could assist in the creation of a revised ePortfolio requirement that students would feel was beneficial.

Poster #8

The Role of Meaningful Work in Astronaut Health and Performance During Long Duration Space Exploration Missions

Mentor: Thomas W. Britt Jr, Psychology

Students: Ashley Brady, Danielle Dimuzio, Stephanie Jeffirs, Jack Wilkes

INTRODUCTION: The present study examined how engagement in meaningful work may decrease the demands associated with boredom and monotony on LDSEM, as well as buffer astronauts from the negative consequences associated with stressors likely to be encountered on these missions. **METHODS:** We conducted interviews with nine subject matter experts (SMEs), including two former astronauts and a number of mission support personnel. Questions addressed the sources of meaning for astronauts and recommended interventions to sustain engagement and meaning. **RESULTS:** SMEs mentioned contributing to humanity, contributing to the mission, exploration, and autonomy over their schedule as the most meaningful aspects of their work. Top recommendations to sustain meaning were the strategic use of social media, giving astronauts autonomy as well as structure, and conducting training during transit. **DISCUSSION:** The interview responses highlight the importance of helping astronauts realize the impact their involvement is having on LDSEM. Future research is needed to evaluate the efficacy of recommendations to enhance meaning during LDSEM.

Poster #9

Health and Business Topics in Film and Media

Mentor: Graciela Tissera, Languages

Students: Emily Blackshire, Elouise Cram, Chelsea Frasier, Nigel James, Merritt McCully, Andrea Rojas, Alyssa Sullivan, Andrew Valvo, Allison Watkins, Therese van der Horst, Chardrevius Martin

This project will analyze different perspectives on health, business, and related topics to explore their impact on Hispanic countries and other areas of the world. Students will research historical and cultural aspects of several nations through videos, mass media, and pertinent materials (such as actual footage, film adaptations of novels, documentaries, movies based on real events, and business and medical literature) by world renowned authors and film directors.

Poster #10

Ultrasound Elastography Probe Design for Rotator Cuff Diagnosis

Mentors: David Kwartowitz, Bioengineering, Delphine Dean, Bioengineering

Students: Christopher Bocklet, William Harley, Glenn Hefter, Emily Kowal, Mari Marlowe, Mia Warner

The goal of our project is to design an attachment system for an ultrasound probe that can determine the pressure being applied to the patient during the imaging process. This attachment system provides measures of tissue mechanical stiffness to the operator that can assist with the determination of rotator cuff injury/disease diagnosis and/or that can be used in the design of treatment plans. For this study, we characterized agarose gels to test the reliability of our novel system in determining the mechanical properties of soft tissue-like materials. Stretch conductive fabric and ex-static conductive fabric were used to make the pressure pads by layering them like a sandwich with the stretch conductive fabric on the outside and two layers of ex-static fabric in the middle and sewing them together; making sure that the two layers of stretch conductive fabric do not touch. The average elastic modulus of the agarose gel that was determined from the ultrasound imaging and pressure pad data (130.5+/-34.5kPa) was consistently higher than the elastic modulus measured by the Bose Electro Force system. Further testing will be done to investigate the discrepancy between the elastic modulus measured by the Bose Electro Force and the Ultrasound Imaging and Pressure Pad data.

Poster #11

Swimming in Terrestrial Turtles: Does Limb Function Correlate with Ecology or Phylogeny?

Mentor: Richard Blob, Biological Sciences

Student: Kaitlyn Vest

Although aquatic lifestyles are considered ancestral among extant turtles, multiple lineages, such as tortoises and box turtles, independently invaded terrestrial habitats. To what extent are swimming patterns retained in such lineages despite terrestrial specialization? Tortoises diverged from other turtles

45 million years before box turtles. We hypothesized that swimming by box turtles would more closely resemble that of aquatic relatives than that of tortoises. We compared high-speed video of swimming box turtles (*Terrapene carolina*), tortoises (*Testudo horsfieldii*), and two semiaquatic species: sliders (*Trachemys scripta*) and painted turtles (*Chrysemys picta*). Kinematic analyses revealed that, in the forelimb, box turtle strokes most resemble those of tortoises, indicating environmental specialization; in the hind limb, box turtles show more similarity to semiaquatic species, indicating phylogenetic influence. Supported by CI Grant #479.

Poster #12

Cellular Export of Isoprenoids for Biofuel Synthesis

Mentor: Tzuen-Rong J Tzeng, Biological Sciences

Students: Laura Bickford, Christina Chiu, Jared Eller, Mohit Gandhi, Rebecca Jones, Albert Tzeng, Michael Summers, Jennifer Wilson, Rhea Mathew, Stephen Hoy, Stephen Borthayre, Jay Sridharan

The need for alternative energy sources has driven the scientific community to explore biofuels, energy sources produced by living things or their wastes; thus we set out to find an economically efficient method for the production and harvesting of biofuels. We are currently in the process of investing the production of isoprenoids by *Escherichia coli* DH10B transformed with plasmids for zeaxanthin, canthaxanthin, ß-carotene, and lycopene production as well as determining the optimal concentration of isoprenoid export for the efflux pumps StMsbA and EcoMsbA. We have confirmed that transformed cells produce their respective isoprenoid through analysis of intracellular isoprenoid content, but extracellular isoprenoid was only detected in the presence of a plasmid containing an efflux pump.

Poster #13

Investigation of Inhibition of Members of the Gastrointestinal Microbiota to Prevent or Delay the Onset of Type 1 Diabetes.

Mentors: Kristi Whitehead, Biological Sciences, Daniel Whitehead, Chemistry

Students: Neal Patel, Nicholle Stein

Before the onset of Type I Diabetes, there is an observed bloom of bacteria originating from the Bacteroidetes phylum. This project investigates therapeutics that inhibit the Starch Utilization System (SUS) of Bacteroidetes species in order to try to prevent this bloom. By inhibiting the SUS, the cell must find alternative methods of metabolism, thus slowing growth. The effect of Acarbose, an alpha-amylase inhibitor, on inhibiting the SUS of *B. theta* and *Lactobacillus reuteri* (*L. reuteri* - a member of the Firmicutes phylum) has been investigated through assays with various carbohydrates in the media. The inhibition is determined after 24 hours by measuring the optical density at a wavelength of 600nm. Tests with *L. reuteri* showed little to no inhibition at 100 uM of acarbose. After testing *B. theta* with various concentrations of Acarbose, there is 95% inhibition of *B. theta* with pullulan as a carbon source and 100 uM of acarbose . Based off of these preliminary results, the effects of Acarbose are being investigated in vivo in non-obese, diabetic mice at the University of Florida.

Poster #14

The Effects of Birth Satisfaction and Labor Choices on the Development of Postpartum Mood Disorders

Mentor: Lisa Miller, School of Nursing

Students: Brianna Allemond, Kathryn Graening, Hanna Sheffrin

Postpartum depression (PPD) affects 10-15% of mothers. Research shows that self-esteem, negative body-image, and spousal support contribute to the development of PPD. The symptoms of PPD include loss of interest in the baby, fatigue, and loss of appetite. This pilot study tests whether the use of Pretty Pushers maternity gowns decreases the incidence of postpartum depression in new mothers in upstate South Carolina. Scores from the Edinburgh Postnatal Depression Scale (EPDS) and a birth satisfaction survey will be evaluated 6 weeks postpartum to compare the group of mothers wearing the Pretty Pusher gowns to the group of mothers wearing hospital gowns. This research will determine if the ability to make decisions concerning labor will increase birth satisfaction and therefore decrease the likelihood of developing PPD. This research has been sponsored by Calhoun Honors College and the Creative Inquiry Program.

Poster #15

No Goats, No Glory? Making a Case for the Integrated Management of Invasive Species

Mentors: Donald Hagan, Forestry & Environment Conserv, Jeremy Pike, Ag & Environmental Sciences, Calvin Sawyer, Ag & Environmental Sciences

Students: Carolyn Lanza, Alicia McAlhaney, Julia Riley

The Hunnicutt Creek Restoration Project is an ongoing effort started in 2013 with the goal of re-establishing the natural functions and conditions of a degraded watershed on Clemson University's campus. Monitoring and removal of invasive species, primarily Chinese Privet and Silverthorn, within the upper reaches of the watershed is an important step toward restoring a natural and more aesthetically pleasing system. We established thirty 5x5 meter plots, using the Carolina Vegetative Survey protocol, to measure the effectiveness of various removal techniques (chemical, mechanical, mechanical and chemical, and prescribed grazing). Five plots were randomly assigned to each of these treatments in addition to five control plots. Results indicate that the chemical and mechanical treatment is the most effective at reducing cover and stem count of invasive species, followed by the chemical treatment. The goats were effective in temporarily opening up the landscape but we observed vigorous regrowth in the year following goat deployment. Further restoration efforts are being made with the propagation of desired native species for eventual introduction into watershed.

Poster #16

Macroscopic Model of Atomic Force Microscopy

Mentor: Vladimir Reukov, Bioengineering

Students: William Bagnal, Bryan Canas, Thomas Roberts, Jacob Tilles

The Atomic Force Microscope (AFM) is an important tool in modern nanoscience, capable of producing surface maps at resolutions below 1nm, which is not possible using other microscopy methods. This model will act as an educational tool to show the principles behind the conceptually difficult AFM to students. The Atomic Force Microscope (AFM) is an important tool in modern nanoscience, capable of producing surface maps at resolutions below 1nm, which is not possible using other microscopy methods. Currently, a fully automatic surface scanner has been built and successfully tested. A student designed MATLAB program converts the video of the scan into both two and three dimensional real-time topographic renderings. The variety of outputs updating in real-time makes it easier to understand the step-by-step functioning of an AFM. Continued work includes refining the stage movement, refining the rendering code, and refining the mechanical components, and get this into classrooms.

Poster #17

Development of 3D Printer / Low Cost Bionic Hand Actuated by Electronic Muscle Pulses

Mentors: Melissa McCullough, Bioengineering, Jorge Rodriguez, Bioengineering

Students: Benjamin Bryla, Kylee Denardo, Jackson Faulling, Christopher Hicks, Hope Johnson, Chance Mahanes, Matthew Roach, Jonah Robison, Megan Sech, Andrew Sedler, Austin Stewart, Catherine Zemitis, Steven Gannon, Jaylin Carter

Progress made in 3D printing technology has opened the door to its application in the prosthetic's field. By using sourced mechanical components, such as small motors and an in-house 3D printer, we have developed an easy to assemble prosthetic hand with customizable sizing and mechanical function. Each finger is powered by one small motor with a bracket on each side, providing a full anatomical range of motion with high torque. Furthermore, 3D printing allows ease of customization for the user in an efficient manner. CAD files can be easily scaled and modified to best fit the needs of the user and recommendations from a prosthetist. In the initial semester of prototype development, Fall 2015, the group divided research into programming, fabrication, and electronics. The initial motion goal was to provide basic extension and flexion of the wrist and fingers. The team created three different hand designs and has taken the best components from each to move forward with in the Spring 2016 semester. Because the hand is designed to be modular the team is investigating several different developments, some of which include worm gears, elastics, and fingertip suction.

Poster #18

Using computing engineering to improve seabird conservation

Mentors: Jacob Sorber, School of Computing, Patrick Jodice, Forestry & Environment Conserv, Yvan Satge, Forestry & Environment Conserv

Students: Mitchell Devenport, Siliang Luo, Omar Mayar, Winslow Mohr, Andrew Tomberg, Jeremy Wilder

Pelagic seabirds, which travel through expansive and distant marine regions, are one of the most threatened groups of birds globally. To study how seabirds use the marine environment, ecologists must first understand their nesting patterns. Current methods are labor intensive or require expensive infrastructure, and are inefficient for monitoring seabirds in remote locations. Our goal is to enable automated, low-cost nest monitoring for remote locations.Our design combines low-power, low-cost components (RFID readers, microcontrollers, and radios) to record when birds are nesting and automatically transmit the information to the ecologists over the Internet, via satellite. This project is a collaborative effort between Ecologists, Computer Scientists, and Electrical Engineers, which includes custom hardware, software, and network protocols. There are plans to field-test this system at Sint Eustatius in May of 2016 on nesting *Phaethon aethereus*, a common seabird in the Caribbean.

Poster #19

Creative Explorations with LEGO

Mentor: Carlos Barrios, School of Architecture

Students: Perry Hammond, Philip Hood, Michael King, Lorne Southern

This project shows applications of creative design using LEGO bricks in combination with 3D printing.

Poster #20

Use of Biotechnology for Engineering Microbial Systems

Mentor: Mark Blenner, Chemical & Biomolecular Eng

Students: Shanna Pearce, Alana Robinson, William Wiseman

Team members in the *Engineering Protein Post-Translational Modifications for Therapeutics* Creative Inquiry will actively engage in using and creating biotechnology to improve the production of protein and peptide therapeutics. Specifically, we will develop platforms for efficiently tyrosine sulfation – a post-translational modification important for several interactions in the immune system. Most notably, antibodies with tyrosine sulfation are able to mimic the HIV receptor. CI students work with Dr. Blenner, graduate student mentors, and fellow CI team members in a highly active interdisciplinary research environment. Students learn how to identify a problem, design and conduct experiments using state-of-art laboratory equipment, analyze data, and communicate findings. To learn more about the projects available through this Creative Inquiry, or summer research opportunities, please contact Dr. Mark Blenner (blenner@clemson.edu) to schedule an appointment. Open to students in: Chemical Engineering, Biomolecular Engineering, Biosystems Engineering, Bioengineering, Microbiology, Biochemistry, Chemistry, Biological Sciences, and others.

Poster #21

Therapeutic Hypothermia

Mentor: John Whitcomb, School of Nursing

Students: Katelyn Beardsley, Sara Brandon, Leah Karol, Cassie Stewart

Therapeutic hypothermia (TH) has improved patient outcomes post-cardiac arrest. Cooling patients' body temperatures has proven to reduce brain edema, reducing neurological complications associated with a cardiac event. This study's purpose is to identify factors that improve TH outcomes in post-cardiac arrest patients, thus creating a nationally standardized protocol. Variables include patient demographics, clinical characteristics, the arrest event, recovery post three months by Cerebral Performance Categories (CPC) score, cooling temperature, and lab values collected throughout treatment. Subjects are patients at Greenville Memorial Hospital (GMH) that have undergone TH. This is a retrospective observational cohort study, so existing data from charts at GMH were used. Data collection is in progress. While it is unlikely that participants will receive any direct benefits, knowledge gained will benefit healthcare providers and society as a whole. Analysis of data will result in a better understanding of TH and factors that produce positive outcomes, which will empower providers to save lives. Sponsors for this research have been Calhoun Honors College and the Creative Inquiry Program.

Poster #22

Identifying the Relationship Between Salamander Skin Morphology and Skin Resistance to Water Loss in *Plethodon metcalfi*

Mentors: Eric Riddell, Biological Sciences, Michael Sears, Biological Sciences
Students: Carlie Blankenship, Jason Damm, Martin Duncan, Jonathan Odom

For amphibians, water loss rates are major drivers of geographic distributions, habitat suitability, and potential for fitness-related activities. However, the mechanisms by which they regulate water loss are not understood. For this research, we used southern grey-cheeked salamanders (*Plethodon metcalfi*). To measure skin resistance to water loss, we used a flow-through system capable of precisely controlling temperature and water vapor pressure. We then measured the thickness of the epidermal, dermal, and subcutaneous layers from samples of dorsal skin. We recorded the number and types of glands in the skin to determine any correlation with resistance to water loss. Ultimately we found that there is no correlation between skin thickness or gland count and resistance to water loss. This research has ruled out one major hypothesis, and thus narrows the focus for future research into this topic.

Poster #23

Listen to Me! Vocal Intensity as a Team Leadership Metric

Mentors: Marissa Shuffler , Psychology, William Kramer, Psychology, Nastassia Savage, Psychology, Dana Verhoeven, Psychology
Student: Erin Moran

The advent of modern technology is providing organizations with a multitude of unique ways to examine behavioral patterns and effectiveness of teams. For instance, the use of wearable sensor arrays is experiencing a surge in popularity as a non-invasive method for measuring team dynamics. One such proxy for traditional survey-based measurement of teamwork is the use of vocal intensity. Defined as the loudness and physical energy of one's speech patterns, vocal intensity affects whether or not others perceive one as assertive or dominant. While there is existing research linking speech patterns to perceptions of hierarchy, our research goes one step further by determining how vocal intensity influences perceptions of shared leadership in the dynamic, social context of an ad-hoc team. We will be presenting results from a lab study of over 100 ad hoc teams and the following questions will be examined: 1. Is there a relationship between vocal intensity and perceptions of shared leadership? 2. Is vocal intensity more predictive of shared leadership in the action or the transition phase?

Poster #24

Influence of Probiotics on Fat Storage in *Caenorhabditis elegans*

Mentors: Min Cao, Biological Sciences, Yuqing Dong, Biological Sciences
Students: Andrew Gitto, James Sullivan, Miranda Klees

Live bacteria ingested by a host providing beneficial effects to the host are called probiotics. At the start of the 20th century, the Nobel laureate Élie Metchnikoff hypothesized that the consumption of certain foods containing lactic acid bacteria could influence the health of a person in a positive way by altering their gut microbiota. Recent research in our lab found that five probiotic strains may extend *C. elegans* lifespan when the probiotics are consumed under monoxenic conditions compared to control feeding of *Escherichia coli* OP50. Considering that metabolism of fatty acids plays an imperative role in regulating healthy lifespan, we questioned whether ingestion of these specific probiotics may benefit fat storage in animals. We will use *C. elegans* mutants that display phenotypes of obesity to evaluate if the probiotics identified above have the ability to reduce the disease phenotype. Given the genetic homology between *C. elegans* and humans, combined with the simplicity of creating a monoxenic gut microbiota, *C. elegans* will be an ideal model to further investigate the underlying mechanisms of how these probiotics influence fat storage in animals.

Poster #25

Survival of Upper Piedmont Stream Fishes Implanted with a Passive Integrated Transponder Tag

Mentor: Yoichiro Kanno, Forestry & Environment Conserv
Students: Joshua Cary, Morgan Reed, Matthew Steffensen

We studied weekly and bi-monthly survival of select non-game fishes in upper Piedmont streams of

South Carolina implanted with an 8-mm passive integrated transponder (PIT) tag. Weekly survival rates were 96% and tag retention rates of surviving individuals (>40mm TL) kept in stream cages were >99% across species (Bluehead Chub *Nocomis leptocephalus*, Creek Chub *Semotilus atromaculatus*, Yellowfin Shiner *Notropis lutipinnis*, Mottled Sculpin *Cottus bairdii*, and Striped Jumprock *Moxostoma rupiscartes*) and these rates did not differ from control cages where individuals were kept for a week without being implanted with a PIT tag. Bi-monthly survival was inferred by conducting a mark-recapture study based on tagging >2,400 individuals of Bluehead Chub, Creek Chub, Mottled Sculpin and Striped Jumprock in two stream sections (740m and 520m long). A Bayesian state-space analysis of Cormack-Jolly-Seber models indicated that survival and detection probabilities differed among species and sites. Additional data collection is ongoing to understand demographic response and synchrony among these species. Our initial results indicate that PIT tags can be successfully applied to study population dynamics of small-bodied non-game fish species.

Poster #26

Examining the Efficacy of a Suicide Prevention Advocacy Training

Mentors: Heidi Zinzow, Psychology, Martha Thompson, Public Health Sciences
Students: Cayley Balser, Robert Calvert, Ashleigh Dickson, Stephanie Jeffirs, Alexa Kramer
Suicide is the 2nd leading cause of death among college students. The present study was dedicated to examining the efficacy of a suicide prevention advocacy training. The training included education about suicide and how to help, and focused on promoting effective communication regarding suicidal thoughts or intentions. We recruited 299 participants from various Clemson University organizations. Survey assessments included an evaluation of trainees' roles on campus and a 14-item awareness measure assessing for knowledge about suicide and appropriate responses. Paired samples t-test analyses demonstrated a significant difference in the total mean score for the awareness measure between pre- and post-test, $t(286)=31.68$, $p<.001$. Paired samples t-test analyses also revealed significant differences between pre- and post-test on all 14 items. The present study suggests the practical importance of a suicide prevention advocacy gatekeeper intervention for any college campus. Sponsored by the Substance Abuse and Mental Health Services Administration.

Poster #27

What Explains Tolerance toward Government (and Private) Corruption? Evidence from Argentina

Mentors: Steven Miller, Political Science, K. Amber Curtis, Political Science
Students: Virginia Forrester, Joanna Olivera, Kailey Pickitt, Machaella Reisman, Emmaline Schafer, Morgan Winkler
When do individuals tolerate government corruption? Can citizens tolerate government corruption but not tolerate corrupt behavior by other societal actors? We argue past scholarship on attitudes toward corruption rely on vague, problematic measures that have hampered our ability to answer these questions. Our Creative Inquiry team improves inferences about tolerance of corruption in government and society with an original, nationally representative survey we conducted in Argentina in February 2016. Our unique questions both better probe respondents' views on corruption and give us leverage over the varying effects that factors like education levels, economic concerns, and perceived security threat over the Falkland Islands have on attitudes toward different forms of corruption. We conclude with our analyses' implications for better understanding the determinants of tolerating corrupt behavior in politics and society.

Poster #28

Validation Testing of a Novel Central Venous Catheterization Simulator

Mentors: Jiro Nagatomi, Bioengineering, Delphine Dean, Bioengineering

Students: Alex Barrett, Jordan Casey, Jennifer Jacoby, Julianne Jett, Regan Van Metre

Our Creative Inquiry group has developed a central venous catheterization (CVC) training simulator. CVC entails the insertion of a catheter into a sizable vein in order to deliver a large influx of drugs to the heart. Due to the proximity of the vein to the heart, lungs, and major arteries, this procedure is risky. Many complications can arise, often as a result of expensive and ineffective training methods. We have created an affordable simulator with features that address the limitations of current simulators, including proper anatomical landmarks and ultrasoundability. We are currently conducting validation testing in which physicians from Greenville Health System run CVC on our simulator and provide feedback via survey.

Poster #29

Individual Variation in Nesting Strategies Within a Population of Eastern Fence Lizards

Mentors: Michael Carlo, Biological Sciences, Michael Sears, Biological Sciences

Students: Rachel Stevenson, Madison Feiste

Perhaps the most important decision a mother makes for her offspring is where to lay her nest, as it determines the developmental environment. For instance, Eastern fence lizards (*Sceloporus undulatus*) dig shallow underground nests, where embryos experience daily fluctuations in temperature and moisture. Research suggests *S. undulatus* move long distances beyond their home ranges to nest in the warmest parts of the habitat. Yet, climate change may push conditions at nest sites toward the physiological limits of embryos. Alternative nesting strategies could enable persistence under warming if fence lizards can select cooler, shadier sites. In this study, we radio-tracked *S. undulatus* in SC to compare nesting behavior to habitat use during the summer breeding season. Results showed variation in nest site selection and nest quality (e.g., shade, temperature, moisture). Alternative nesting strategies could benefit populations by buffering developing lizards from effects of climate warming.

Poster #30

Effects of Mammography Radiation on Breast Cancer Severity

Mentors: Julia Eggert, School of Nursing, Sourat Darabi, School of Nursing

Students: William Geer, Hannah Sloger, Corianne Powell, Dani Inglesby, Morgan Peterson

Our purpose is to investigate biomarkers in women with breast cancer to determine if an increased number of mammograms correlate to an increased risk for breast cancer development. Our population consists of 600 women in the Upstate of South Carolina. These women have been seen at an inherited cancer clinic and meet the following criteria: Women considered high risk for breast cancer based on NCCN guidelines, and women considered high risk and currently have breast cancer diagnosis, also based on NCCN guidelines. The methodology used is a retrospective chart audit, convenience method with no manipulation, randomization, or controls. No significant results were found after data analysis. The results reiterate the current NCCN guidelines for high-risk women receiving mammographies and do not reflect any implications for practice. We would like to thank both the Calhoun Honors College and Clemson Creative Inquiry for sponsoring our research.

Poster #31

Teaching Induction and Deduction for our QEP

Mentor: Benjamin R Stephens, Psychology

Students: Chloe Beesburg, Victoria Brewer, Allison Carney, Caitlin Dicke, Rebecca Pittman, Amanda Schneider, Danielle Stevens, Krista Yockel

One of the primary objectives of our QEP is to assist undergraduates in the development of their critical thinking skills. Critical thinking has been defined as the ability to identify central issues or assumptions in an argument, eliminate useless information, evaluate evidence and alternative explanations, provide support for a conclusion, and read with a high level of comprehension. In an effort to enhance critical thinking via instructional modules, we employed an inductive/deductive multiple-choice pretest/posttest design. This design consisted of twelve-item pretest questions assessing inductive and deductive arguments, with eight category response alternatives (inductive/deductive, weak/strong/valid/invalid). After the pretest, participants are given either a tutorial explaining inductive and deductive reasoning or a tutorial explaining

operant and classical conditioning. After the tutorial, they complete a posttest. The results should help us identify ways to teach and communicate critical thinking skills.

Poster #32

Donor Human Milk

Mentor: Nancy K Meehan, School of Nursing

Student: Abbey Robinson

The nutritional and immunobiological components of breast milk contribute to the essential growth and development of infants. The idea of mothers donating their excess milk to other mothers unable to breast-feed is termed *donor human milk* (DHM). This study aims to describe a cohort of 375 infants (< 1 year of age) who received donor human milk at The Children's Hospital of Philadelphia through a retrospective study. The study collected descriptive data including gestational age, birth weight, diagnosis, total number of days receiving donor human milk, volume of donor milk per day/total volume, ordered diet at discharge, cost, and total length of stay. The resulting data is currently being statistically analyzed; thus, the findings cannot be properly summarized. The conclusion of the research should describe indications of DHM and looks to increase its use nationwide. I am thankful for support of my research mentor, Dr. Diane Spatz with the University of Pennsylvania School of Nursing.

Poster #33

Design and Construction of a Reverse Osmosis Membrane System for Education and Outreach

Mentor: Christine Duval, Chemical & Biomolecular Eng

Students: Julia Metri, Christine Mullan, Graham Reed, Shannon Roberson, Joseph Tedder, Brenna Westbrook

Clean water is essential for human life. Reverse osmosis (RO) is an emerging technology which uses a semipermeable membrane for water purification. The goal of this creative inquiry project is to design and construct a reverse osmosis unit that can be used by students to learn about the challenges of optimizing RO units and membrane separations. Learning how to capture RO's full potential as the process becomes more common is important because it is a viable method to provide clean drinking water for the world. After researching existing RO technologies a portable unit was designed. Calculations were performed to determine the limits of our operating conditions including maximum size of the pump and minimum size of the piping through the process. After designing a unit using the GE Osmonics AK Series Membrane that can withstand 115 psi and perform with a rejection of 99.0% within an acrylic shell that can withstand 400 psi, the components' including piping, feed pump, conductivity meters and thermocouples, total cost was $10,000. Construction is already underway. This portable RO unit will be used for both classroom experiments and outreach demonstrations that educate undergraduate students and inspire future engineers.

Poster #34

Do Trails and Roads Facilitate Plant Invasions in Multi-use Forests?

Mentor: Donald Hagan, Forestry & Environment Conserv

Students: Natalie Bock, William Durham, Alison Rehfus, Trevor Stamey

The spread of exotic invasive plant species is major issue in multiple use forests throughout the United States. In the Clemson Experimental Forest, invasive plant species are commonly found near trailheads and alongside roads and trails. However, the ecological mechanisms that explain these patterns of invasion are not well understood. We conducted a study to determine if anthropogenic activity on trails and roads resulted in increasing the spread of these invasive species. Our results indicate that most exotic invasive species decreased in cover with increasing distance from trails and roads, and this was especially true of Japanese stiltgrass (*Microstegium vimineum*). In order to research the patterns of Japanese stiltgrass invasion further, we conducted an experimental addition study to determine which trail users' disturbance (hikers, bikers and horseback riders) might be contributing to its establishment. An improved understanding of exotic invasive species in multiple use forests will allow forest managers to predict where the invasive species are most likely to establish, thereby enabling them to more efficiently respond to this growing issue.

Poster #35

Who Runs the World? Eastern Gray Squirrels (*Sciurus carolinensis*)! All Others Excluded!

Mentors: Todd Schweisinger, Mechanical Engineering, Kristina Dunn, Aquaculture, Fish and Wildlife

Students: Robert Baumgardner, Morghan Davidson, Bryan Sheehy, Myranda Thomas, Wayne Chao

The purpose of this research project was to redesign the current hopper being used to administer contraceptive bait to gray squirrels on Clemson University's main campus. Our goal was to optimize contraceptive bait consumption by the target species, gray squirrels, while minimizing bait consumption by all other species. After examination of the hopper, the researchers defined a list of both criteria and constraints. Once prototypes were developed, they were tested in the field. Each was placed in a tree with an original hopper and all hoppers had camera traps on them to record bait consumption. Photos were analyzed to determine if the modifications allowed the target species to consume seed while reducing non-target access. Results were used to determine which modification best met the goal.

Poster #36

Organic Light-Emitting Diodes for Biomedical Application

Mentors: Vladimir Reukov, Bioengineering, Dmitry Gil, Bioengineering

Students: Matthew Burt, Shannon Daly, Amanda David, Zachariah Lindower, Alison Markley, Grace Mcnamara, Jeannette Rodriguez Gonzalez, Andrew Sedler, Adrian Zenteno

Organic light-emitting diodes (OLEDs) offer many advantages over their closest competitors, liquid crystal displays (LCDs) and light emitting diodes (LEDs). OLED screens are often touted for their incredible picture quality and lower power consumption. Moreover, OLED panels can be durable and lighter which give additional options for portable device manufacturers. That is why OLED technology is expected to change the way we use displays.

It was shown that OLEDs can be successfully implemented for biomedical application. For instance, OLEDs are used in analyzing living cells and organisms. Possibilities exist in detecting oxygen and glucose levels in the body and as an implant to activate photosensitive drugs.

The purpose of this creative inquiry is to manufacture a single OLED starting with synthesizing luminophore, coating a substrate, encapsulating the diode and finally manufacturing the electrical contacts.

Poster #37

Martian Soil Simulant - Mechanical Properties and Feasibility as Building Blocks

Mentor: Qiushi Chen, Civil Engineering

Students: Michael Burden, Joel Miller, Miho Shiotani, Chaofeng Wang, Kousaalya Bakthavatchalam, Srikanth Pilla

Efficient in-situ resource utilization is a critical component of NASA's current and future Mars exploration missions. The ability to build infrastructure using in-situ resources will enable the construction of roads, landing pads, habitats and other structures that provide mechanical, thermal and radiation protection for human explorers with minimal payload weight launched from Earth. In this project, the team develops a process for synthesizing novel regolith-based composite materials for the creation of functional building blocks with UV curing technology. The team also investigates the mechanical properties of the Martian soil simulants and the synthesized composite building blocks with different regolith to binder ratio, which are indication of their feasibility as building blocks.

Poster #38

Biomimicry

Mentor: Carlos Barrios, School of Architecture

Students: Emily Alderson, Thomas Curry, Max Faykus, Jillian Gaskins, Samantha Grubb, Nicholas Hafner, Bradley Kittrell, Matthew Lindler, Nicholas Loe, Elena Miyasato, Joseph Rabin, Sara Rolfe, Kaelyn Tharp

Preliminary results of the first few experiments in underwater research and biomimicry.

Poster #39

Evaluation of Management Alternatives Following Ice Storms

Mentor: Patrick Hiesl, Forestry & Environment Conserv

Students: Mark Boyd, John Deason, Jon Herndon, Glenn Rippon

The 2014 ice storm in South Carolina caused 360 million dollars' worth of damage to timber stands. Following an ice storm, forest managers across the Southeast are faced with numerous economic decisions in managing damaged stands. In this Creative Inquiry project our goal is to quantify the economic impact of multiple management alternatives. We will achieve our goal by utilizing computer simulations using plot level Forest Inventory & Analysis (FIA) data. We will meet with the local forest products industry to better understand current decision making processes and management procedures. Results from this project will help forest managers to make the most economical decision following future ice storms and other natural events.

Poster #40

Bouncing to Success: How Does in Classroom Bouncy Band Usage Impact Attention?

Mentor: June Pilcher, Psychology

Students: Taylor Roberson, Linda Harley, Shelby McGill, Harriet Pruitt

Research suggest that physical activity could improve academic performance. Bouncy Bands provide children access to subtle activity in the classroom. The purpose of this study is to explore the effect of Bouncy Band use on attention among elementary school students. Twenty-seven students were recruited through an after school program. Half of the students were provided with Bouncy Bands, which they used for three weeks, while half were not. The students completed an attention task before and after the Bouncy Bands were installed. There was no significant difference in correctly identified attention items between the groups at pretest, $t(df)=-1.805(25)$, $p=0.083$. However, students who had access to the bands identified significantly more "d2" items compared to the students who did not have access to the bands, $t(df)=-2.757(25), p=.011$. These results indicate that Bouncy Band usage may increase attention in the classroom, which could lead to the placement of Bouncy Bands in schools.

Poster #41

Historical Murals from Charleston

Mentors: Carlos Barrios, School of Architecture, Ufuk Ersoy, School of Architecture

Students: Lorne Southern, Mujie Guan

This project presents 8 architectural collage murals depicting the spatial and architectonic elements of Charleston. The murals are based on the tradition of the Ecole de Beaux Arts architectural collages.

Poster #42

3D Printing Architecture

Mentor: David Lee, School of Architecture

Students: Alvaro Almada, Diego Bazzani, Eric Bell, Andrew Ramsey, Caleb Roberts

There are two primary inquiries of this research. The first is to question the possibility of 'making' complex and rigorously defined geometries at the scale of buildings using additive manufacturing technology. How are materials and assemblies considered in this context? The second inquiry concerns how design for additive manufacturing is taught with regard to 'making', particularly at the complexity and scale of buildings. With typical projects realized at full scale, even those that are completely digitally fabricated with flat sheet material, there is a requirement that the assembly of many parts be considered as inherent to the design process. Does a change in the construction/fabrication method that all but eliminates the aggregation of components eliminate the lessons associated with the construction process? Can those 'making' lessons be integrated with an additive manufacturing design and construction process? In other words, can we teach the tool, the technique and the construction at the same time with the pairing of 3D printing and doubly-curved surfaces?

Poster #43

Mind Controlled 3D Printing

Mentor: Hugo Sanabria, Physics & Astronomy

Students: Corey Benson, Perry Bolick, Derek Mcmullen, Ella Moore, William Wham, Russell Willems

Can the use of CAD programming in additive manufacturing be eliminated through the synchronization of human thought and machine output? In answering this challenge, we aim to humanize and optimize additive manufacturing processes. As a Creative Inquiry, we have evaluated the multitude of EEG (Electroencephalograph) headsets to learn how the human mind can be read and provide output to a computer. The project's long term goal is to create an environment of manufacturing directly from mind to material. The current objective of the team is to correlate the output from the EEG to functional motor control of the 3D printer. The elimination of limitations due to the use of CAD software creates new possibilities in the innovation of additive manufacturing. Research is also being conducted to fully utilize the brain's neural plasticity and ability to learn and adapt.

Poster #44

Social Network Effects in Europe

Mentor: K. Amber Curtis, Political Science

Students: Doris Baxley, Adelaide Everidge, David Griffith, Shiva Mohan

Scholars increasingly recognize that individuals do not exist in isolation; they are social creatures and the social networks in which they are embedded may have an important impact on their subsequent political attitudes and behavior. Despite this growing theoretical advancement, empirical studies investigating social network effects—especially outside of the United States—are rare. Our project thus reports the results of an original, nationally-representative public opinion survey conducted in three European countries (Germany, Poland, and the United Kingdom) where respondents were asked to identify and report on numerous dimensions of their social contacts' characteristics. We use this information to descriptively report on a number of network features such as size, composition, and closeness. We then analyze how these aspects vary across respondents' own sociopolitical background including gender, age, ideology, political interest, etc. Lastly, we report preliminary findings about the extent to which these European social networks discuss, feel towards, and identify with the European Union. Our analyses confirm that social networks are a crucial consideration when examining political outcomes.

Poster #45a

Sex Does Not Predict Responses to Novel Foods in Captive Golden Lion Tamarins (*Leontopithecus rosalia*)

Mentors: Brett Frye, Biological Sciences, Lisa Rapaport, Biological Sciences

Students: Tara Brown, Haylee Knotts, Megan O'Brien

Marmosets and tamarins exhibit few behavioral or morphological differences between the sexes.However, females have been shown to outperform males in novel food tasks. Expressly, females show a priority of access to new foods, spend more time attempting to acquire foods, and obtain food items more frequently than do males. To further investigate this phenomenon, weconducted novel-food experiments on10 male and 12 female golden lion tamarins (*Leontopithecus rosalia*).We assessed their willingness to approach, sniff, and taste novel foods. In contrast to previous findings, study subjects did not exhibit sexual dimorphism in exploratory behavior. The sexes did not differ in their latencies to approach (General Linear Mixed Model - Females: 36.45± 1.96s; Males: 53.29 ± 1.66s, Likelihood Ratio Test (LRT) $p = 0.42$), sniff (Females: 52.08± 1.85s; Males: 73.37 ± 1.59s, LRT $p = 0.43$), or taste (Females: 90.01± 1.84s; Males: 84.16 ± 1.54s, LRT $p = 0.95$) novel foods. Moreover,males and femalesapproached, sniffed, and tasted equal numbers of foods. These results indicate that captive golden lion tamarins do not exhibit overt sexual dimorphism in exploratory behavior.

Poster #45b

Health Literacy

Mentor: Janice Lanham, School of Nursing

Student: Renee Bourgeois

This creative inquiry deals with the effectiveness of health literacy, the degree to which people can obtain,

understand, and follow the health information given to them. Health literacy also addresses the environmental, political, and social factors that determine health, influencing an individual's and group's capacity to use this information to make informed decisions. In this project, various scientific studies regarding health literacy were reviewed to gain a wider understanding of health literacy issues. There are many tests to assess one's health literacy. Some examples are Short Assessment of Health Literacy-Spanish and English (SAHL-S&E) and Rapid Estimate of Adult Literacy in Medicine--Short Form (REALM-SF). A test can gauge a patient's health literacy by assessing knowledge of medical terminology. Understanding a patient's health literacy can help medical professionals explain an illness or disease to the patient in a way that they can understand, improving patient outcomes.

Poster #46a

Motor Patterns of the Hind Limb Muscles of Pleurodire Turtles: Correlations Between Changes in Muscle Attachments and Activity

Mentors: Richard Blob, Biological Sciences, Christopher Mayerl, Biological Sciences
Student: Jenna Pruett

Being able to move effectively using muscles is vital for survival and reproduction for many animals. The ability to perform these behaviors depends on the attachment of muscles, and any change may affect muscle performance and function. In freshwater species of the two extant turtle lineages (cryptodires and pleurodires), many hind limb muscles have different origination locations; however, many species within these taxa exhibit similar swimming and walking behavior. We compared hind limb muscle activity and kinematics of two aquatic generalists: a pleurodire, *Emydura subglobosa*, and a cryptodire, *Trachemys scripta*. We found that some muscles with differing attachments showed different patterns of activity, especially in the hip protractors. The greatest differences in muscle activity were found in walking as opposed to swimming. Our results suggest that novel neuromotor patterns can be correlated with differences in muscular arrangement, though they are not necessarily so.

Poster #46b

Exploring the Mechanism of Cytokinesis Failure in *Cryptococcus neoformans* Treated with an Antifungal Drug, Fluconazole

Mentor: Lukasz Kozubowski, Genetics & Biochemistry
Students: Diana Fang, Logan Crowe

Cryptococcus neoformans is a pathogenic yeast that causes lethal cryptoccocal meningitis in immunocompromised patients. One of the challenges during treatment of cryptococcosis is the development of resistance to an antifungal drug fluconazole. Previous *in vitro* studies found that the failure of cytokinesis and/or final cell separation during mitosis may contribute to fluconazole resistance. To investigate which part of cytokinesis has failed in *C. neoformans* treated with fluconazole, we monitored the dynamics of the key cytokinesis component actomyosin ring (AMR). Our data show heterogeneous responses to fluconazole in terms of timing and rate of constriction of the AMR. After the constriction of the AMR, a septum was usually formed between the mother and daughter cells. Therefore, these findings suggest that even in the presence of fluconazole, the AMR does constrict and a septum is formed. However, a final degradation of the septum between mother and daughter may not occur, resulting in the lack of complete separation between the cells (This study is funded by the 1R15 AI119801-01 grant from the NIH).

Poster #47

Women and Golf: Understanding Perceptions, Barriers, and Level of Interest

Mentors: Teresa Tucker, Parks Recreation & Tourism Mgt, Adam Savedra, Parks Recreation & Tourism Mgt

Students: Chandler Ayers, Alfred Camp, Colleen Castro, Shea Colbert, Donte Grantham, Taylor Hearn, Molly Mains, Drew Ronemus, Ali Starnes, Will Tomick, Zachary Wankowski

The golf industry has an important economic impact on tourism in South Carolina. The Professional Golf Association (PGA) is committed to "engage and grow women as a key new constituency of the golf industry." According to their study, only 19.3% of all golfers are women golfers, and in the last five years, for every man who quit playing golf, three women left the game (PGA, 2012). However, 42% of the women in the United States have expressed a desire to play golf. The purpose of this study is to understand the perceptions, barriers, interests, and opportunities among female Clemson students. An online survey was developed using Qualtrics and distributed to undergraduate and graduate female students at Clemson. Upon completion of data analysis, implications and recommendations will be presented in a public forum. Results of this survey could lead to recommendations of how to grow the sport of golf among women.

Poster #48

Telemedicine: Changing the Face of Healthcare

Mentor: Janice Lanham, School of Nursing

Students: Elizabeth Foley, Emily Gandy, Teresa Lyons

The purpose of this study is to examine the impact of telemedicine using the remote robot on patient care delivery. Telemedicine is the distribution and delivery of healthcare via mobile technology devices. The perceptions of telemedicine held by healthcare providers will also be explored, along with factors that affect the efficiency and successful adoption of telemedicine . This study will add to the current literature by expanding on areas such as digital rounding, interdisciplinary collaboration, remote robotic telepresence, and telehealth in the acute care setting.

Keywords: telehealth, telemedicine, delivery of care, perceptions of telemedicine

Poster #50

The Pendleton Elementary School Nature Trail

Mentor: John R Wagner, Environmental Engr & Earth Sci

Students: Jacob Archer, Austin Bobo, Sarah Braun, Sarah Canterbury, Chelsea Huston, Leighton Knowlin, Kaelyn Sherley, Catherine Smithdeal, Gabriella Stefano, Kevin Tidd, Jaiquan Winns

Pendleton Elementary School is unique in that a portion of the school property includes a large woodland area surrounding a small stream system. The woodland area also contains a significant wetland created by ponding behind a culvert where the stream passes beneath a highway. This woodland, with its varied ecosystems, provides multiple opportunities for outdoor inquiry activities and hands-on learning experiences for students in all grade levels at the school. A sub-group of Engineering students constructed a nature trail through the woodland, designed so it would pass through as many different ecosystems as possible. Three bridges were constructed with natural materials to permit easy stream crossings. Other sub-groups of students researched specific sites along the nature trail that were environmentally significant and correlated these with academic science standards for different grade levels. The Clemson students then designed class activities that would allow the Pendleton students to apply their scientific knowledge and skills to various outdoor investigations. This project was sponsored by the Clemson University Creative Inquiry Office.

Poster #51a

From Queen's Chapel to First African Baptist: Faith of the Newly Freed

Mentor: Barbara D Hamberg, Philosophy & Religion

Student: Nigel James

The research displayed will show videos of interviews conducted at Queen's Chapel AME who just recently celebrated their 150th anniversary. There will also be a poster showing the development of First African as the first church of newly freed slaves in SC.

Poster #51b

Oconee County's Oldest Black Churches

Mentor: Barbara D Hamberg, Philosophy & Religion

Student: Tristan Raphael

Student research on 15 of the oldest Black churches in Oconee County, SC. This work was requested by the curator of of the Bertha Lee Strickland Cultural Museum located in Seneca, SC. after the curator attended presentations by the PAS Creative Inquiry classes. There will be videos of the churches as well as a poster showing photos of the 15 churches being researched. This information will be used interactively at the museum to engage visitors and the congregations of the churches.

Poster #52a

Hands on Tissue Engineering Research. Engineering Vascular Graft, Cancer Microenvironment, Cartilage Regeneration, and Brain Surgical Model.

Mentors: Jorge Rodriguez, Bioengineering, Delphine Dean, Bioengineering

Students: David Evans, John Mcgreevey, Sarah Mckain, Jonah Robison, Austin Stewart, Peyton Tharp

This CI works in four tissue engineering projects. The first project aims to create a patient-specific 3D printed brain model based on MRI scans. We focus on the development of a material to ressemble the physical properties of human dura mater and brain tissue. By doing this, surgeons will be able to plan operations for surgical accuracy. The second project aims to modify a common inkjet printer to bioprint cancer cell cultures and run cytotoxic assays. The ultimate goal is to provide a time and cost effective approach to chemotherapeutic medicine. The third project aims to develop a better method for electrospinning fibers for use in vascular grafts. Research is being done using different polymer combinations to create the most biocompatible fibers. The final project explores the use of 3D culturing technologies to create chondrocytes spheroids. This research will improve the regenerative capacity of human cartilage tissue. This group work is partially funded by Creative inquiry.

Poster #52b

Understanding the Brain (HPER)

Mentors: Kevin Taaffe, Industrial Engineering, Dotan Shvorin, Industrial Engineering

Students: Osasu Aighewi, William Axson, James Courie, Matthew Csernica, Evan Johnson, Lukas Kalcos, Mauri Leonard, Thomas Mumford, Carolina Nunes, Emilee Pence, Neeraj Singal, Julie Sonday

Discovering the mysteries of the brain is an exciting journey as we take small steps into the great unknown. Nowadays,leading edge technologies enable us to interact with the brain in new ways and visualize its activity in real time. Our research examines the connection between brain activity and decision making, and we explore this connection with the participation of members from the Clemson Club Tennis Team. Our team is learning the areas of the brain that are responsiblefor cognition activities, and weutilize process mapping techniques to outline the pathway from an input signal to an output decision. A mobile-electroencephalogram (EEG)device that detects and recordselectricalbrainactivity is usedto generate a data base for correlation testing. Next semester, we willcollaborate with the Academic Success Center and identify how brainactivity can be used as a measure of decision making and processing instudents with disabilities.

7 APRIL

Poster #53

Culinary Nutrition Monthly Group Cooking Design and Implementation

Mentor: Margaret Condrasky, Food, Nutrition & Package Sci

Students: Lashaveria Benson, Rachel Edwards, Landon Flowers, Emily Gaither, Allison Howland, Paige Lindquist, Amber Martinez, Madison Pouch, Katherine Smith, Abel Wilson, Meagan Miller

The research objective was to create healthy, well-balanced menus for children who are overweight or at risk. This CI shares a monthly educational family dinner night for these children and their families. Mainly food science and nutrition undergraduate students were recruited for this creative inquiry. The students formed groups, each charged with creating a full menu for one of the monthly dinners as well as cooking and demonstrating the recipes for the families. This creative inquiry defines healthy meals as low sodium, low fat, and well balanced according to the MyPlate model. The menu developing process included researching healthy ingredients, choosing health-centered recipes, testing and revising each recipe, using Genesis to obtain nutrition analysis, and designing a menu handout. Verbal communication has shown that the acceptance for each menu has been high, children are trying more new foods, and the families are cooking more at home using the menu handouts. Overall, the menus provided are playing a role in promoting a healthy lifestyle to counteract the obesity epidemic for the New Impact children and families.

Poster #54

Investigation on Carbon Nanotubes/Cellulose Nanocrystals Composites for Potential Used in Microelectromecanical Systems

Mentor: Christopher Kitchens, Chemical & Biomolecular Eng

Students: Thomas Shackleton, Owen Wilson

In this study, mixing of cellulose nanocrystals (CNC) and single-walled or multi-walled and carbon nanotubes (MWNT-HT) in aqueous suspension has been conducted. By adding Sodium dodecylbenzenesulfonate (SDBS) into the suspension (only 20 %wt with respect to the weight of the MWNT), a highly improved aqueous dispersion of MWNT was obtained, observed and proved by optical microscope and Atomic Force Microscope characterization. We will be measuring the resistance across to charged particles, to determine the conductivity of the final dry composite film. To find the mechanical properties of the particle, a Dynamic Mechanical Analysis will be performed along with testing the tensile strength. Using a polarized microscope we will find the orientation of the cellulose and carbon nanotube.

Poster #55

Soil Inventory of Private Lands in South Carolina

Mentors: Elena Mikhailova, Forestry & Environment Conserv, Christopher Post, Forestry & Environment Conserv, Julia Sharp, Mathematical Sciences

Students: Margaret Brown, Elizabeth Buckfelder, Ryan Donohue, Kyle Duffy, Yentl Lalesca Dukart, Virginia Lister, Keomba McNeely, Frederick Moore, Grayson Williams

Most of South Carolina's land is currently owned by private families or individuals. The objectives of this study were to conduct soil inventories of private lands in various locations in South Carolina using the Web Soil Survey, to collect soil samples, to analyze these collected soil samples using Clemson University Agricultural Service Laboratory, and to make management recommendations. Various soil series were identified within the private lands and rated based on their suitability's and limitations (e.g., building site development, land classifications and management, vegetative productivity and waste management). Soil nutrient analysis recommendations are discussed to maximize agricultural productivity, while minimizing environmental impact. The Clemson University Creative Inquiry Program supported this study.

Poster #56

Ferrofluid as a Mechanism for Bacterial Containment

Mentor: Tamara McNealy, Biological Sciences

Student: Tabitha Banks

Catheter-associated urinary tract infections (CAUTIs) account for greater than 60% of all UTIs and are usually due to bacteria spreading up the catheter from the external environment. Ferrofluids have been shown to have antimicrobial properties. This project investigates the use of ferrofluids as a potential

mechanism of CAUTI prevention. Ferrofluids were tested on agar to prevent the spread of *Pseudomonas aeruginosa*. We show that *P. aeruginosa* can be contained within a ring of ferrofluid suspended in mineral oil. Future experiments will investigate ferrofluid inhibition of *Staphylococcus aureus* and *Escherichia coli* bacterial spread. A tube-in-tube system meant to mimic the effects of a catheter within the urethra is being developed for use as a 3D model system. Based on our results, ferrofluids can successfully inhibit bacterial and possibly biofilm spread. Incorporation of ferrofluids within or around catheters could provide a unique method to reduce the incidence of CAUTI.

Poster #57

Sputtering and Spectroscopy of Passivated Stainless Steel

Mentors: Chad Sosolik, Physics & Astronomy, Dhruva Kulkarni, School of Computing
Students: Alexander Holstead, Neil Monga

What passivation technique is most effective to transport Hydrogen gas? This end goal of this project will help select the technique used for some Hydrogen powered vehicles.The passivation of surfaces is a common technique for creating a protective layer against corrosion or other degradation of underlying material. We have investigated multiple pretreated, passivated stainless steel samples obtained from the Savannah River National Laboratory. Our goal was to probe the “passivation layer” formed on these samples to determine its thickness and its chemical composition as a function of depth. Sputtering or removal of the passivation layer with Ar+ ion sputtering was used in tandem with Auger electron spectroscopy (AES) to obtain depth-dependent composition profiles. The sputtering or removal rates for the layer were calculated using the oxygen spectral peak in a control sample, with reference to SiO2. Depth profiles of C, O, and Fe were obtained, with the peak-to-peak amplitude of each element at each depth represented as percentage of the layer at that position.

Poster #58

Does Who You Grow Up With Matter? The Impact of Social Condition on the Development of Female Mate Preferences

Mentors: Margaret Ptacek, Biological Sciences, Kelly Hogan, Biological Sciences
Students: Amelia Abbott, Seirra Hamilton, Rebecca Helstern, Carley Mcalister, Emily Soby

While the influence of social experience during early development is known to affect male mating behaviors, how social experiences during development might influence female mate choice as adults is seldom investigated. This study was designed to test whether the social environment during juvenile development influences female mating preferences in the sailfin molly fish (*Poecilia latipinna*) for large male body size. Juveniles were reared in one of 3 social conditions (1) 2 females and 1 large male; 2) 2 females and 1 small males; 3) 3 females), and first tested at maturity and then again, once they had given birth to their first brood. We found an overall trend for females in all social treatments to prefer larger males when the difference between stimulus males was greatest, however, no effect of social rearing treatment was found to strongly influence female mating preferences. We conclude that early rearing social experience does not impact female preference for larger male size. Instead, female preference for large-bodied males may be learned through social experience following sexual maturation. We thank Clemson’s Creative Inquiry Program for funding for this study.

Poster #59

Understanding Cellular Response to Spider Silks Variation

Mentors: Marian Kennedy, Materials Science&Engineering, Delphine Dean, Bioengineering
Students: Johnnie Catoe, Katherine Hafner, Hannah Maeser, Olivia Ross, Corey Stoner, Leif Kays

Spider dragline silk has a unique set of mechanical properties such as high specific tensile strength and toughness when compared to synthetic fibers. Bulk properties have been tested and analyzed, but surface properties are difficult to elucidate due to the minute size of the silk. Prior attempts at characterizing surface charge and roughness, using atomic force microscopy, has shown distinct variations between the dragline silk harvested from different species of spiders. The main purpose of this research project is to use cardiomyocytes, fibroblasts, and adipose stem cells as sensors to determine the discrepancies of the surface properties of the silk. The dragline silk of the spider species Nephila clavipes is being used. In this study, the silk is UV treated for various lengths of time, with the goal of inducing different degrees of surface roughness. Cells are plated on the silk and then are analyzed for adherence, proliferation, and elongation along the silk fiber.

Poster #60

Trapping Creative Inquiry

Mentor: Webb M Smathers Jr, Ag & Environmental Sciences

Students: Robert Bond, Sarah Caldwell, Matthew Marbert, Austin Moore

Have you every set a mouse trap in your home? Even catching a small nuisance animals such as a mouse is considered trapping. In this creative inquiry we focus on the economic, ethical, and practical aspects of trapping nuisance and overpopulated animals. Hogs, beaver, possums, and many other animals are considered to be detrimental to the South Carolina wildlife because they destroy habitats and other animals that are beneficial to the upstate area. We strive to teach the importance of ethical trapping--not letting any animal suffer--and we focus on the overall impact that these creatures have on South Carolina in general.

Poster #61

Soil Judging Project - Hand-On Experience in Soil Science

Mentor: Elena Mikhailova, Forestry & Environment Conserv

Students: Justin Bacroduverger, Marcus Banks, Keaton Connolly, Victor Davis, John Fulp, Elizabeth Guillot, Frederick Hanna, Coleman Little, William Love, Robert Marion, Alexandra Meyer, Arden Phillips

Soil Judging Project teaches students important skills for field identification of soil types, their properties, and interpretations for use. Soil Judging Project can be beneficial to students as well as government agencies and private sector. The objective of this study was to learn how to describe the soil morphological properties (e.g. horizons, texture, color, structure, consistency, and redoximorphic features), interpret soil profile properties (e.g. infiltration, hydraulic conductivity, available water, soil wetness class), identify site characteristics (e.g. position of site, parent material, slope, surface runoff, erosion potential), and classify soil. A Southeastern Region Soil Judging Handbook was used by students from various disciplines (e.g. business, accounting, etc.) to master the skills of soil description, identification and interpretation in the field. Soil Judging Project can significantly improve soil education and mitigate problems associated with land use management.

Poster #62

Reinforced Magnesium Oxide Based Cements as a Sustainable Building Alternative

Mentor: Christopher Kitchens, Chemical & Biomolecular Eng

Students: Hansen Mou, David Nasol, Natalie Rogers, Thomas Vreeland

In the United States, 38% of the total CO2 emissions come from construction and operation of buildings. The CI addresses this issue by developing a building material with low carbon footprint: magnesium oxychloride cement (MOC). Increasing the structural properties of this material using fibers such as aramid fibers and carbon fibers will expand the material's construction applications. A flexural strength increase up to 66% was found when fibers were added at 1% by weight. Weathering behavior was studied as well to ensure structural stability, particularly, high humidity conditions and exposure to atmospheric CO2. Fiber reinforced MOC was exposed to 30% and 90% R.H. and the dimensions were assessed after each condition. Carbon fibers seem to mitigate expansion under high humidity. Additionally, experiments using pressure cells show that MOC can form chlorartinite in the presence of CO2; the CI's future work will include ways to mitigate this issue, as it is a detrimental phenomenon.

Poster #63

Engineering Bacterial Systems for Renewable Chemicals and Biosensors

Mentor: Mark Blenner, Chemical & Biomolecular Eng

Students: Erika Arvay, Robert Barrett, Kylie Burkes, Tanner Karp, Mary Rumph, Tiffany Yu

Team members in the *Sustainable Chemical Production in Engineered Microorganisms* Creative Inquiry will actively engage in using and creating biotechnology to improve the production of sustainable chemicals. CI students work with Dr. Blenner, graduate student mentors, and fellow CI team members in a highly active interdisciplinary research environment. Students learn how to identify a problem, design and conduct experiments using state-of-art laboratory equipment, analyze data, and communicate findings. The projects available in this Creative Inquiry involve: 1. The design of microbial enzymatic pathways to create sustainable chemicals. 2. Biotechnology development for controlling and improve microbial biosynthesis. 3. Creating a microbial produced non-living biocatalyst.

Poster #64

Steeling Sex: The Possible Hidden Threat of Eastern Gray Squirrel (*Sciurus carolinensis*) Contraception

Mentor: Kristina Dunn, Aquaculture, Fish and Wildlife

Students: Katelyn Adkins, Cortney Curtis, Kaylynn Hippler, Caroline Hitchner, Wayne Chao

Eastern gray squirrels are one of the most common wildlife species in urban areas within the eastern United States. Gray squirrels have caused damage to trees and shrubs on Clemson University's campus. A non-lethal study has been and is currently being conducted to reduce gray squirrel reproduction on the University's main campus. DiazaCon™ coated sunflower hearts were and are currently being administered to gray squirrels via hoppers made of galvanized steel. There is concern that when exposed to environmental elements the galvanized coating may corrode, potentially exposing gray squirrels to toxic levels of Zinc. Serum samples from 43 individual gray squirrels were analyzed for Zinc concentrations using AAS. Preliminary serum results showed some gray squirrels were exposed to toxic levels of Zinc which could adversely affect their health.

Poster #65

Applied Interdisciplinary Healthy Food Product Development for Children

Mentors: Margaret Condrasky, Food, Nutrition & Package Sci, Duncan Darby, Food, Nutrition & Package Sci

Students: Catherine Blankenship, Kaylee Cobb, Paul Cucco, Zachary Floyd, Ashley Knight, Megan Mars, Jack Prevost, Anna Prochaska, Keenan Sullivan, Kristen Wood

This CI team creates healthy foods for children. Students from nutrition, packaging sciences, culinology ® and Marketing collaborate from ideation to launch to design tasty foods for school feeding programs and supermarkets. The Stage Gate Product Development Model is employed dfor this two semester sophomore CI. Three teams have created, tested and prepared their gold standard product for further evaluation by children and parents this semester. The teams include: Butternut Rotini Bake, Sweet Potato Pasta, and CauliCups. Butternut Rotini Bake is a a creamy golden sauce of butternut squash sharp cheese with whole wheat rotini with breadcrumbs. Sweet Potato Pasta is made from a sweet potato base with a maple glaze and crushed pecans. A taste of Italy in a bite. CauliCups is a pizza - like snack filled with vegetables, protein, and fiber with no gluten. Product industry specifications for launch includes a professional team presentation, technical report and sample tasting.

Poster #66

Inhibition of Hsp90 Increases Fluconazole Resistance in *Cryptococcus neoformans*

Mentor: Lukasz Kozubowski, Genetics & Biochemistry

Students: Charles Simmons, Eric Zuberi

Cryptococcosis, an infection caused by *Cryptococcus neoformans*, affects mostly immunocompromised individuals resulting in over 600,000 deaths annually. The antifungal drug fluconazole (FLC) is a cheap and easily accessible treatment option. However, resistance to FLC is commonly developed making the treatment more challenging. FLC- resistant cells are typically aneuploid. We find that during early response to FLC, haploid *C. neoformans* cells increase in ploidy with significant fraction of cells reaching tetraploid state. It has been shown in *Saccharomyces cerevisiae* that inhibition of the chaperone HSP90 increases resistance to fluconazole, presumably through affecting kinetochore assembly and promoting aneuploidy. We wanted to test if this was true in *C. neoformans*. Cells were pre-treated with an HSP90 inhibitor and subsequently tested for the potential to become resistant to FLC. Our results suggest that inhibition of HSP90 increases the chance of *C. neoformans* to become resistant to FLC. We also observed that inhibition of HSP90 leads to an increased ploidy, which is consistent with affected kinetochore assembly.

Poster #67

Exploring the Potential Impacts of Climate Change on Existing Ecological Communities

Mentors: Gaofeng Wang, Forestry & Environment Conserv, Lauren Pile, Ag & Environmental Sciences
Students: Hannah Spencer, Carissa Adams, Carlee Steppe

Human activity has led to climate change and the spread of species past their native ranges, giving them the potential to become invasive. Current management for invasive and native species often focuses on preserving native species composition. Climate change could alter these ecosystems, making them inhospitable to native species. Climate change is expected to continue affecting weather patterns and nutrient cycles,increasingcarbon-dioxide and nitrogen levels,andmodifyingglobal temperatures,drought frequency, andprecipitation levels.These effects will alter ecosystem boundaries. In some communities, climate change could provide an advantage to species that are currently struggling to persist. In other communities, it could encourage the spread of invasive species and reduce biodiversity. Plant and wildlife management and research should take into account the rapidly shifting nature of local and global climates as they create strategies to protect native biodiversity.

Poster #68

Portable Near Infrared Camera for Diabetic Ulcer Prevention

Mentors: Vladimir Reukov, Bioengineering, Aleksey Shaporev, Bioengineering
Students: Omar Abdeladl, Michael Edwards, Colin Fair, Ryan Gilbert, Alex Giron, Bryce Kunkle, Michelle Schleicher

Venous blood accumulation, or high levels of deoxygenated blood within a tissue, can indicate poor blood circulation and increased risk of ulceration. This condition is associated with Peripheral Arterial Occlusive Disease, or diabetic foot ulceration, which is classified as the most common cause for lower extremity amputation. Due to the loss of sensation, ulcers can form without the patient's' knowledge. Regular inspection of the afflicted area by a physician is the best prevention method for this condition. To simplify the process of examination, a low cost system for self-monitoring by patients was developed. A near infrared camera was built utilizing a Raspberry Pi System and optical filters in conjunction with MATLAB to detect venous blood in tissues. Tests to optimize the best wavelength and imaging conditions were conducted to determine the optimal settings for the device. Further development includes the creation of an interface to allow data sharing between patients and physicians possible.

Poster #69

Designing Medical Technology for the Developing World

Mentors: Delphine Dean, Bioengineering, John D DesJardins, Bioengineering, Kayla Gainey, Bioengineering, Jorge Rodriguez, Bioengineering
Students: Carson Brewer, Ryan Gilbert, Zachary Hargett, Jacqueline Rohde, Sarah Stafford

In the developing world, there exists unique challenges to healthcare due to the lack of access to functional medical devices. Our Creative Inquiry team works to improve global health through both outreach and medical device design that caters to these unique needs. We send groups of students to visit hospitals in Tanzania for researching needs areas. The students work to design sustainable and affordable devices that can be produced and repaired locally. Projects draw from a variety of disciplines including bioengineering, mechanical engineering, and computer science. Current medical devices include a low-cost infant monitor and regulating system, an infant assisted breathing device, and a rapid bacteria detector. The bacteria detector is able to function without the need for culturing. The infant monitor and assisted breathing device are designed to be used for premature infants in NICU wards of hospitals using low-cost and robust parts which can be made in-country.

Poster #70

Smart and Savvy Students: Broadcasting the Brain

Mentor: June Pilcher, Psychology
Students: Kathleen Clancy, Ashleigh Dickson, Carlisle Hiott, Stephanie Kinard, Christine Myers, Tiffany Sharpe

Many psychological research articles contain valuable information for high school and college students; however, they are often difficult to fully comprehend. The goal of the Smart and Savvy Students (SSS) is to break down these useful scientific articles into smaller snapshots containing information to better peo-

ple's mental and physical health. We have a Facebook page where we post article summaries 5 days a week in order to reach the Clemson student body, as well as anyone else who finds the page. Each post contains links to the original articles so that students who are interested in the topic are able to further learn about the research findings. In addition to the Facebook page are our Instagram and Twitter feed where we briefly describe the original Facebook post and provide its link. Finally, this year our team has been trying to reach more high school students by working on a Brain Bee for next year, as well as planning potential visits to campuses and distributing our useful findings. Overall, SSS aims to spread beneficial information related to the brain by using social media covering topics such as exercise, study skills, mood regulation, and healthy habits.

Poster #71

Insect Diversity in the Clemson Forest

Mentors: John Morse, Ag & Environmental Sciences, Michael Caterino, Ag & Environmental Sciences
Students: Robert Bennett, Kristen Cairco, Langston Jones, Charles Matthews, Nicholas Addison, Alison Cercy, Robert Lowman, Jamie Pikutis

Two projects were undertaken in 2015-2016 to increase knowledge of insect diversity in the Clemson Experimental Forest. One project attempted to estimate the difference between diversity of flies and beetles in lower canopy versus upper canopy forest in the Aull Tract of the South Forest. Newly designed flight-intercept traps captured specimens in the lower and upper canopy in 4 replicates (8 traps). The other project cataloged the diversity of dragonflies in the Wildcat Creek area of the North Forest and collected specimens associated with *Boyeria* spp. (Odonata: Aeshnidae) to determine any detectable prey differences. Much insect diversity was encountered in both studies. The experimental results will be provided.

Poster #72

Synthesis of Titanium Oxycarbide Through Carbothermal Reduction of Titanium Oxide Nanoparticles and Renewable Biopolymers

Mentor: Rodrigo Martinez-Duarte, Mechanical Engineering
Students: Paulo Figueiredo De Lima, Joshua Sparks, Joshua Flach

Metal oxycarbides are highly useful engineering materials due to their high strength, resistance to wear, and their ability to withstand various extreme temperatures. The most common methods for the synthesis of titanium oxycarbide are through powder, gas phase, and sol-gel reactions at high energy and using petroleum-based carbon sources. A lower-energy process using renewable resources is desired. Initial results show the feasibility of mixing iota-carrageenan (IC), extracted from seaweed and a common polymer used in the food industry; chitin, obtained from shrimp shells; and titania to obtain titanium oxycarbide after heat treatment. Ongoing work is on analyzing the impact of the temperature, heating time, heating rate, and furnace atmosphere on the properties, porosity, and shrinkage of the resultant material.

Poster #73

Effects Of Ethnicity And Breastfeeding On Aggressive Breast Cancer Phenotype

Mentor: Julia A Eggert, School of Nursing
Students: Anna Few, Callie Wingo, Katherine Coggins

Purpose: To examine the relationship of ethnicity, breastfeeding, and aggressive breast cancer phenotype in a high-risk population.
Design: A retrospective chart review was performed on 600 charts from an inherited cancer genetics clinic. A total of 289 met eligibility requirements based on National Coalition Cancer Network (NCCN) high risk for breast cancer guidelines.
Methods: Using NCCN, chart data was collected, confirmed with a second review, de-identified with numerical codes and password secured in a Word Excel document.
Results: Data is under final analysis using SPSS. Preliminary results suggest a relationship between African American (AA) women, lack of breastfeeding and the incidence of aggressive breast cancer, specifically the triple negative (TNBC) phenotype.
Conclusions: There seems to be a relationship between AA women, the influence of no breastfeeding, and the development of aggressive breast cancer. Further studies need to be developed to identify cause.
Clinical Relevance: Educational opportunities with implementation strategies need to be developed regarding the importance of breastfeeding to decrease the occurrence of TNBC.

Poster #74

Using GIS to Conduct a Household Survey for Developing a Community Health and Assets Assessment in the Dominican Republic

Mentor: Arelis Moore De Peralta, Youth, Fmly & Comm Studies
Students: Luis Garcia, Rebecca Lenti

Background. Low-income communities face health-related challenges that inhibit their development. In order to build healthier communities, collaborative public health services are needed. Team-based research was conducted in the Dominican Republic (DR). Clemson students adapted CDC's CHANGE guide to conduct a Community Health Assessment (CHA). Five local health priorities (sanitation, education, chronic disease, vaccine preventable diseases, and unwanted pregnancies), and five sectors (community at large, school, healthcare, community organizations, and work) were used to frame this study. ArcGIS survey system was used to collect household-based data. **Methods.** Data was collected from 18-65 years old caregivers. A team of Clemson and UNIBE students read an informed verbal consent and conducted a survey using an App. Data include questions on assets, risk factors, and history of disease within the household. **Results.** Frequency measures were used to map assets, risk factors, and history of disease. Relationship between risk and protective (assets) factors with frequency of disease was explored by using geographic information through GIS.

Poster #75

Engineering Yeast for Production of Oleochemicals from Waste and Renewable Resources

Mentor: Mark Blenner, Chemical & Biomolecular Eng
Students: Phillip Baker, Matthew Brabender, Lauren Gambill, William Hardy, Kaitlyn Scola, Spencer Smith

The major barriers to more broad adoption of biochemicals in the chemical process industry are starting to be overcome by advances in biotechnology and engineering. Taking advantage of natural biodiversity, and engineering new biological components will enable an expanded set of biochemical reactions to be better controlled and therefore more efficiently produced. Team members in the *Engineering Yeast for Sustainable Production of Fuels, Chemicals, and Nutraceuticals* creative inquiry will actively engage in using and creating biotechnology to improve the production of sustainable chemicals. CI students work with Dr. Blenner, graduate student mentors, and fellow CI team members in a highly active interdisciplinary research environment. Students learn how to identify a problem, design and conduct experiments using state-of-art laboratory equipment, analyze data, and communicate findings. The projects available in this creative inquiry involve: 1. Engineering yeast for metabolism of lignocellulose. 2. Engineering biocatalytic conversion of animal fats into value added products. 3. Establishing genetic and metabolic engineering tools for a novel oleaginous yeast.

Poster #76

Molecular Pathways Regulating Stress Response in *Cryptococcus neoformans*

Mentor: Srikripa Chandrasekaran, Genetics & Biochemistry
Students: Mohit Gandhi, Alexander Rubin, Iqra Wani

Cyrptococcus neoformans (CN) is a fungal pathogen known to cause meningitis infections. There are several factors involved with the virulence of CN, including septins. Lack of septins, leads to improper cellar division, along with compromised cellular morphology and growth at high temperatures (37˚C) and/or the presence of FK506, a chemical stressor. Our group screened a set of promising mutants in CN that would potentially mirror the phenotype of septin mutant (*cdc3Δ*). After our screening, the group found a particular mutant (*ugt1Δ*), showed similar phenotypes to *cdc3Δ* at high heat and chemical stress. Based on this observation, we will investigate the role of *ugt1Δ* in virulence of CN and also discern its involvement in septin organization within the cell. We will use molecular biology techniques, such as fluorescence microscopy, to understand the biochemical interactions between Cdc3 and Ugt1, and virulence assays using the moth *Galleria mellonella* as a model organism.

Poster #77

Safe Use of Herbs

Mentor: Rosanne Pruitt, School of Nursing

Students: Ashley Lemanski, Adam Carroll

The use of herbs for health has a long history and continues today as individuals search for natural remedies. Many herbs are safe and effective, others can be harmful and may dangerously interact with prescribed medication. There is a lot of evidence to support use of herbs, but it is not in a useable format readily accessible for nurses, nurse practitioners and other providers to respond to patients who ask. This honors research involves an extensive evaluation of existing research to determine the support for common herbs. The goal of this phase of the Creative Inquiry is to set up user friendly charts that can be used to offer evidence based recommendations for using herbs to maintain health.

Poster #78

Health Disparities in America

Mentor: Janice Lanham, School of Nursing

Student: Matthew Whiteman

Perhaps the most important decision a mother makes for her offspring is where to lay her nest, as it determines the developmental environment. For instance, Eastern fence lizards (*Sceloporus undulatus*) dig shallow underground nests, where embryos experience daily fluctuations in temperature and moisture. Research suggests *S. undulatus* move long distances beyond their home ranges to nest in the warmest parts of the habitat. Yet, climate change may push conditions at nest sites toward the physiological limits of embryos. Alternative nesting strategies could enable persistence under warming if fence lizards can select cooler, shadier sites. In this study, we radio-tracked *S. undulatus* in SC to compare nesting behavior to habitat use during the summer breeding season. Results showed variation in nest site selection and nest quality (e.g., shade, temperature, moisture). Alternative nesting strategies could benefit populations by buffering developing lizards from effects of climate warming.

Poster #79

The Effect of Very Low Dose Radiation on the Proliferation of 3T3 Fibroblasts

Mentors: Delphine Dean, Bioengineering, Matthew Rusin, Bioengineering

Students: Bryana Baginski, Suzanne Bradley, Katelyn Truong, Joseph Wilson

Radiation is commonly used for many medical applications, including cancer therapy and imaging. Low doses of radiation in imaging have been assumed to have minimal, if any, effect on healthy tissues. Our study aims to determine the effects of low dose radiation on fibroblast cells, which maintain healthy tissues and are critical for wound healing and tissue repair after injury. Using a unique radiation source, ~0.2mGray of x-ray were delivered to fibroblasts. Compared to controls, fibroblasts exposed to x-rays initially slowed their proliferation 24 hours after being irradiated, but then surpassed the control cells in growth. Protein content followed a similar pattern, indicating that the irradiated cells were functioning well. Flow Cytometry showed that the irradiated cells initially spent more time in the growth phases and less time in the division phases of mitosis. Our data suggests that low-dose x-ray exposure may be used for therapeutic application during wound healing.

Poster #80

Clemson University Retrieval of Explants Registry and Program in Orthopaedics

Mentors: Melinda Harman, Bioengineering, John D DesJardins, Bioengineering

Students: Madeline Bebler, Moriah David, Jonathan Doyle, Alison Farrell, William Graham, Curtis Harper, Haley Leslie, Ang Li

Each year, over 1 million Americans undergo joint replacement to relieve pain from arthritis and restore joint function. While these devices typically last 15-20 years, revision joint replacement is sometimes required due to wear, loosening, or joint infection. The revision rate reported by international registries is approximately 1 revision for every 10 primary joint replacements. Such registries are essential for progress in the orthopaedic industry. The goal of **CU-REPRO** is to develop a state-wide registry to answer questions relating to the in vivo performance of joint replacements. The **CU-REPRO** repository now includes over 600 devices that have been removed, or "explanted", from patients. Students collaborate with hospitals across South Carolina to collect and evaluate these explants. This semester, **CU-REPRO** is analyzing a subset of **CU-REPRO** knee replacement explants and comparing results with six international registries. The results are focused on patient demographics, device survivorship, and knee replacement design features, such as modularity, stabilizing mechanisms, and fixation. The value of **CU-REPRO** is its ability to integrate the engineering aspects of joint replacement design with the clinical reality of surgery and society's expectation of this technology.

Poster #81

Examining How Social Media and Media Content Influence Basking in Reflected Glory (BIRGing) and Cutting off Reflected Failure (CORFing) Behaviors Among Sports Fans

Mentor: John Spinda, Communications Studies

Students: Gabrielle Bates, Kaila Burns-Heffner, Thomas Canedo

A great deal of research has indicated that sports fans emphasize or de-emphasize their team affiliation as a form of self-presentation. One parallel set of self-presentation behaviors involve fans Basking in Reflected Glory (BIRGing), or strategically aligning oneself with a successful group, as well as Cutting off Reflected Failure (CORFing), or distancing oneself from a group that has failed. This poster will outline the results of a Creative Inquiry project that has revised existing BIRGing and CORFing scales (Spinda, 2011) to examine the ways in which social media and new broadcast technologies impact these behaviors in sports fans.

Poster #82

Trip Hazard Assessment: A Survey Method

Mentor: Benjamin R Stephens, Psychology

Students: Zoe Bartholomew, Sarah Kirstein, Ansley Seay, Nicole Sicilia, Kylie Anne Stiltner, Anna Taffer

Sudden elevation changes that cause trip-and-falls are a significant source of injury. Kwasniak and Cuadrado (2012) found that participants judged higher elevation changes to be more hazardous. "Minimum foot clearance", estimated to average between 10-20 mm (Begg and Best, 2007), is also linked in trip events. The goals of our study were to evaluate the validity of a survey technique to measure trip hazard perception, and to explore the connection between participants' judgements of trip hazards and minimum foot clearance. Participants were informed of the definition of trip hazard, trip and fall, minimum foot clearance, and elevation change. They also were presented with two-practice profile assessments for a 0 inch and 7.75 inch elevation change. After viewing the profiles, participants rated each of eight profiles along five dimensions. Our results indicated that the effects of profile height were significantly related to ratings of walking condition, estimated height, and trip likelihood. The results of this study will help to explore the connections between hazard perception judgment for elevation changes and estimates of minimal foot clearance.

Poster #83

New Heat Extraction Technique for Thermophilic (Hot) Compost Piles

Mentor: Shawn Jadrnicek, Ag & Environmental Sciences

Students: Allison Acosta, Jenna Agin, Michael Bartley, Carly Basinger, Carly Cox, Jennifer Lane, Meredith Mcswain, Charles Murray, Aaron Stiebohr, Charles Weinheimer

A new compost heat extraction technique was designed and built at the Clemson University Student

Organic Farm. Water from internal greenhouse ponds was pumped through 15 interconnected 55 gallon plastic drums. The drums formed the wall between a greenhouse and a thermophilic (hot) compost pile. Heat from the compost pile transferred into the water inside the drums and then into the greenhouse pond to warm the greenhouse and pond for freshwater prawn production. The drums were designed to also filter the pond water by settling solids for removal by an extraction pipe. The filtration design used a "swirl separator" action to take advantage of centrifugal and gravitational forces on pollutants.

Poster #84

Increasing Suicide Awareness and Prevention on Campus through the Aspire to be Well Program

Mentors: Martha Thompson, Public Health Sciences, Hannah Allison, Student Health Center, Jennifer Goree, Student Health Center, Chloe Green, Student Health Center, Kelsey Rock, Student Health Center
Students: Thomas Smith, LaRoweshia Uzell, Mary Harbin

Developing Peer Delivered Initiatives to Foster the Promotion of a Healthy Campus Creative Inquiry focuses on the Aspire to be Well Program. A Clemson University new student requirement, Aspire, highlights the topics of mental health & suicide prevention, alcohol & other drug misuse, and interpersonal violence prevention. Students learn warning signs, symptoms and bystander intervention strategies to help maintain a safe campus and community. In connection to the Substance Abuse and Mental Health Services Administration (SAMHSA) grant that Clemson University received, the Aspire to be Well Program and CI now have an increased emphasis on suicide awareness and prevention on campus.

Poster #85

Analysis of Type II Secretion System Function in *Legionella clemsonensis*

Mentor: Tamara McNealy, Biological Sciences
Student: Heather Greene

Legionella pneumophila is the causative agent of Legionnaires' Disease (LD). Type II secretion systems (T2SS) permit the export of proteins from within the bacteria into the environment or into target host cells. T2SS have been shown to be required for some virulence traits and promotes the persistence of *L. pneumophila* in aquatic habitats at low temperatures. This project examines the T2SS in *Legionella clemsonensis*, a recently identified novel species. Previous research in our lab has shown that *L. clemsonensis* has reduced pigment production and an inability to grow below 26°C, both of which are associated with T2SS. Protease, chitinase, and lipase assays were conducted as these proteins are normally secreted via T2SS. Biosurfactant production, also associated with the T2SS, was also examined. To examine survival at various temperatures, persistence of *L. clemsonensis* in tap water was assessed at 4, 26 and 42°C. The type strain, *Legionella pneumophila* Philadelphia 1, was used as a positive control. Altered T2SS activity in *L. clemsonensis* may help explain T2SS effects on virulence and *L. pneumophila's* prevalence in water systems, causing more cases of LD.

Poster #86

Autonomous Vehicles: A Physiological Stress Response to Simulated Dangerous Driving

Mentors: Drew Morris, Psychology, June Pilcher, Psychology
Students: Marion Campbell, Marisa Finlayson, Steven Greene, Alyssa Sullivan

The goal of this study was to examine the physiological stress response while riding in a simulated autonomous vehicle. Participants complete a series of simulated tracks while physiological measures of stress were recorded. The tracks varied by how many obstacles were in the environment, how safe the autonomous vehicle drove, and whether the participant had control of the vehicle. Preliminary testing found that risky driving decisions made by the simulated autonomous vehicle resulted in a physiological stress response. Automated vehicle actions such as drifting out of lane near traffic and failing to stop brought about increased galvanic skin response and increased breathing rate. However, stress response quickly returned to baseline once the behavior was corrected. These findings suggest that physiological based autonomous vehicle research can be performed using driving simulators. These findings also suggest that drivers may be quick to regain trust of autonomous vehicles.

Poster #87

Test and Calibration of Two Types of Ionization Gauges for a NASA Sounding Rocket Experiment

Mentor: Gerald Lehmacher, Physics & Astronomy
Students: William Krier, James Near
The NASA sounding rocket project AZURE will study the horizontal and vertical variation of the wind field in the thermosphere (100-400 km) under auroral forcing. We have selected two commercial ionization gauges of different type: a cold cathode gauge of new compact design and a hot cathode gauge. We plan to fly both gauges, which will observe the same pressure and compare their performance. In preparation for the experiment, both gauges are calibrated against a precision capacitance gauge. The voltage-pressure characteristics are compared with the factory provided conversions. We also evaluate the noise level, which is important for measuring small-scale fluctuations associated with turbulence. The gauges are integrated in a shock-absorbing package and will be subjected to a vibration test at NASA Wallops Flight Facility.

Poster #88

Acetaminophen Toxicity in Invasive Populations

Mentor: Peter Van den Hurk, Biological Sciences
Students: Casey Cummings, Lisa Emerson, Lydia Krause
Invasive species cause severe losses of biodiversity in world environments. One example is the brown tree snake, which was introduced onto Guam and subsequently caused the loss of 12 avifauna species. To control for the snakes, researchers began to use acetaminophen (APAP). This study investigates enzymatic activity in snake livers, which causes the death of the snakes. In contrast to most mammals, snakes do not experience liver damage from the detoxification intermediate, NAPQI, and instead extinguish from methemoglobinemia. This study has explored four biotransformation pathways for APAP: UGT, SULT, GST, and GSH through enzyme assays measured by recording naphthol fluorescence. Preliminary results indicate that the UGT activity in snakes is very low, but the other pathways process APAP in snake livers. However, these three pathways are not thought to be sufficient to detoxify APAP, and we have concluded that another pathway or lack thereof is responsible for the death of the snakes. Applications of this research could serve to control other invasive populations including the Burmese python and sea lamprey.

Poster #89

Tiger Gardens: Healthy Urban Vegetable Production

Mentors: Dilrukshi Thavarajah, Ag & Environmental Sciences, Paula Agudelo, Ag & Environmental Sciences
Students: Alexander Abare, Joshua Yeargin, Fredrick Carruth, Benton Dahill, Lydia Randall, Lindsay Jenkinson
Failure to link agricultural production with human nutrition and health has led to the development of unhealthy food systems. Diseases linked to malnutrition and obesity are the result of such food systems. A sensible and economical approach to combat nutritional challenges is the development of urban vegetable production systems. Increasing dietary diversity, in which vegetables play a central role to provide a range of essential nutrients is paramount. This creative inquiry project provides an introduction to vegetable production, value addition, and nutrition. A home or community garden model to provide year-round nutritious vegetables (especially micronutrients and vegetable proteins) is presented.

Poster #90

CU Succeed: Incentive Wellness Program for Pregnant and Parenting Teens

Mentor: Caitlin Moore, Clinical Ed/Pract&Med Surv Pro
Students: Kathryn Cook, Emily Gaal
The purpose of this research is to create an incentive based program in CU (Clemson University) Succeed for parenting and pregnant teens in Oconee County, SC. The main objective of this research was to create an effective program that enhances participants' educational attainment, social interactions, and health. Using an online incentives program to reward behaviors, the CU Succeed program aimed to encourage a healthy lifestyle and reinforce educational behaviors thus enabling the teens to have a better well-being. The research team used a systematic, theoretical analysis of methods of implementation to

document the establishment of the program and how its efficacy would be measured. After the program was created, there was a lack of interest from parenting and pregnant teens. Teens felt less inclined to participate because the program was broad, focusing on many different aspects of health and not individualized to their specific needs and lifestyle. Sponsors for this program have been the Calhoun Honors College and the Creative Inquiry Program.

Poster #91

Development of a Fully Decellularized Bovine Caudal IVD Scaffold

Mentor: Jeremy Mercuri, Bioengineering

Students: Arjun Aggarwal, Timothy Litzinger, Jess Rames, Tyler Watt, Kendyl Williams, Shannon Wood, Austin Hensley, Clayton Compton

Back pain is a major public health issue in our society, and is strongly correlated with the degeneration of intervertebral discs (IVDs). Disc degeneration increases with age, ranging from 20% of teens with mild disc degeneration to 60% percent of those over age 70 with severely degenerated discs. Current solutions are conservative or surgical, and there is significant room for improvement. The first goal of our project is to create a fully decellularized bovine caudal IVD to be used as a scaffold on which to seed adult human stem cells in an attempt to engineer a healthy, replacement IVD for patients suffering from IVD degeneration and lower back pain.

Poster #92

The Influence of Leaders on Organizations: Considering the Role of Political Skill

Mentors: Marissa Shuffler , Psychology, William Kramer, Psychology, Nastassia Savage, Psychology, Dana Verhoeven, Psychology

Students: Joann Demos, Elizabeth Mercer

Organizations such as Google, Amazon, and Facebook have had huge global success. One feature that these companies have in common is having effective leadership in their companies. As these organizations have a large number of employees and teams that work together across the globe, excellent leaders are a must to ensure success within those teams and across the organization as a whole. One characteristic identified in the literature as a key factor for leader effectiveness is political skill, which refers to the extent that a leader is able to influence others for personal or organizational objectives. Individuals who are high in political skill are more likely than others to have the ability to positively impact the unique situations that larger organizations face. This can include managing the large teams necessary for project completion and adapting to changes in the organizations. Overall, the literature supports the importance of leadership for organizational success.

Poster #93

Mobile Health Applications

Mentor: Vladimir Reukov, Bioengineering

Students: Edward Bear, Tyler Graham, Richard Hanger, Curron Johnson, Jushawn Macon, Benjamin Shumpert, Jacob Tilles

Recent developments in mobile connectivity and computing power have led to a foundation for mobile health devices. These devices, commonly in the form of wearable sensors, are capable of sending data to smartphones, which can, in turn, process the raw data and display it to the user. An additional benefit of having the data on a smartphone is that the phone can forward the data to a health care provider, allowing doctors and nurses to monitor their patients with critical conditions more closely. This CI is focused on three main projects. The first is a smart water bottle that is capable of measuring the user's water consumption. This project works by using a magnetic field sensor to detect the rotation of a spinning magnetic wheel located in the straw of the bottle. The bottle is Bluetooth-enabled so that it can send consumption data to an Android application we developed. Another project is a sock that can determine if plantar fasciitis patients are doing heel stretches correctly. The last project is a set of suspenders that can monitor posture and alert the user when his or her posture needs correction.

Poster #94a

Promoting Public Health Science Education & Community Outreach Through Video-Based Service Learning Projects

Mentor: Ralph Welsh, Public Health Sciences

Students: Zoe Ayers, Alyssa Barre, Rachel Brown, Lukas Daniel, Victoria Gar, Monica Garvin, Lindsey Hughes, Joshua Hutchinson, Emily Radziwon, Danielle Reitsma, Chandler Richardson, Reagan Stokes, Allyson Swygert, Paul Thomas, Mark Wilson

As technological innovations have grown in popularity, they have spread throughout multiple facets of our society. Video production has immersed itself into the modern classroom to help enhance students' learning and critical thinking skills while video-based community education has also grown in popularity with the growth of social media sites like YouTube. The purpose of this CI project has been to work collaboratively to evaluate, research and enhance undergraduate students' experiences in an Introduction to Public Health course that has replaced term papers with community outreach student video projects. CI group projects include a) evaluating students' attitudes toward video projects & barriers to the video production process, b) creating a white paper to enhance student video production efficiency, c) evaluating the impact of the course YouTube outreach site, and d) designing a theory-based original research study aimed at evaluating the effectiveness of audiovisual-based community outreach. Application of our results to student learning and community outreach are presented through a creative video communication message (Adobe Premier Pro).

Poster #94b

Precast Tessellations

Mentors: Carlos Barrios, School of Architecture, Brandon Ross, Civil Engineering

Students: August Lehnert, Bentley Sam, Austin Ferguson

This project presents design tessellations made in precast concrete and shows an interactive demonstration of the application in buildings.

Poster #95a

Hand Preferences Do Not Predict Responses to Novel Food Items in Captive Golden Lion Tamarins (*Leontopithecus rosalia*)

Mentors: Brett Frye, Biological Sciences, Lisa Rapaport, Biological Sciences

Students: Alyssa Cobranchi, Carly Holthausen, Margaret Keener, Molly Nielsen

Differences in exploratory behavior are sometimes associated with handedness. Right-handed individuals often show more neophilia, whereas, left-handed individuals exhibit more neophobia. To further investigate this phenomenon, weconducted novel-food experiments on10 male and 12 female captive golden lion tamarins (*Leontopithecus rosalia*). We assessed willingness to approach, sniff, and taste novel foods. Unexpectedly, right-handed tamarins' behavior differed little from that of left-handed tamarins. Right- and left-handed monkeys did not differ in their latencies to approach (General Linear Mixed Model - Right: 34.27± 1.80s; Left: 36.21 ± 1.91s,Likelihood Ratio Test (LRT)p= 0.92), sniff (Right: 52.80± 1.64s; Left: 52.42 ± 1.72s,LRTp= 0.99), or taste (Right: 127.17± 1.62s; Left: 90.60 ± 1.70s,LRTp= 0.45) novel foods. Right- and left-handed tamarins approached and sniffed equal numbers of foods. However, right-handed tamarins tasted fewer foods (0.27± 0.20) than left-handed tamarins (2.15± 1.12,LRTp= 0.04). These results suggest that the link between handedness and exploration in lion tamarins is relatively weak.

Poster #95b

The People and Places of Daufuskie Island

Mentors: Abel Bartley, History, Barbara Hamberg, Philosophy & Religion

Student: Tylaar Miller

Student's research work depicting the people and places on Daufuskie Island that are being researched. Also, genealogical research that has been conducted on Mitchelville will also be on display. It was the quality and amount of Mitchelville research that prompted the Heritage Library to request research be conducted on the history and genealogy of the inhabitants of Daufuskie Island; which now only has 13 native islander residents. There will be genealogy records displayed as well along with video footage of interviews and lectures.

Poster #96

Investigation of the Presence and Impact of Bacterial Pathogens Around Campus

Mentors: Kristi Whitehead, Biological Sciences, Krista R Rudolph, Biological Sciences

Students: Hunter Owen, Samuel Ramey, Madison Scott

College campuses create an atmosphere with close human-to-human contact, orchestrating a breeding ground for infectious disease. Transmission of diseases such as the flu, common colds, “stomach bugs,” and even meningitis is done with ease due to the multitude of human hosts in such close quarters. We aim to explore to bacterial microbiome of a college campus. Are there potential pathogens? Are there higher levels than expected? Does the microbiome change with season and weather? We have begun our investigation by taking samples of various surfaces on campus. Cultures were made, and colonies have been isolated for identification and testing. We have begun differentiating between bacteria using Gram staining techniques. Various selective and differential media will be used to confirm Gram stain results and to shed light on the metabolic capacity of each isolated organism. Through numerous tests, we intend to identify and quantify specific bacteria present on different parts of campus, determine if relative abundance and diversity changes with seasons and weather, and investigate whether any of these isolates pose a significant threat to us.

Poster #97

Invasive Species: Studies of *Bellamya japonica*, a New Invasive Aquatic Snail in the Savannah River Basin

Mentor: John Hains, Biological Sciences

Students: Nicholas Chiodo, Sarah Fishburne, John Hutson, Kyle Kilpatrick, Josephine Anthony, Jacob Bartell, Ashley Gaynor, Jacob Laird, Richard Mahon, Nike Pappas, Lauren Turbyfill

Since the discovery of *Bellamya japonica* a new invasive species to the Savannah River Basin in 2006, the dispersal and ecological characteristics of this exotic species have largely been unknown. Aside from impacts to the HVAC systems for Clemson University, the effects of this new invasive species remain under investigation. Our studies have shown negative phototaxis, indifference with respect to geotaxis, seasonal fecundity patterns, low dispersal rates in a controlled environment, sources of mortality and possible controls, and estimates of metabolic rates under ambient conditions. Using individual tags and an experimental pond segmented into observation regions, we have followed hundreds of individual snails, their locations, their individual growth, and individual reproduction. Many of these studies are the first ever of their kind and some have led to derivative questions for future research. Future investigations include nutritional and genetic comparisons between populations and habitats as well as continuing refinement of current investigations.

Poster #98

Improving the Inventory Experience for Nurses

Mentors: Kayla Gainey, Bioengineering, Mary Hobbs, Industrial Engineering

Students: Carter Ellis, Zachary Lemieux, Andrew Sauer, Christopher Levesque, Jawaan Smith, Osasu Aighewi, Emily Stanton, Matthew Jones, Cassandra Watson, Kenneth Hyneman, Renata Roque, Joy Miller

Each quarter, hospitals lose as much as $150,000 in supplies due to lack of system organization related to inventory management. Nurses must retrieve items from supply closets twenty or more times per shift, but the process is time-consuming and requires numerous steps to be completed properly. Our team of Industrial Engineering, Bioengineering, and Computer Science students is working to improve the experience of dealing with inventory for nurses, as they are the main users of the system. We are designing a color-coded bin system to make finding the correct items easier as well as developing an app that would streamline the process to assign an item to a patient chart while simultaneously updating the materials management team so they know when to reorder supplies. Based on survey data, additional features will be added to the app to address other issues nurses face daily. Both of these solutions will increase efficiency for nurses so they can focus on patient care, their main priority.

Poster #99

Recombinant Flavodoxin for Single Molecule Fluorescence Experiments

Mentor: Hugo Sanabria, Physics & Astronomy

Students: Edward Blocker, Zachary Disharoon, Hiba Kouser, Matheu Spencer

The goal of single molecule spectroscopy is to identify certain characteristics of a biological molecule, in this case the protein folding pathway of Flavodoxin. Flavodoxin is an electron transfer protein whose structure is characterized by five-stranded parallel beta sheets with alpha helices on either side of it. We use Flavodoxin as a model system to study non-sequential folding pathways. To prepare samples for single molecule fluorescence spectroscopy, we employ site directed mutagenesis of the wild type sequence to alter two key residues that are thought to affect Flavodoxin's folding pathway. In addition, we substitute two residues for cysteines in order to fluorescently tag them using maleimide chemistry. Using an E. coli expression system, Flavodoxin is expressed and further purified using immobilized metal ion affinity chromatography columns. Once purified, the protein is then optimized for labeling with a donor and acceptor fluorophores for Förster Resonance Energy Transfer experiments (FRET) at a single-molecule level. We hope to use these prepared samples to study the folding dynamics at various environmental conditions and learn about the principles that lead to non-sequential folding and long-range amino acid interactions in protein folding and unfolding dynamics.

Poster #100a

Addressing Human-Elephant Conflict

Mentor: Christie Sampson, Biological Sciences

Students: Caroline Herring, Hallie Lawrence, Meghan McDevitt, Alexandra Scott

This project seeks to reduce human-elephant conflict in Myanmar using educational outreach. To make elephant behavior more accessible to their human neighbors, we creating a short film that will exhibit photos of native Myanmar people participating in everyday activities, for example playing or eating, and compare them to pictures of elephants engaging in similar activities. In addition, we aim to engage the younger generation through the use of a coloring book. The same information from the short film will be utilized, as well as illustrations featuring a relatable elephant character. Not only will children be able to color the pages, but they will be perforated so that the children can share them with others or hang the illustrations on a wall. This project will help those of Myanmar, who see elephants as a threat, to better understand the behavior, ecology and value of wild elephants in their landscape.

Poster #100b

Mega-Gardeners: Asian Elephants

Mentor: Christie Sampson, Biological Sciences

Students: Mary May, Zachary Primm, Morgan Rhodes, Abigail Towe

Habitat loss due to agricultural expansion is causing elephants to forage for food at agricultural sites leading to human-elephant conflict in Myanmar. Elephants are an important part of the ecosystem for their ability to create micro climates for smaller species, as well as their importance in seed dispersal. In order to mitigate human induced conflict with elephants, a children's book has been written to help explain elephant's importance to the ecosystem. Additionally the book incorporates elephant ecology and behavior to allow children in areas with high human-elephant conflict to form a deeper connection with these beautiful creatures.

Poster #101

Greeks for Greeks

Mentor: Kelsey Rock, Student Health Center

Students: Mary Carter, Amanda Cirillo, Lukas Daniel, Nicole Eppig, Carter Fiveash, Sierra Laster, Delaney Lee, Kyle Mcdonald, Emily Nichols, Margot Sprow

Benefit the Clemson Family by promoting alcohol education & bystander intervention through research & outreach initiatives that encourage personal responsibility for self & others. We accomplish this goal through the values of Service, Collaboration & Education through Research.

STUDENT INDEX

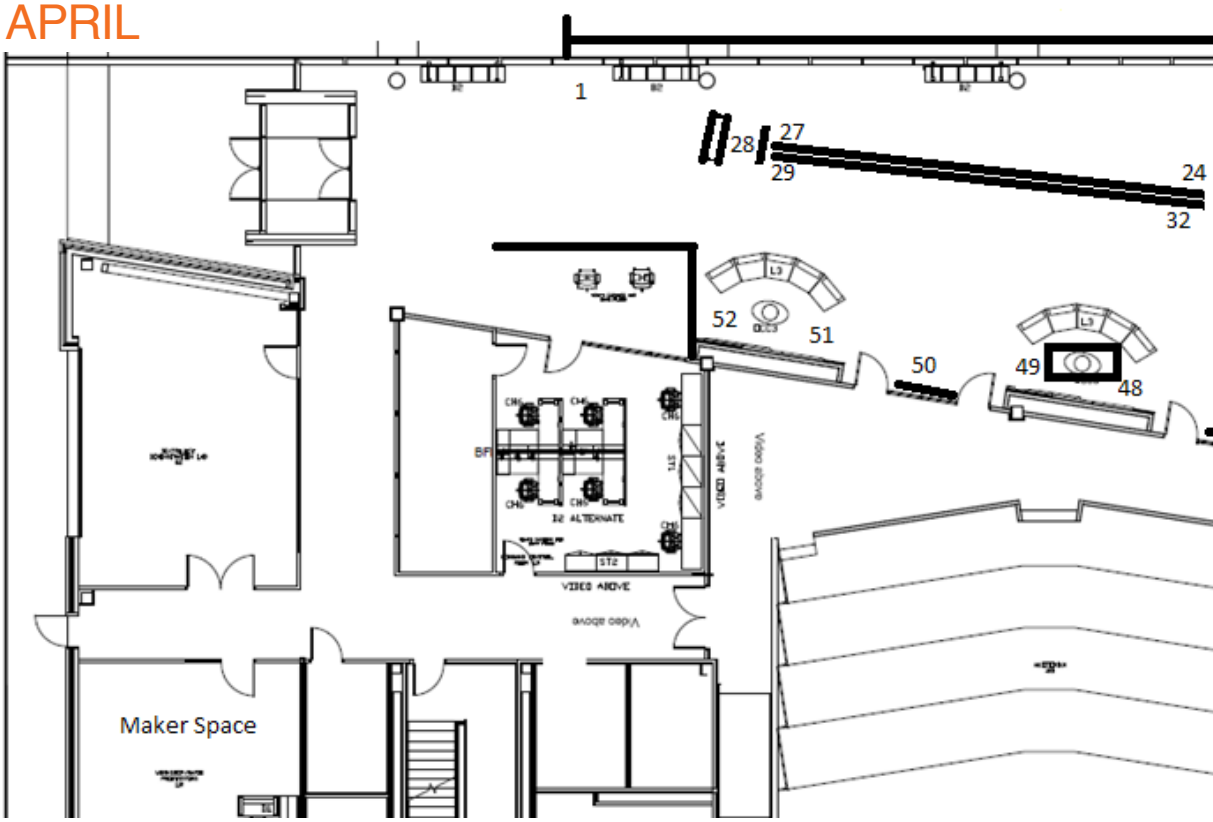
STUDENT INDEX

STUDENT INDEX

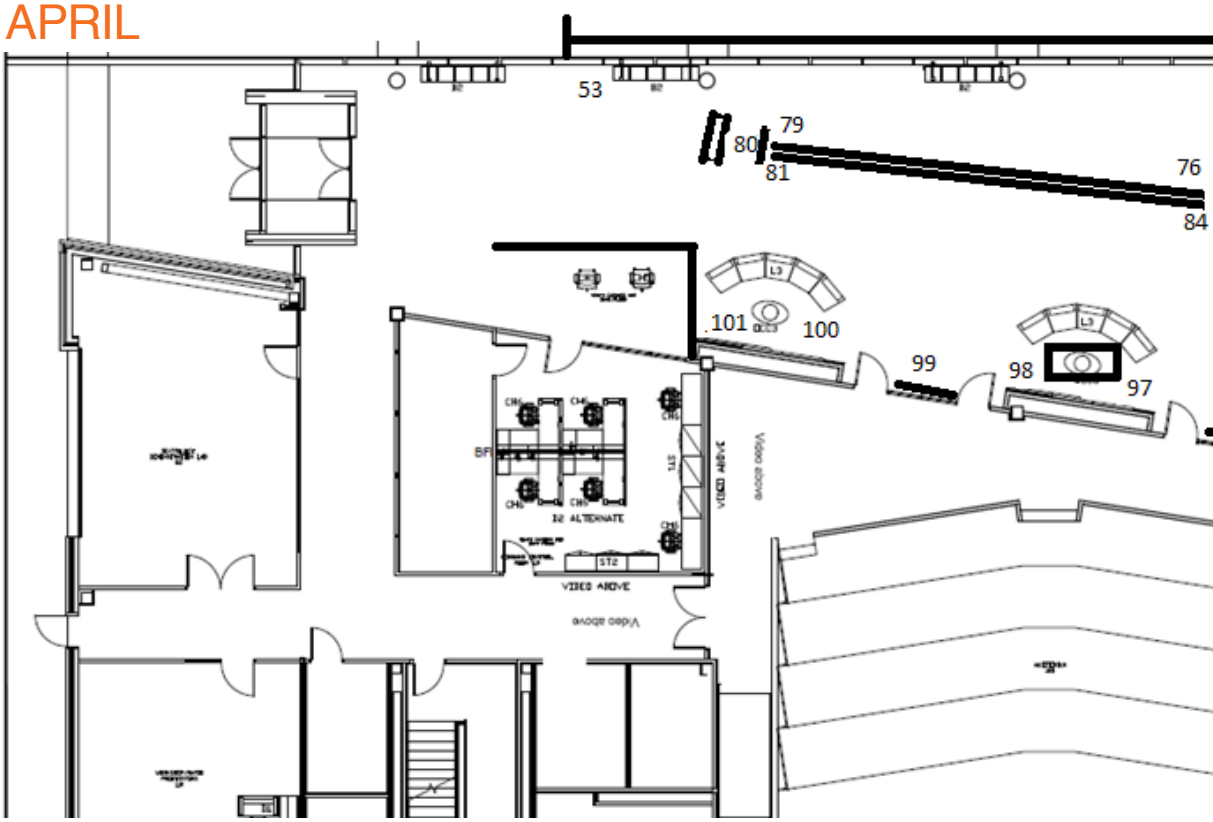
MENTOR INDEX

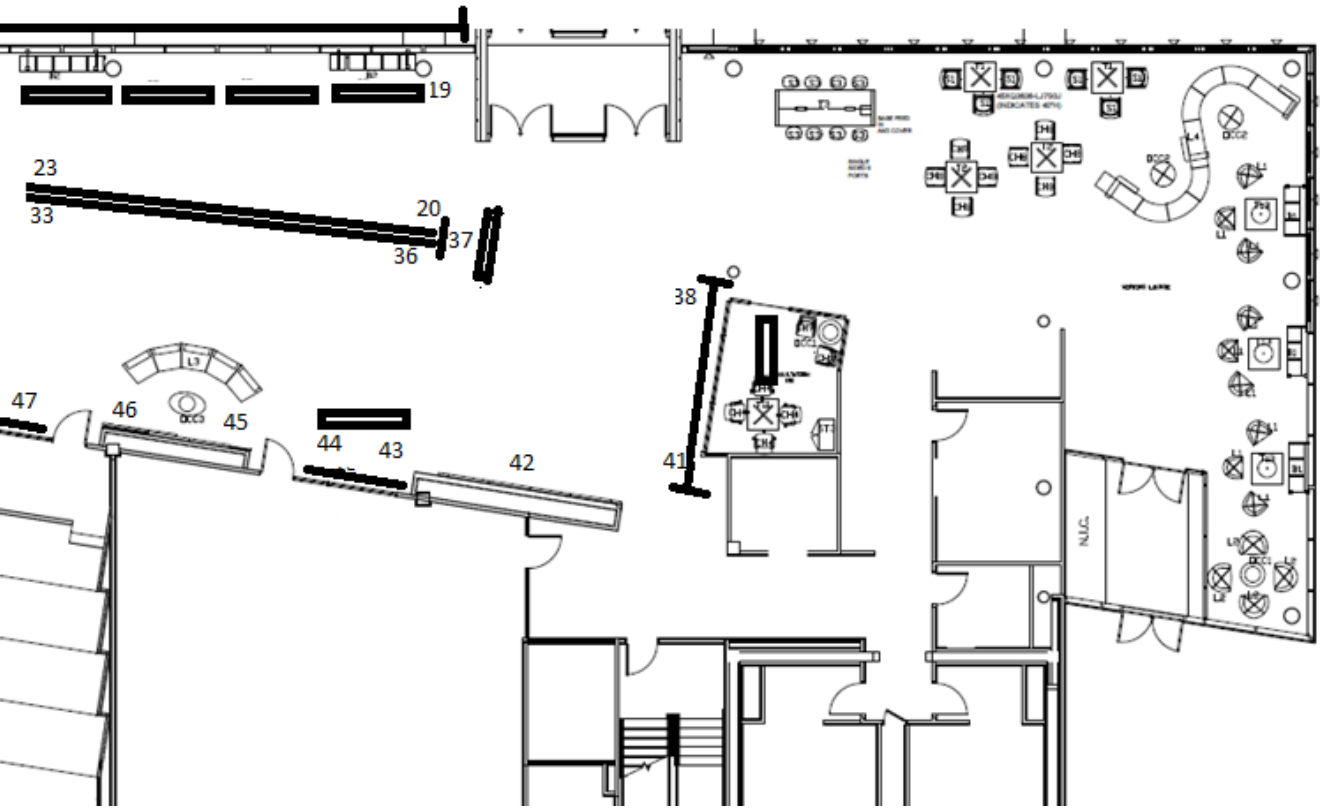
POSTER MAPS

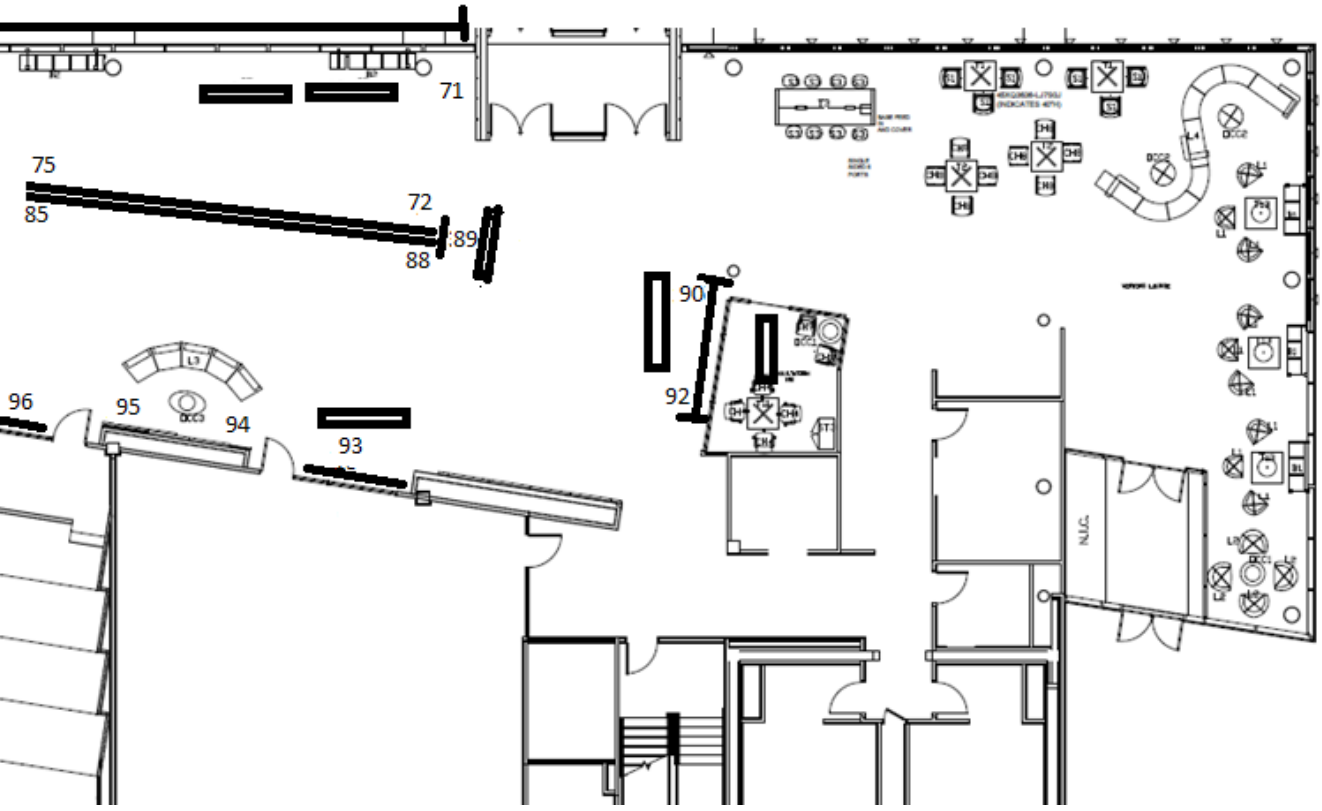
6 APRIL



7 APRIL




19
23
33
20
37
36
38
41
47
46
45
44
43
42
N.U.G.


71
75
85
72
89
88
90
92
96
95
94
93
N.U.G.

NOTES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CREATIVE INQUIRY