4-6-2015

10th Annual Focus on Creative Inquiry Poster Forum Program

Clemson University

CLEMSON UNIVERSITY

10th Annual

Poster Forum

Focus on Creative Inquiry

April 6, 2015

10th Annual Poster Forum

focus on creative inquiry

The 2015 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 800 teams enrolling approximately 22,000 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 communications skills as they present their work at professional conferences and to the external community, where they field questions from experts and decision-makers.

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 and on our website: clemson.edu/ci

For more information about Creative Inquiry, contact:

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Find us online: clemson.edu/ci
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Acknowledgements

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Cover Design by Joseph Whitt, CI Creative Director

Schedule of Events

8:00 am - 9:30 am	Students install posters	Hendrix Ballrooms, Meeting Rooms & Multipurpose Room
10:00 am - 12:00 pm	Morning Poster Session	Hendrix Ballrooms, Meeting Rooms & Multipurpose Room
1:00 pm - 3:00 pm	Afternoon Poster Session	Hendrix Ballrooms, Meeting Rooms & Multipurpose Room
3:00 pm - 4:00 pm	Plenary Session	McKissick Theater
	Welcome	Dr. Barbara Speziale
	Introduction	Dr. Janice Murdoch
	Featured Speaker	Dr. Heather Dunn Animal and Veterinary Sciences

Creative Inquiry: Develop Strategically Not Tactically

Awards Announcements - Dr. Barbara Speziale

4:00 pm - 5:00 pm	Students remove posters

Speakers

Dr. Barbara J. Speziale
Associate Dean, Undergraduate Studies

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 in Undergraduate Studies. 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. She has received numerous awards for her work, including the Elliott Award for Outstanding Service to Off-Campus, Distance and Continuing Education, the South Carolina Governor's Award for Scientific Awareness, Clemson's Martin Luther King Jr. Award for Excellence in Service, the Society for Environmental Toxicology / Menzie-Cura Environmental Education Award, and two awards for the $4H_20$-Pontoon Classroom curriculum -- the Natural Resources Conservation Service Youth Environmental Award and the 4-H Centennial Program of Excellence.

Janice Murdoch
Vice Provost and Dean of Undergraduate Studies

Jan Murdoch, who has taught at Clemson since 1986, received her bachelor's with honors in Psychology from Wake Forest University in 1980, followed by a master's in General Experimental Psychology in 1982. She was elected to Phi Beta Kappa in 1980. A native of Wilmington, NC, she completed her Ph.D, in clinical psychology at Vanderbilt University in 1985, with a clinical internship at Brown University. She is licensed to practice clinical psychology and holds the rank of full professor in the Department of Psychology. Murdoch's primary interest has been in undergraduate teaching. She also works with students on directed research projects and honors research. Courses she teaches include abnormal psychology, substance abuse treatment, and health psychology. Murdoch's research interests are in learning outcomes in General Education social science courses. Murdoch's other interests include public policy, including a sabbatical leave during the 1994-95 academic year to serve as an American Psychological Association Congressional Fellow working for Senator Jay Rockefeller's Senate Committee on Veterans' Affairs staff. She also plays bluegrass mandolin with "Any Old Time."
As Dean of Undergraduate Studies, Murdoch is responsible for maintaining and enhancing the quality of undergraduate academic programs and services, including curriculum, academic advising, the Calhoun Honors College, Cooperative Education, the Academic Success Center, Creative Inquiry, and ePortfolio.

Plenary Speaker

Dr. Heather Dunn
Assistant Professor in Research of Animal and Veterinary Sciences

Dr. Heather Dunn received her M.S. in Animal Science from the University of California Davis, her Ph.D. in Microbiology from Clemson University and completed two years of post doctorate research at Dana-Farber Cancer Institute in Boston, MA. Dr. Dunn joined the Clemson Family in 2006 and has dedicated her efforts to improve undergraduate experiences through teaching and research. Her research area focuses on mammary gland development and how "stem-like" signals that mimic growth are reactivated in highly invasive breast cancers. In 2014, she was awarded the Phil and Mary Bradley Award for Mentoring in Creative Inquiry due to her work with Animal & Veterinary Science students at Clemson University. Dr. Dunn currently mentors three undergraduate Creative Inquiry research teams from topics of fine needle biopsy techniques, increasing agriculture awareness and revitalization of farming operations at a South Carolina children's home.

Plenary Lecture:
Creative Inquiry: Develop Strategically Not Tactically

This talk will focus on how CI groups can benefit undergraduate experiences through traditional benchwork, assisting with continued development of a product or idea, answering questions regarding the impact of educational experiences, or creating something entirely new. Dr. Dunn finds that successful CI teams are established strategically by reaching small milestones along the way, rather than the tactical approach of completing one final outcome. Several CI teams helped her create textbooks in the form of photo atlases, that were designed for use at Clemson University and have since been adopted at other universities across the USA. Dr. Dunn will outline how her team was initially organized to begin completing their mission, how they adapted to changes and how they ultimately showcased their final products at an international convention.

The Phil and Mary Bradley Award

The Phil and Mary Bradley Award for Mentoring in Creative Inquiry is presented each spring in recognition of outstanding work with undergraduate students. Nominations are accepted from student participants in Creative Inquiry Initiative team projects. The award is made possible by a generous gift from Phil and Mary Bradley, and consists of a plaque and a salary supplement.

Bradley Award Recipients

2014	Dr. Heather Dunn, Assistant Professor, Animal and Veterinary Science
2013	Dr. Marian (Molly) Kennedy, Associate Professor, Materials Science, and Engineering
2012	Dr. John DesJardins, Assistant Professor, Bioengineering
2011	Dr. Delphine Dean, Assistant Professor, Bioengineering
2010	Dr. June Pilcher, Alumni Distinguished Professor, Psychology
2009	Dr. Karen Kemper, Associate Professor, Public Health Sciences
2008	Dr. Susanna Ashton, Professor, English
2007	Dr. Mark Charney, Professor, Performing Arts

The Bradleys are a "One Clemson" family, supporting both athletics and academics, including providing the first major gift for the Creative Inquiry initiative. They did so because they like the idea of relevance and results. "The projects we've seen so far are about real problems," says Phil, "and they're designed to find solutions."

Phil's father, William F., had attended Clemson in the late 1930s, gone into service before he graduated, gotten married and started a family. In the late 1940s, he came back to Clemson with his young family to finish his degree. Years later, Phil Bradley enrolled in Clemson. After his sophomore year, he married his high school sweetheart, Mary, and before he graduated in 1965, they too had begun their own family with daughter, Renee.

After military service, the Bradleys settled in Charleston where they had their second child, Philip, and where Phil established a successful career in the insurance industry. Their children grew up coming to Clemson ball games. One of Philip's first Death Valley memories is that of being picked up by the Tiger.

Both children attended Clemson. Renee later transferred to the College of Charleston, while Philip earned a political science degree at Clemson in 1992. He now has his own Allstate agency in Mount Pleasant. Seeing Philip graduate was coming full circle for Phil and Mary. In fact, Philip had his father's and grandfather's graduation years engraved inside his own Clemson ring.

The Bradley family has always believed in a life of involvement - whether it's working for their church, hosting Clemson Lowcountry events or giving financial assistance to worthy causes.

"Clemson has played a large role in my family's development," says Philip. "As our own history has evolved, so has the University's. Giving back is part of our shared tradition."

Excerpted from: Clemson World, Summer 2006Volume 59 Number 3: 'One Clemson' Family

Creative Inquiry gratefully acknowledges the support of Provost Robert H. Jones

Dr. Robert H. Jones
Executive Vice President for Academic Affairs and Provost Professor of School of Agricultural, Forest and Environmental Sciences

Robert H. "Bob" Jones is Clemson's first executive vice president for academic affairs and provost, providing leadership for the university's undergraduate and graduate programs, academic support programs, research and public service activities. Jones earned his bachelor's degree in forest management and master's in forestry from Clemson and his doctorate in forest ecology from the State University of New York College of Environmental Science and Forestry, Syracuse University. He previously served as dean of the Eberly College of Arts and Sciences at West Virginia University and department head and professor of biological sciences at Virginia Tech.

Upon returning to Clemson, Jones noted that "Creative Inquiry has emerged as one of Clemson's signature learning tools, and has contributed significantly to our rapid climb into the national spotlight. CI is a winning strategy in many ways. CI strengthens student engagement with scholarship, teamwork and faculty. CI projects challenge our way of thinking and lead to new and better ways for us to manage the university. And CI speaks to the very heart of the Clemson experience, which is steeped in innovation, creativity, and interdisciplinary learning."

Poster #1
Portable NIR Camera for Diabetic Ulcers Prevention
Mentor: Vladimir Reukov, Bioengineering
Students: Michelle Schleicher, Maria Portilla Rodriguez, Maxwell Hoelzen, Clayton Evans, Caleb Dautel, William Bagnal

Venous blood accumulation, or high levels of deoxygenated blood within a tissue, can indicate poor blood circulation and increased risk of ulceration. Thus purpose of this Creative Inquiry is to test whether near-infrared (NIR) imaging devices can detect areas of skin at risk for ulceration in diabetic patients. Here we propose to detect venous blood in tissues using differences in optical spectra of oxygenated vs. deoxygenated blood in NIR region. We previously designed and built a prototype scanner with three integrated NIR light sources that is being tested at MUSC. Our current work is focused on testing of improved NIR illumination systems and improved NIR imaging device, and our second prototype that uses a more sensitive Raspberry Pi-controlled camera and advanced NIR light sources will provide significantly improved image quality. Upon success, the ultimate goal of this project is to manufacture a cheap, portable NIR camera for skin self-monitoring by diabetic patients. Sponsors for this project have been the Creative Inquiry Program and the Bioengineering Department.

Poster #2
Combining Knowledge from Chemistry, Biology and Animal Care
Mentor: Rhett Smith, Chemistry
Students: Rachel Kunkler, Rachel Larue, Maya Linyard, Auri Silverstone, Mallory Turner, Heather Walker

There are numerous veterinary medicinal handbooks available for use, but not many are specific to one species. Handbooks are often broadly applicable to all animals, making it difficult for beginners to decipher the drug intended for a specific animal. Another problem facing students in animal and veterinary science (AVS) is that there are not many texts that relate studies across a variety of disciplines (chemistry, biology, courses on animal care, etc.). This Creative Inquiry project involves research on the medical issues most common among cattle, with the aim of producing a handbook for publication. One important aim of the book is to present information in a way that is easily accessible and understandable to people with varying levels of animal experience. In addition to usual drug handbook information, the chemical structure and pathology of each active ingredient are provided in an effort to provide AVS students with a unified picture of chemistry, physiology and animal care.

Poster #3
Machine Shop Set-Up Reduction
Mentors: Brian J Melloy, Industrial Engineering, Aditya Vaze, Industrial Engineering, David Parker, Industrial Engineering, Melissa Dorlette Paul, Industrial Engineering, Shibi Karuppusamy, Industrial Engineering
Students: Emily Holt, Brian Lewis, Harold Stein, Justin Welch, Michael Frisch, Thaddeus Morgan, Zachary Morrison, Jessica Pate

Team A - In partnership with Amsted Rail - Faiveley's Greenville manufacturing plant, this design project focused on reducing the time spent by machine operators on the changeover process between machining jobs in the CNC machine shop. Through data collection, interviewing, surveys, and conducting time studies, the customer needs and product specifications were determined. System losses were identified, such as wasted motion in processes, waste in walking, and machine or operator idle time waste. A subsequent root cause analysis was conducted to identify the causes of the losses, to which an iterative concept generation phase followed focusing on reducing wasted operations. The best concepts were determined for future implementation to the client.

Team B - This design project focuses on decreasing the changeover and set up times on the machine shop floor of the Faiveley Transport factory in Greenville, South Carolina. Faiveley Transport has many vertical tooling centers (VTCs) in their factory, but our team is assigned to the changeover process of three of the VTCs. The changeover process involves receiving an order of parts from a customer, setting up the machine for that part, quality checking the first part made, and running the machine for the allotted number of parts that the customer ordered. There is no schedule for making different part types and customer orders are filled based on a first in first out basis. Faiveley Transport does not keep any inventory of the parts that they supply to customers at their factory. Since learning about the current state of the system, our group has determined the customer needs through interviews and surveys as well as making general observations. At this point in the project, we are working on identifying the system losses based on key business goals and conducting a root cause analysis. Defining the system losses will help our team to identify and generate the best concepts for solution.

Poster #4
Optimizing the Packing Operation
Mentors: Brian J Melloy, Industrial Engineering, Aditya Vaze, Industrial Engineering, David Parker, Industrial Engineering, Melissa Dorlette Paul, Industrial Engineering, Shibi Karuppusamy, Industrial Engineering
Students: Bradley Gainey, Corey Lockwood, Lauren Moravec, Aparna Narayana, Jessica Romine, Nathan Bruhn, Valerie Clements, James Ethridge, Michael Haffner, Kevin Russo

Team A - In partnership with Itron's Oconee County manufacturing plant, this capstone design project worked to improve the packing process at the CENTRON I Packing Station. The project aimed to address the ergonomic issues, redesign and standardize the process, and increase operator satisfaction. Root cause analysis was conducted and system losses were identified to be: ergonomic issues, time to replenish cardboard, rework issues, changing tape, and other non-value added operator tasks. The main concern with the current system is ergonomics. To address these concerns, REBA charts, cause and effect analysis, fish-bone charts, 5 why's analysis, and Pareto analysis were used to narrow down the root causes of these issues. Based on these findings, the team has chosen to work with Itron and its various departments to develop a more ergonomic packing station to address problems found throughout the project. Team B - In partnership with Itron's Seneca facility, this design project focuses on improving the CENTRON meter packing station by reducing operator and system material handling as well as improving the station ergonomically. The Customer's needs and product specifications were determined in the initial stages of the project in order to understand where the system losses were within the current system. Using root cause analysis tools such as fishbone diagrams and Pareto charts, we were able to pinpoint some of the major contributors to idle time and worker injuries. The proceeding phase is concept generation where each idea will aim to reduce material handling time by 30% and decrease the Rula assessment score by at least 2 points while maintaining a budget under $15,000. Through testing and cost analyses the most effective and efficient option will be presented to the client.

Poster #5
A Survey of Stream Fish Diversity in the Clemson Experimental Forest
Mentor: Yoichiro Kanno, School of Agricultural, Forest and Environmental Sciences
Students: Joshua Cary, Jesse Duvall, Benjamin Lam, Ryan Medric

The southeastern USA harbors high aquatic diversity in the temperate region. Yet, stream fish suffer high imperilment rates due to anthropogenic activities such as habitat loss and water quality degradation. From the biodiversity conservation perspective, it is important to document what and where species occur in a landscape. The purpose of this Creative Inquiry project was to survey stream fish assemblages in and around the Clemson

Experimental Forest. We surveyed local streams using electrofishing and seining techniques in Fall 2014 and recorded abundance of fish species captured. We collected common species such as blue head chub (Nocomis leptocephalus) and spottail shiner (Notropis hudsonius), as well as locally rare species such as mottled sculpin (Cottus bairdii). Although we hypothesized that larger streams would contain more species diversity than smaller streams, our data did not support this hypothesis based on a linear regression analysis. Our study showed that fish fauna around campus is diverse and we should be aware of these important water resources for conservation.

Poster #6

Changes in Soil CO_2 Flux from an Urban Environment due to Anthropogenic Compaction

Mentor: Scott E Brame, Environmental Engineering and Earth Sciences

Student: Dana Walters

Compaction or bulk density of soil affects the release of carbon dioxide from soil. Carbon dioxide is produced as a byproduct of below-ground respiration from organisms such as plant roots, fungi, soil animals, bacteria and decomposers. Soil respiration and decomposition account for nearly 29% of all naturally produced atmospheric carbon dioxide. Worldwide this equates to roughly 220 billion tons of carbon emissions. In order to determine the correlation between anthropogenic soil compaction and soil CO_2 flux, measurements were taken on Bowman Field, an area of Clemson University's campus known to host multiple large-scale social events each year. The soil CO_2 flux dropped significantly after the conclusion of Homecoming 2014 and showed a slow recovery in the following ten weeks. The average soil CO_2 flux from the field before the Homecoming event was 13.89 μM/m2/second. After the event, this average flux dropped to 2.15 μM/m2/second. These results demonstrate a negative relationship between anthropogenic soil compaction and natural CO_2 flux.

Poster #7

Campus Recreation and Leisure Skills Participation: The Combined Wellness Impact

Mentors: Kellie Walters, Parks, Recreation & Tourism Management, Teresa Tucker, Parks, Recreation & Tourism Management

Students: Kathryn Brinker, Cole Brock, Bailey Griffin, Matthew Hogue, Garrett Lovorn, Allen McKee, Carly Miktuk, Emily Mutschler, Kristina Shakes, Jordan Shaw

Studies have shown that stress and body image are the top health problems that concern college students. Although there is data to suggest the positive impact leisure skills education and campus recreation involvement have on student's health, little is known about the indirect effects that leisure skills participation may have on campus recreation involvement. Therefore the purpose of this research is to examine the relationship between leisure skills and campus recreation involvement and students' body image, self-esteem, and stress levels. Questionnaires were administered to students at the beginning and end of their class. There were 220 participants (111 males, 109 females) ranging in age from 18 to 28. The perceived stress scale, self-esteem scale, and body-esteem scale were the measurements used for this study. Descriptive statistics, correlations, and main effects will be examined. While the study provides a first step in understanding the role that leisure skills programs may have in the health of college students, further research on the correlation between body image, self-esteem and perceived stress in for credit leisure skills is needed.

Poster #8

Oyster Reef Restoration

Mentor: Caye Drapcho, Environmental Engineering and Earth Sciences

Students: Rachel Thurmes, Allison Thompson, Gabriella Stefano, Emily Skibenes, Zachary Primm, Clare Moriarty, Alston Loper, Kayla Kernich, Zachary Gilstrap, Morgan Daughtridge, Jenna Agin, Haley Willis, Nicholas Tinsley

Due to over harvesting and habitat destruction 85% of oyster reef populations have been lost globally over the past several decades. Apart from being a keystone species, oysters provide many ecosystem services that make them near perfect for living shorelines; a recent ecological engineering design strategy that naturally stabilizes the shoreline as well as provides protection for intertidal environments. Oyster reefs increase wave attenuation protecting the shoreline environment from intense wave action in addition to the reef's ability to cause sediment accretion; not just protecting shoreline environments but expanding them as well. Oysters produce baby oysters called spat that require a substrate to attach to in order to grow. Ordinarily, other oysters in the reef provide such substrate but with reef populations being over-harvested, much of the spat doesn't have an appropriate surface to bind to. In the ACE Basin area a lack of substrate rather than spat is hindering oyster reef development. In an attempt to protect coastal shorelines as well as rehabilitate oyster reef populations within the ACE Basin area lightweight, biologically-compatible structures have been designed and implemented to provide the necessary substrate for oyster spat attachment.

Poster #9

Stability and Reactivity of Cationic Polyelectrolytes in Alkaline Conditions

Mentor: Rhett Smith, Chemistry

Student: Caitlin Keen

Phosphonium ionomers have found utility as components of alkaline fuel cells, where they are used as hydroxide ion-transporting membranes. One of the problems associated with such cationic polymers is that many organic polymers and functional groups undergo potentially undesirable decomposition reactions in the presence of hydroxide ions due to hydroxides identity as a strong base and a good nucleophile. In this Creative Inquiry project we explored new routes to prepare tetraarylphosphonium ionomers and the decomposition pathways that occur in phosphonium polyelectrolytes. The structural influence on which decomposition pathways are possible and rate of decomposition will be discussed with the aim of revealing rational design principles that could improve the stability of phosphonium ionomers for use in alkaline environments.

Poster #10

Investigating Multiple Methods of Scaffold Generation for Tissue Engineering and Drug Delivery Applications

Mentors: Delphine Dean, Bioengineering, Elliott Mappus, General Engineering, Jorge Rodriguez, Bioengineering

Students: Brian Peterson, Sharon Olang, Kelsey Leeke, Aniqa Chowdhury, Katie Brentzel, Huu Vo

Tissue engineering seeks to use a patient's own cells to construct viable organs that can be placed back in the patient without eliciting an immune response. This study explores two different methods to create scaffolds for tissue engineering and drug delivery. The first method involves synthesizing cell spheroids with human breast cancer cells using a biodegradable high molecular weight polymer to create a viscous medium, which allows for the formation of spheroids grown in the medium. These spheroids give a more accurate tissue model and may be used to study anti-cancer drug delivery. The second aspect of this Creative Inquiry seeks to use PDMS soft lithography to produce a high resolution picture of a Clemson tiger paw composed of 3T3 fibroblasts using

immunofluorescence. The end goal of this study is to use rapid prototyping to produce novel PDMS stamps for use in tissue engineering cell seeding.

Poster #11
Investigating Branched Polymers for Water Purification Applications Using Molecular Dynamics Simulations
Mentor: Sapna Sarupria, Chemical and Biomolecular Engineering
Students: David Barton, Danielle Jacobs

In this project, we use molecular dynamics simulations to study the behavior of dendrimers, a class of branched polymers, in an aqueous solution of hydrocarbons. Previous experimental studies have suggested that dendrimers can be used for oil spill remediation and water purification. Both these applications depend on how the dendrimers interact with the hydrocarbons present in the oil spill as well as the water contaminants. In our study, we focus on elucidating the molecular mechanisms through which the dendrimers associate with different types of hydrocarbons. Specifically, we use all-atom and coarse-grained models to study the association of dendrimers with aromatic hydrocarbons like naphthalene and linear hydrocarbons like octane. We have investigated the effect of dendrimer size, and hydrocarbon concentration on the association behavior. Our studies reveal new pictures of dendrimer-hydrocarbon association and provide insights that can be used to engineer dendrimers for effective use in water purification applications.

Poster #12
3D Cell-based Structures for Pancreatic Islet Regeneration
Mentor: Agneta Simionescu, Bioengineering
Students: Nicole Ambrosio, Kristina Carlson, Daniel Gow, Ashley Haney, Breanne Hourigan, Kayla Mulqueen, Mitchell Scull, Benjamin Wilkin

Diabetes is a significant health problem affecting over 8% of the population and increasing to epidemic proportion worldwide. In type1 diabetes, the pancreas completely stops producing insulin, a hormone that enables the body to use glucose found in foods for energy. The beta cells, responsible for insulin production, are located in pancreatic islets. In this project, the potential of human adipose tissue-derived stem cells to form cellular spheroids and differentiate into insulin-producing cells is investigated. Stem cell spheroids were formed and characterized using histological staining. In order to generate insulin-secreting cells in response to glucose stimulation, the stem cell-based spheroids are differentiated using specific agents described in the literature. In future work, these structures could serve as *in vitro* models to study the effect of drugs used in diabetes.

Poster #13
Correlations Between Basal Area and Salamander Diversity in Natural and Urbanized Streams in Clemson, SC
Mentors: Russell Barrett, School of Agricultural, Forest and Environmental Sciences, Nathaniel Weaver, School of Agricultural, Forest and Environmental Sciences
Student: Bonnie Miller

Urbanization, which is increasing globally, leads to a series of changes in the landscape that have an effect on riparian systems and the organisms that inhabit them. Along with habitat loss, urbanization can have both direct and indirect effects on entire watersheds and associated streams. Salamanders, which are normally abundant in small streams in the southeastern United States, are sensitive to environmental degradation, thus salamander diversity can be an indication of habitat quality. This study, sponsored by Dr. Kyle Barrett and master's student Nathan Weaver, focuses on the relationship between basal area and salamander diversity in five streams in and around the Clemson, SC area. Basal area is the measurement of how much of an area is occupied by trees and can give an indication of how much forest has been lost due to urban development in the immediate riparian (stream) area. The streams that were studied varied in location and estimated levels of urbanization within their watershed. We found a positive correlation between salamander diversity and basal area. The conclusions indicate increasing older vegetation along stream banks is associated with greater salamander diversity, which may be a sign of overall stream quality. These results have implications for stream buffer ordinances and stream restoration efforts.

Poster #14
Ergonomic Evaluation for Occupational Redesign
Mentors: Drew Morris, Campbell Graduate Engineering Program, June Pilcher, Psychology
Students: Jessica Romine, Trevor Ormson, Julia Harper

Students from Industrial Engineering and Psychology worked with Plastics Omnium Industries' (OP) plant in Anderson, SC in an effort to support the plant's ergonomics program. The students spent time assimilating information from factory employees' actions and verbal reactions to their work processes. In the first stages of this processes, the students worked together to learn the field of ergonomics through a hands-on interaction with visual data collecting, pinpointing key problem areas, and providing usable feedback to OP. During the next stages of the project, students plan to collaborate with the ergonomics program at OP in order to find optimal solutions for design and work process flaws. Fundamentally, the project aims to turn a learning experience into a key aid in OP's ergonomics reform.

Poster #15
Integrating Row Covers and Hydronic Heating for High Tunnel Season Extension Vegetable Production
Mentors: Geoffrey Zehnder, School of Agricultural, Forest and Environmental Sciences, Kelly Gilkerson, School of Agricultural, Forest and Environmental Sciences, Shawn Jadrnicek, School of Agricultural, Forest and Environmental Sciences
Students: Richard Bowers, Christopher Cortina, David Haines, Timothy Mings, Sally Watkins

Row covers or lightweight blankets are commonly placed over the top of vegetable plants to protect them from cold injury and extend the growing season. Hydronic heating systems or the heating of water and using water to convey heat to plants through closed loop tubing is also used to protect plants from cold injury and extend the growing season. Our research combines row covers with hydronic heat to quantify the synergy between the two techniques. Performance of row covers is doubled by the addition of hydronic heat tubing under the row covers. The technique allows growers to extend the growing season and protect plants from intense cold.

Poster #16
Sleep Consistency as a Predictor of Daily Well-Being
Mentors: June Pilcher, Psychology, Drew Morris, Campbell Graduate Engineering Program
Students: Elizabeth Ferguson, Sarah Limyansky, Ellen Szubski, Elizabeth Rummel, Nicole Horth

The purpose of this study is to develop a new sleep variable construct incorporating sleep consistency. Participants from three large data sets were asked to complete multiple surveys. Using the Pittsburgh Sleep Quality Index (PSQI), we examined a) time into bed, b) wake up time, c) midpoint of sleep, d) sleep duration, and e) sleep quality. These five measures of sleep are being analyzed using a regression analysis predicting other measures of well-being completed by participants. Our data findings suggest that sleep consistency could be important independent construct of measuring sleep and sleep habits. This project was partially supported by the Creative Inquiry program at Clemson University.

Poster #17
Critical Thinking: Undergraduate Views and an Intervention
Mentor: Benjamin R. Stephens, Psychology
Students: Lucas Bogart, Allison Carney, Adam Cox, Caitlin Dicke, Mieke Overdyk, Makayla Samour, Ashlyn Staples

Critical thinking includes the ability to evaluate evidence and alternative explanations, and provide support for a conclusion. Professors value critical thinking, but also are vague and confusing in their descriptions of components of critical thinking instruction. In two versions of an 11-item survey, we asked 139 undergraduates about a "professor's" and "student's" views of critical thinking. The results suggest that students view faculty critical thinking as personal, and neither explicit nor clear. We now report on an intervention to enhance critical thinking. Fifty-one participants completed pretest and posttest assessments. Participants were prompted to describe graphical data verbally, identify alternative explanations, and identify possible new data. The experimenter illustrated correct answers between the tests. ANOVA indicates a significant interaction - our method of teaching critical thinking skills was effective for student ability to identify new data, with improvements likely due to a poor initial understanding of concepts. We are currently collecting further data on critical thinking intervention methods.

Poster #18
Engineering Protein Post-Translational Modifications for Therapeutics
Mentor: Mark Blenner, Chemical and Biomolecular Engineering
Students: Julia Borglin, Andrew Dippre, Kyle Pazzo, Margaret Wilkes, William Wiseman

We are seeking to develop a novel mechanism of engineered post-translational modification in prokaryotes intended for therapeutic use. Given the recent discovery of prokaryotic tyrosine sulfation and tyrosulfotransferases, the design of sulfation pathway in vivois our end goal. The use of tyrosine sulfation is of primary interest due to the function of this chemical modification elucidated in HIV invasion and propagation. HIV-1 viral infection is dependent upon the interaction of the viral gp120 coat protein and the amino terminus of the CCR5 cell receptor, which contains sulfated tyrosine residues. We believe similar bio-mimicry can achieve similar therapeutic results for other chemokine receptor mediated diseases. To achieve this end, we have isolated and co-expressed the native sulfotransferase from *Xanthomonas oryzae* known as RaxST and the native sulfation targetOmp1xand its analogAx21. Additionally, we have isolated sulfate donor constructs RaxPQ and E. coli homolog Cys DNC for the improved production of PAPS. These constructs are designed for the production of in vitro sulfation of the natural sulfation target, along with human compatible compounds CCR5, CXCR4, antiplasmin, Gp1b, and RaxX. We have characterized the ability of the cells to express these proteins using techniques such as SDS Polyacrylamide gel electrophoresis and Western blotting. The successful sulfation of these domains, inserted in antibody fragments will further our goal towards developing protein therapeutics that interfere with sulfation mediated protein-protein interactions.

Poster #19
Identification and Functional Evaluation of Anti-Inflammatory Immunomodulators from *Physalis peruviana* (Poha)
Mentor: Yanzhang Wei, Biological Sciences
Students: Alyssa Shearer, Haley Huggins, Alicia Burns, Stephanie Brierley

The likelihood of a relation between the immune system's inflammatory response and cancer has been observed since the 19th century, and recently scientific evidence has strengthened this hypothesis. A failure to control the immune system response can lead to unnecessary inflammation that continues to disturb the cellular microenvironment, which can lead to atypical gene expression, posttranslational modification of cell cycle proteins, and apoptosis. Also, inflammatory cells can promote cancer cell proliferation and survival through the secretion of chemokines, leukocytes, and growth factors. One way to combat cancer is to alleviate the aberrant inflammatory response. An ability to reduce inflammation has been observed from various plants, including *Physalis peruviana*, the Hawaiian poha fruit. Effective compounds of poha fruit juice have shown to reduce nitric oxide (NO) production in vitro in the mammalian macrophage cell line RAW 264.7. Two compounds from poha, PPH and PPP, when applied to the macrophage cells perturbed for inflammation, significantly reduced the NO levels in the cell media when compared to untreated cells. Large amounts of nitric oxide can be pro-inflammatory, and therefore lead to progressed tumor growth. This significant reduction in NO demonstrates the potential of these effective compounds in combatting inflammation, and potentially cancer. The molecular basis of the mechanism and pathways involved need further elucidation through future studies.

Poster #20
Community Supported Art (CSArt) Launches Student Artists at Clemson University
Mentor: Valerie Zimany, Art
Students: Brittany Wilund, Hannah Hunt, John Murphy, Allison Rupprecht, Stephanie Pechthalt, Matthew Pizzuti, Ellen Wesly, Elizabeth Davis

Throughout our undergraduate years, Ceramics-emphasis Art majors and minors have explored how to market a non-profit that is centered on the arts, specifically ceramics. Our non-profit uses grants for research and to seed revenue-generating events, which fund community outreach, education and art sales. These sales and events help fund the Clemson University Ceramics program and provide other important professional experiences and practice-based learning opportunities for students. Marketing our sales and events is especially important. By learning to market our non-profit initiatives well, we are in turn learning how to market ourselves as artists and professionals. Our presentation at the National Council on Education for the Ceramic Arts conference covered the Community Supported Art (CSArt) program begun through Clemson University's Creative Inquiry initiative, grant writing, the Clemson Ceramics Association and event marketing.

Poster #21
Increasing the Quality of the Thermoforming Process
Mentors: Brian J. Melloy, Industrial Engineering, Aditya Vaze, Industrial Engineering, David Parker, Industrial Engineering, Melissa Dorlette Paul, Industrial Engineering, Shibi Karuppusamy,Industrial Engineering
Students: Michael Howell, Christopher Lourenco, Ashley Sabinsky, Stephen Smith, Vincent Carter, Thomas Power, Casey Rivers, Michael Whitaker

Team A For this project, we were tasked with improving the quality of the thermoforming process on line 9 at Fabri-Kal's Greenville plant. Thermoforming is the process by which plastic cups are made by heating a sheet of plastic to a rubbery elastic state, stretched over a mold and trimmed. In order to identify the goals of this project, we performed an initial investigation of the process and created a mission statement. Next, we used interviews, observations and focus groups to develop customer needs and product specifications. Next, we had to identify what the losses of the system were and performed root cause analysis in order to determine what was causing the problems in the process. Through root cause analysis, we concluded that the largest sources of scrap were due to the oven, trim press (trims cups from the sheet), and lip roller (rolls a "lip" that allows the cup to be used for personal consumption). The final step of the project is concept generation and selection in which we will design an alternate process that will reduce scrap in the thermoforming process. Ultimately our goal is to reduce scrap from its current rate of 15.5% to only 4%.Team B At the Greenville, SC thermoforming facility Fabr-Kal, scrap rates are high in a section of their processes. The motivation to reducing these scrap rates for Fabri-Kal will be a significant reduction in operational costs. Data collection has been performed by way of internal SAP systems and a specific data reporting system called Lincs, which generates scrap reports based on many different parameters. The process has been analyzed for efficiency by using methods such as Fish Bone Diagrams, 5-Why Analyses, Pareto Charting and FMEA Analyses. Based on the analyses, the main causes of scrap that will be addressed in the concept generation phase are related to trim press alignment issues, too many "other" categories in scrap report, trimming quality, and bagger issues. From here the team will use the root cause analyses' results to begin generating concepts to address the system losses which will provide Fabri-Kal with significant cost savings and enhance future development.

Poster #22
CU Defense - Lightweight Cranial Protection and Low Altitude Parachute Systems
Mentors: John D. Desjardins, Bioengineering, Christopher Norfolk, Chemical and Biomolecular Engineering
Students: Devin Gibson, Nicholas Boone, Collin Clemons, Shayne Rimer, Charles Weirick, Casey Young

The Clemson family proudly embraces its school's rich military heritage and students in every department regularly demonstrate patriotism and respect for our nation's armed forces. Our multidisciplinary team of undergraduates has sought to study and improve currently used technology to give soldiers an advantage in the field. We currently have two active projects, as described below. Lightweight Cranial Protection Current standard-issue combat helmets weigh more and offer less protection than desired. Equipment weight reduction is a constant goal for the armed forces, and enhanced safety is always favored. With recent technological developments in the application of dilatants, or shear-thickening fluids (STF), it appears that a helmet's design and construction can be improved. We intend to apply several STF compositions to selected ballistic fibers using multiple impregnation methods. The resulting fibers will be tested for variations in ballistic performance. Low Altitude Parachute System Currently used parachutes are designed to inflate slowly to avoid injury on opening. As a result, there is a range of heights that are too low for current parachutes to behave effectively. Using past current research and simulation software, we intend to study the various shapes and sizes of parachutes used throughout history and design a parachute system that will be effective at these low altitudes. This research could lead to the development of products that vastly increase the quality of life and safety of military, law enforcement, and rescue operations.

Poster #23
Ecology and Biology of *Bellamya japonica*, a New Invasive Species in the Savannah River Basin
Mentor: John Hains, Biological Sciences
Students: Josephine Anthony, Sarah Fishburne, John Hutson, Kyle Kilpatrick, Skyler Melton, Lauren Turbyfill

Bellamya japonica, the Japanese mystery snail, is a new invasive species to Lake Hartwell, and this is the only reported occurrence in the Savannah River Basin although it is widespread in other parts of the United States. We performed analysis of the dimensions of snails captured from Lake Hartwell, to determine the relationship between mass, volume, and shell length. The data showed a predictable positive linear relationship between the three dimensions. As part of a mark-recapture effort to track their dispersal, after we measured the snails, we tagged them and re-released them into the lake at a defined location. On subsequent trips we took note of the distance of marked snails from the origin point where we had released them. During the course of the study, few of the snails had moved from the origin, indicating that *B. japonica* does not meet a critical assumption of the mark-recapture method. We also continued study of fecundity rates with weekly observations to determine the seasonal effects. These results indicated that warmer temperatures were the prime period for the snails to breed and reproduce, while cooler temperatures resulted in low fecundity. We have just begun another study to determine if protecting the shells with a polymer would improve their growth and survival compared to unprotected specimens. Here we describe the experimental rationale and design of this new field experiment to further describe the response of this new invasive species in its new environment.

Poster #24
Sustainable Smoking on Campus
Mentors: Gary V. Gaulin, University Housing, Leidy Klotz, Civil Engineering
Students: Benjamin Ramsey, Jamie Pikutis, Kristen Brown

As Clemson students, it has come to our attention the increased amount of cigarette waste on the grounds of campus. Cigarette filters never truly decompose, they merely break apart after 12 years. Thus, posing multiple litter, pollution and environmental issues. Research has led us to believe there are two fundamental problems behind this: Lack of awareness on the smokers behalf and lack of availability of waste receptacles. With the goal of approaching both issues we devised a survey to make students reflect upon the environmental impact of cigarette waste. The survey is meant to spread awareness and encourage more sustainable behavior. We also plan to use feedback as contribution to the changes we plan to make on campus, which include the whereabouts of more receptacles. With our results, we anticipate finding the root cause as to why students litter their cigarettes. At the end of our experiment, there should be a decrease in cigarette waste on the grounds of Clemson, and the smoking population will have become more conscious of proper disposing. We also want to thank our adviser Gary Gaulin and the Creative Inquiry program for making this research possible!

Poster #25
Understand and Visualize Fluid Flow through Porous Materials
Mentor: Qiushi Chen, Civil Engineering
Students: Alexander Ryan, Graham Varn, Joel Miller, David McCormick

This CI project aims to understand and visualize how fluid flows through various porous materials and how the mesoscopic material properties influence flow process. Porous material is ubiquitous in nature and engineering and appears in many forms including sands, foams, and shredded tires. Understanding how fluid flows through various porous materials has important engineering implications. One example application that motivates this project is contaminant transport problem in porous materials: if there is an oil leakage from underground pipe line or if there is polluted underground water, how and where will the contaminate moves within the soil mass and what measures could be taken to guide and/or stop the flow contaminates. In this project, student will design and construct simple experimental devices to visualize and analyze flow process through various porous materials (geological materials such as soil, and man-made materials such as glass beads). Students will also have opportunities to learn basic theory behind the physical phenomenon and use computer tools (such as Matlab) to model and assist in understanding such process.

Poster #26
Under the Surface: Biological Monitoring Along Hunnicutt Creek Restoration
Mentors: Donald Hagan, School of Agricultural, Forest and Environmental Sciences, Calvin B. Sawyer, School of Agricultural, Forest and Environmental Sciences, Jeremy Pike, School of Agricultural, Forest and Environmental Sciences
Students: Nathaniel Slaton, Sean Mckinney, Carolyn Lanza, Brett Kelly, Nicole Harper, Lollice Courtney

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 located on Clemson University's campus. The current research is focused on monitoring key factors of an aquatic ecosystem that indicate habitat viability and overall water quality. Data contributing to our research include the levels of bacteria, dissolved oxygen, pH, conductivity, and the quantified species richness and abundance of amphibians and macroinvertebrates. The results presented in this poster are the baseline comparisons between the improved sections of Hunnicutt Creek and identified reference sites.

Poster #27
Solid-Supported Agents for Removal of Dye Pollutants from Water
Mentor: Rhett Smith, Chemistry
Students: Peter Gennaro, Kara Jolly

Dyestuffs are pervasive pollutants, especially in areas where leather and textile industries are in operation. There is a need to develop effective and efficient strategies for the removal of these pollutants from drinking water and the environment. Solid supports have been exploited extensively as convenient supports for molecular functional groups capable of selective absorption/reaction with solution-phase species followed by facile removal of the solid-supported material from the solution. This Creative Inquiry project involves modification of magnetic silica-coated magnetic microspheres and commercial resins with a variety of phosphonium species with the aim of using these materials for adsorption of anionic dyes from aqueous solutions. These particular solids were selected because they are easily removed from a fluid such as drinking water that has been purified by the modified particles. The kinetics, adsorption isotherms and recyclability of dye uptake will be discussed.

Poster #28
Investigating if Coke Zero Has Real Coke Taste
Mentors: Paul Dawson, Food, Nutrition and Packaging Sciences, Rose Martinez-Dawson, Mathematical Sciences
Students: Allison Spagnoletti, Marianna Painter, Brianna Crosby, Andrew Boggs, Rachel Tatge

In many commercials, Coca-Cola corporation claims that Coke Zero has the taste of Coca-Cola. Our team intends to conduct a triangle taste test using students enrolled in STAT 2220 or FDSC 2140 during the Spring 2015 semester to determine if students can distinguish between Coke Zero and Coca-Cola. Also, the team will investigate if demographic characteristics such as gender and frequency of soda drinking affect being able to distinguish between the two drinks.

Poster #29
A Flexible Implementation of Laboratory Interfacing on a Custom Ion Beam Instrument
Mentors: Chad Sosolik, Physics and Astronomy, Dhruva Kulkarni, Physics and Astronomy
Students: William Doran, Brandon Gray, Valerie Jones, Neil Monga, Brooke Watson

Experimental physics instrumentation commonly involves both off-the-shelf and custom-designed measurement tools that must be interfaced for the purposes of monitoring, control, and data acquisition. Over time, this effort becomes difficult as legacy equipment, which often retains high performance characteristics, can have interfaces that predate modern computing architectures. In this project we have set up a flexible, modular, and easily integrated interfacing suite based on a standard Linux PC with GPIB, a Raspberry Pi, and a Rabbit Microcontroller. The interfacing was achieved on an ultrahigh vacuum ion scattering system designed for radiation studies relating to common electrical engineering device platforms (e.g. diodes and capacitors) and to fundamental studies of material response to ion impacts. The scattering system consists of an ion source connected to a multi-section beamline and a two-tier scattering or target chamber. Within this system are an array of status, control and measurement points that involve pumping and pressure regulation, high voltage power supplies, ion current extraction, and scattered ion/neutral detection. To date, we have implemented the interfacing of ion detection and an ion energy scan using a GPIB interface and a digital-to-analog programming voltage originating from our PC and Microcontroller platforms. With flexible coding, these tools can be seamlessly shifted to the Raspberry Pi environment, which has a significantly reduced cost and physical footprint. Planned expansions of this interfacing will include ion and electron spectrometry tools for time-of-flight and elemental analysis.

Poster #30
Phosphonium Polyelectrolytes: Film Formation and Anti-Bacterial Properties
Mentor: Rhett Smith, Chemistry
Students: Catherine Conrad, Emily Freeman, Emily Colter

Ionic polymers that contain ammonium and phosphonium units have demonstrated outstanding ability to form supramolecularly organized films via facile layer-by-layer deposition as well as antibacterial properties. This Creative Inquiry project involved the synthesis of a series of phosphonium polyelectrolytes via polymerization of a variety of diphosphines with bis(bromomethyl)arene comonomers, leading to the cationic polyelectrolytes of interest. The spacer between charged units was varied to include flexible, rigid, and electroactive moieties. The influence of polymer structure on film formation, supramolecular assembly and antibacterial properties are discussed in this contribution.

Poster #31
The Thrill of Victory and the Agony of Defeat: Using the Social Media Listening Center to Examine Post-game Twitter Content in College Rivalry Games
Mentor: John Spinda, Communications Studies
Students: Grace Chandler, Carlee Chapin, Michaela Heil, Sarah Maxson, Courtney Paul, Carly Rose, Taylor Rouse, Avery Sheehan

This Creative Inquiry project studied post-game Twitter messages (i.e., "Tweets") in the aftermath of closely contested rivalry games in college football/basketball to learn more about how fans react to victories/defeats using social media. We aimed to determine whether or not these reactions would mirror the predictions from the disposition theory of sports spectatorship (Zillmann, Bryant, & Sapolsky, 1989). According to this theory, enjoyment of sports will be maximized when an intensely liked team defeats an intensely disliked team. Conversely, when an intensely liked team loses to an intensely disliked team, "negative enjoyment" occurs. Using Radian6 software in the Social Media Listening Center, we were able to pinpoint the end of closely contested rivalry games and study tweets from fans of the victorious and losing teams. Tweets from each game were saved and coded into themes separately by each member of the CI team. Next, CI members along with their faculty advisor discussed the themes they felt emerged from the tweets overall and achieved consensus about each contest being studied, and then sought consensus for themes that emerged across games.

Poster #32
Dynamic Regulation and Metabolic Engineering of Total Biodiesel Production in *E. coli*
Mentor: Mark Blenner, Chemical and Biomolecular Engineering
Students: Erika Arvay, Charles Kessler

The purpose of the project is to engineer a strain of *E. coli* that produces fatty acid ethyl esters more efficiently. Esters are used in numerous industrial and commercial products including fuel, lubricants, fragrances, and flavorings. Currently there is an imbalance in the ester producing pathway of *E. coli* that creates an abundance of alcohol in relation to fatty acid, preventing optimal efficiency. As of now we have replaced pyruvate decarboxylase and acyl transferase genes using techniques such as polymerase chain reaction, sequence and ligation independent cloning, and electroporation. The next step of our project is to confirm increased production rates via growth studies and gas chromatography to measure the amounts of fatty acid ethyl ester produced. In the future we hope to experiment with atfA, an acyl transferase gene engineered to have higher solubility and thus more enzymatic activity. Through this we hope to achieve not only increased fatty acid ethyl ester production, but also to identify the effect of varying substrates on the type of ester produced.

Poster #33
Improving Clemson's Employee Wellness Program
Mentors: Caitlin Moore, Clinical Ed/Pract&Med Surv Pro, Nancy K. Meehan, School of Nursing, Paula Watt, Clinical Ed/Pract&Med Surv Pro, William W. Mayo, Clinical Ed/Pract&Med Surv Pro
Students: Grace Stonecypher, Nicole Clements

The nurse-managed Joseph F. Sullivan Center of Clemson University operates an incentive based employee wellness program called CU4Health. In order to determine the effectiveness of the program, researchers from Clemson University's School of Nursing analyzed the return of investment from the program, defined by the improvement of participants' health, which was scored by eight biomarkers. This research displays evidence that participation in Clemson University's employee wellness program is associated with overall healthier biomarkers, therefore supporting the implementation and continuance of the CU4Health.

Poster #34
SolarStation: Clean Outdoor Power For All
Mentor: Rajendra Singh, Electrical and Computer Engineering
Students: Trev Comstock, Michael McDonald, Yongkun Liao

SolarStation was created as a way to showcase the capability of solar power in an informational and personal use manner. The questions were, "Are solar photovoltaics sufficient enough to power personal electronics, such as laptops and cell phones?" and "How can solar be better incorporated into everyday use?" This was brought about by the lack of outdoor power outlets for public use on-campus, which requires people to go indoors to recharge their devices. To figure out what size system would be powerful enough, the power usage of 2 average laptop power adapters used for 6 hours a day was calculated to be 780 watt-hours per day of power usage. A 400 watt solar panel system was chosen along with a 200 amp-hour battery to provide power for the expected usage scenario. This combined system along with the proper support components will allow for self-sustained, constantly available, renewable power for multiple laptops, day and night. We would like to thank our advisor Dr. Rajendra Singh for his invaluable knowledge and support; and the Creative Inquiry program and the Student Sustainability Initiative for funding the project.

Poster #35
3D Cell-based Structures for Cardiac Tissue Engineering
Mentor: Agneta Simionescu, Bioengineering
Students: Antonio Ayala, Adam Baker, Erica Beal, Jeremy Dale, Isaac Jacks, Spencer Marsh, Timothy Moses, Kirsten Scalera

Myocardial infarction and heart failure are predominant pathologies in developed countries and strategies for restoration of heart function remain clinical priorities. Mesenchymal stem cells have the potential to differentiate into cardiac cells, especially when grown as 3D spheroid structures. Human adipose tissue-derived stem cell spheroids were formed and characterized using histological staining. In order to generate cardiac-like micro tissues, the spheroids are treated with specific differentiating agents. In future work, these structures could serve as in vitro models to study the effect of drugs on cardiac cells and/or they can assemble as building blocks and generate larger-sized tissue constructs (a tissue engineering and regenerative medicine approach).

Poster #36
Optimization of Parts Ordering Systems at Boeing
Mentors: Brian J. Melloy, Industrial Engineering, Aditya Vaze, Industrial Engineering, David Parker, Industrial Engineering, Melissa Dorlette Paul, Industrial Engineering, Shibi Karuppusamy,Industrial Engineering
Students: Trent Brunson, Alexander Gahafer, Kylie Gomes

While working with the Boeing Company's Materials Management Organization the team will be analyzing the ordering process, and identifying an ideal solution for finding the quantity of each part to order. Boeing is currently in the early stages of production of the 787-9 Dreamliner. With the beginning of production being recent, there are many issues that have come up within the process from production of parts all the way to finally assembly. All of these issues are tracked within Boeing MRP system as "Second Issues". Each second issue is diligently documented and then the part is either replaced or worked on by a mechanic so that the part can be used in production. The Clemson Group has gone through the process of organizing surveys and conducting interviews to see what the biggest concerns for the system are; from this data collection the team created a list of customer needs. After the team analyzed the customer needs, the product specifications were generated. The

system was examined for its losses and then was analyzed for a root cause to identify the source of the second issues. The team found that the trends of the issues come from ordering too few parts from the category that can be best identified as “Problem Parts.”

Poster #37
Study of *Caenorhabditis elegans* and *Vibrio cholerae* Interactions
Mentors: Min Cao, Biological Sciences, Yuqing Dong, Biological Sciences
Student: Phoebe Hourigan

Vibrio cholerae is the causative agent of the disease cholera in humans. It is critical for this bacterium to communicate via quorum sensing (QS) to persist and survive in the environment, as well as cause infection. Recently, it has been shown that eukaryotes can sense and respond to certain QS molecules produced by different bacteria. *Caenorhabditis elegansis* a particularly useful model for studying this interaction. Previously, it was noticed that *C. elegans* were strongly attracted to *V. cholerae*, although this bacterium kills the nematodes at a high rate. Sponsored by the Creative Inquiry program, this project studied this phenomenon by conducting chemotaxis, learning, and lifespan assays. It was found that *C. elegans* can sense various auto-inducer molecules produced by *V. cholerae*, but other signaling molecules also appear to be involved in chemotaxis behavior. Interestingly, *C. elegans* N2 preference towards *V. cholerae* is dependent on ToxT, a transcriptional activator that is necessary for pathogenesis and production of cyclic GMP-AMP (c-GAMP). Further study aims to investigate the role of c-GAMP and ToxT in this host-pathogen interaction.

Poster #38
Effects of Flow on the Swimming Stability of Turtles
Mentor: Richard Blob, Biological Sciences
Students: Kirsten Hicks, Jenna Pruett, Jacob Youngblood

Aquatic environments show wide ranges of flow speeds, and animals must be able to modify their behavior to meet such varying demands. Stability is a key component of aquatic locomotion, as being stable can lead to energetic savings and improve sensory perception. However, little is known about how varying flow speeds influence the stability of tetrapods. To determine the effects of flow on swimming stability, we analyzed high-speed videos of the turtle *Emydura subglobosa* taken at three flow speeds. We found that swimming speed, yaw and kinematic excursions were significantly greater at higher flow, while pitch, heave, and sideslip were unaffected. Our results suggest that in rowing turtles, increases in antero-posterior limb movements to attain higher speeds in faster flow lead to an increase in yaw without affecting other stability components. While turtles can respond to changes in flow, decreases in stability may require them to spend additional energy to traverse the environment.

Poster #39
Assessing Culinary Capability Amongst Undergraduate Students
Mentors: Katherine L Cason, Food, Nutrition and Packaging Sciences, Elizabeth Ramirez, Food, Nutrition and Packaging Sciences
Students: Morgan Hodapp, Melinda Russell, Chelsea Wooten

As obesity rates continue to increase throughout the United States, it becomes more apparent that people spend less time cooking for themselves, and spend more time eating pre-made or packaged foods. One population that heavily depends on premade or packaged foods are college students. Universities provide numerous dining options for their students, especially those who live on campus. Many students reside in a location that has a fully functioning kitchen, yet continue to rely on the foods provided by the dinning services at the university. The purpose of the project is to develop a tool in which participants can provide a self-assessment of their cooking self-efficacy, their current dietary behaviors, and their current physical activity behaviors. Preliminary results will be presented at the symposium. This research will add to the literature about the perception young adults have regarding their abilities to cook and their confidence in being able to provide healthy meals to their future families.

Poster #40
Assisted Reproductive Technologies in the Mare
Mentor: Anna Shirley, Animal & Veterinary Sciences
Student: Kelly McKinnell

Students will work towards becoming efficient in standard industry practices pertaining to breeding horses, successful foaling (parturition) of mares, and healthcare of the mare and neonatal foal. Students will learn to question the ‘normal’ and expect the abnormal in dealing with these critical times in animal health. Seven teams of students will work independently to conduct mare wellness checks until parturition is impending. Then, these teams will watch their mare overnight via cameras, and be present to assist with the foaling as needed, with the help of a staff member. Then, these teams will work to breed mares back for the 2016 foaling season. The breeding portion of this project includes handling mares and stallions for teasing, observing reproductive ultrasounds, collecting semen from the stallion, and artificially inseminating the mare. The results of this project should include healthy mares/foals post-parturition, and mares in foal for next season, however, in reality some modifications will take place. Students will research advanced technologies and their application to practical use. The 2005 economic study conducted by the American Horse Council Foundation cites that there are 9.2 million horses in the U.S. with 4.6 million Americans involved in the industry. The horse industry has a $102 billion impact on the U.S. economy.

Poster #41
International Health and Hispanic Culture
Mentors: Graciela Tissera, Languages, Juana Martin-Armas, Languages
Students: Emily Blackshire, Jardin Dogan, Jada Jones, Thomas Offerle, Elizabeth Villegas, Ainsley Wingard, Andrea Rojas, Chelsea Frasier, Katelyn Ragland, Nigel James, Kendyl Williams

This research project will focus on the interrelations between health and culture in the Hispanic countries and their impact on individuals and communities. The research will explore medical diseases and conditions, people’s traditions, beliefs, and perceptions related to health issues, home remedies, behavior change, family and community, doctor-patient relationship, and social aspects of public health. Students will have the opportunity to participate in service learning projects to help Hispanic communities and collect data for their research projects.

Poster #42
Re-establishment of Farming at the Thornwell Home for Children
Mentors: Thomas R. Scott, Animal and Veterinary Sciences, Heather Dunn, Animal and Veterinary Sciences
Students: Courtney Baldwin, Elizabeth Caskey, Kelly Colwell, Hannah Creech, Laura Fadeley, Susan Justice, Kathryn Lankford, Tykiyah Lee, Brenton Lowney, Abby McLane, Anna McLane, Anna Mink, Katherine Pfeiffer, Janie Vassar

The Thornwell Home for Children in Clinton, SC has a 300-acre farm. The administration contacted Clemson University for assistance with a business plan, upgrades and putting into operation sustainable practices. A team was formed with the goal of the home's administration to reactivate farming. The team has four groups working, respectively, on a business plan, a marketing plan, documentation via photography/videography, and student organizations/clubs service projects. The business plan includes steps to improve the small poultry flock and implement aquaponics. Funds for these operations are in place, but other phases for the farm require marketing to raise awareness and donations. This spring student groups helped work on a poultry house and assist with bringing the dining hall kitchen up to DHEC standards. The photography/videography group is documenting all improvements and implementations. In time, the farm will be fully functionally with animal and vegetable products for local markets.

Poster #43
Clemson University Retrieval of Explants Program and Registry in Orthopaedics
Mentors: Melinda Harman, Bioengineering, John D. Desjardins, Bioengineering
Students: Rachel Binnicker, Amar Patel, Ryan Taylor, Garrett Hall, Curtis Harper, Haley Leslie

The Clemson University Retrieval of Explants Program and Registry in Orthopaedics (CU-REPRO) is a student-led creative inquiry program created in 2008. CU-REPRO is a working repository of more than 500 explanted joint replacements collected from cooperative partnerships with 11 hospitals in South Carolina. This program provides an exciting opportunity for students to work with orthopedic surgical teams to collect and process explanted medical devices. This program allows students to explore clinical problems associated with surgical and patient variables, and develop the tools and techniques for systematic evaluation of implant designs, biomaterials, and function. It is one of only a few implant retrieval programs in the country and distinguishes itself by incorporating undergraduate education, biomaterials research and community outreach in its mission. This year, CU-REPRO began research into hip replacements to determine reasons why a subset of explanted femoral stems were received with mid-stem fractures. Review of clinical records revealed that some stems were cut during revision surgery to aid removal while others endured fatigue fractures while in the patients. This semester, the engineering significance of this finding will be explored, as related to loading conditions, stem size and material. The goal is to publish these findings in a suitable orthopaedics journal and make a meaningful scientific contribution. The REPRO team would like to thank the Clemson University Creative Inquiry program for the opportunity to continue to build the growing registry and to expand the program to include research projects.

Poster #44
Telemedicine: How Innovation is Changing the Face of Healthcare
Mentor: Janice Lanham, School of Nursing
Students: Caroline Gettelfinger, Sydney Preston

For our creative inquiry project, we are researching how using innovative technology is impacting healthcare. For the first semester, we conducted a literature review on telemedicine research and its benefits. We discovered that telemedicine is beneficial to providing care to a greater number of people when there are less health care professionals available, due to critical shortages in healthcare providers to provide care services. We have been looking as well to determine the cost effectiveness of telemedicine. In looking at more in-depth telemedicine services, we made a video of the usefulness of telemedicine in the elementary school setting. In Tennessee, nurse practitioners are able to look at patients at a school system in a different city using this technology. Many children are signed up for the program, which has aided many children and families by getting the medicine they need without going to their primary care physician. For the second semester, we will be looking at the pros and cons of a Double robot and it's role using mobile technology to improve healthcare practices. We were responsible for figuring out how to use the robot with the iPad. We will determine whether or not the robot would actually be beneficial in the hospital setting. To do this, we will be looking at how it is able to maneuver throughout the hospital and how far the physician/nurse practitioner can be from the patient in order to control the robot. Through further testing, we will be able to determine if this form of telemedicine would be beneficial in a hospital setting in nearby partner healthcare facilities.

Poster #45
Effects of Thoughts and Sensory Experiences on Heart Rate Variability of Dementia Caregivers
Mentor: Cheryl Dye, Public Health Sciences
Students: Christine Galligan, Natalie Decker, Joy Carsten, Hannah Johnson

Background: Creative Inquiry teams studied the impact of interventions including thoughts and external stimuli such as nature images, aromas, and music on heart rate variability (HRV) of older adults. Low HRV is associated with an increased risk of all-cause mortality (Thayer and Lane, 2007; Thayer et al., 2010). It is measured by the sequence of time intervals between heart beats and is an indicator of the balance between the sympathetic and parasympathetic nervous systems. HRV can be measured by a monitor called the emWave2 which indicates the percentage of time that HRV reflects various levels of "coherence" with highest levels in the green zone. Research Question: How do thoughts and environmental stimuli affect the HRV of older adults? Methods: In Spring 2014, thirteen caregivers of those with Alzheimer's Disease and Related Disorders (ADRD) participated in the study and in Fall 2014 there were an additional eight participants. Through a sorting process, all participants chose a preferred nature image, aroma, and musical selection and the effects of these preferred stimuli on HRV was measured during a 2.5 minute reading using the emWave2. Results: We observed variations in the effect of different stimuli on the HRV of participants. As compared to coherence during thoughts of frustration, we found that the greatest improvement in percentage of time in coherence occurred during post-stimuli readings. Conclusions: Study participants were able to achieve higher levels of coherence (p=.05) in post-intervention readings as compared to coherence levels during thoughts of frustration indicating they learned to shift their thoughts of frustration to feelings of gratitude and appreciation.

Poster #46
Throughput Optimization of Velour Non-Woven Products
Mentors: Brian J. Melloy, Industrial Engineering, Aditya Vaze, Industrial Engineering, David Parker, Industrial Engineering, Melissa Dorlette Paul, Industrial Engineering, Shibi Karuppusamy,Industrial Engineering
Students: Oyindamola Famulegun, Katherine Jones, Auburn Lamb, Jared Smith, Douglas Burns, Anna Ford, Sarah Rast, Priyanka Shankar

Team A - In partnership with Milliken Enterprise Finishing Plant, this capstone design project focused on minimizing turnover time and first run fallout of a new, more complicated nonwoven fabric. The current system was evaluated through observation of the current system, interviews with Project Improvement Manager, Brody

Craven, and surveys of customers' needs. A root cause analysis, fishbone diagram, was used to determine the system losses. The biggest issue with the current system is the amount of first run fallout. This was followed by a concept generation phase, where the main focus was to reduce first run fallout and improve workers knowledge of job procedure and process. By achieving the previously stated, Milliken Enterprise Finishing Plant will be able to reach and potentially increase their production goal. The best concepts were presented to the company in a preliminary meeting to give the client a chance to rule out infeasible ideology. After final refinement, the most feasible process and procedural changes were presented to the client. Team B - Milliken & Company is a worldwide manufacturer of performance materials. Milliken & Company-Enterprise Finishing plant, in Marietta, SC, is currently in the process of starting production on a non-woven material for Toyota, Rav-4 carpet. As of now, they have only conducted test runs on the material; however, demand will soon increase to 14,000 yards per week and will be a major contributor to plant volume in 2015. The team has toured the facility, acquired an understanding of the processes involved, and conducted surveys and interviews to gauge what kind of improvements should be made in the process. From those surveys, a list of interpreted customer needs and metrics specifications were created. Time studies were conducted to determine which parts of the process contributed to the overall system losses. From this information, the team will move forward with concept generation that will propose solutions to reduce the number of system losses and improve the overall efficiency of the process.

Poster #47
Warehouse Inventory Accuracy Improvement
Mentors: Brian J. Melloy, Industrial Engineering, Aditya Vaze, Industrial Engineering, David Parker, Industrial Engineering, Melissa Dorlette Paul, Industrial Engineering, Shibi Karuppusamy,Industrial Engineering
Students: Justin Carrico, Taylor Gomillion, Sha'tarra Sheppard

In partnership with The Boeing Company in Charleston South Carolina, this senior design project is focused on identifying key warehouse transactions within the Interiors Responsibility Center purchased inventory warehouse, as well as proposing standard controls that will assure increased inventory accuracy. After thoroughly observing the processes within the warehouse, interviews were performed and surveys taken in order to determine key customer needs and quantifiable business goals. Once these needs were determined, they were used to develop a list of product specifications. The team then performed a detailed root cause analysis, in which key errors were investigated in order to identify the causes of system losses. It was determined that the main source for inaccuracies is part picking. This investigation was followed by concept generation, in which the team focused on solutions to decrease the amount of warehouse errors.

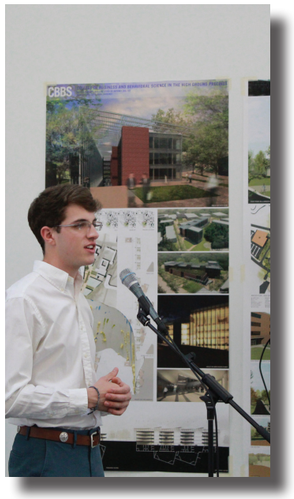
Poster #48
Road Safety Initiative
Mentors: Jennifer Ogle, Civil Engineering, Dylan Bargar, Campus Recreation
Students: Joshua Leibel, Joseph Comparini

The road traversing the Central Plateau of Haiti is a dangerous stretch built into the side of a mountain. Our focus is a 525 foot section of Route 3, the Cange marketplace, which sits along the edge of the road. Here, vendors and pedestrians are in danger of speeding overloaded vehicles. Thus, the goal of our initiative is to implement solutions that improve the safety of the road for drivers and market users. The question driving our research is, "What are the most applicable solutions to improve road safety conditions in the marketplace?"

To investigate this question, we will collect and analyze data using the iRAP methodology, which is an internationally recognized system for road assessments. We expect that the results of the data analysis will inform our proposed solutions for the problem. Once the proposed solutions are accepted by the relevant authority and the community, they will be implemented under the supervision of Clemson engineering interns in Haiti. The impact of this project upon completion will improve the condition of road safety for all users.

Poster #49
Poverty Ends with a Girl
Mentor: Elizabeth Adams, Student Athlete Enrichment
Students: Jenna Weed, Savannah Mozingo, Melissa Moore, Amanda Ivester, Whitney Garland, Grace Farley, Misayo Welke

Poverty Ends with a Girl is a Women' Studies Creative Inquiry that focuses on the unique challenges that adolescent girls face around the world and the important effect that girls' education and empowerment has on alleviating global poverty. Projects for this semester: We are working on projects surrounding advocacy and education. We have split into two teams to develop curriculums. One curriculum will be used by our group as a guide for educating internationally-focused Clemson organizations about the importance of promoting gender equality in their overseas work, and the other curriculum will design a culturally-sensitive, globally adaptable women's studies curriculum for adolescent girls. We plan to finish these curriculums this semester and begin presenting to local area groups.



Poster #50
Complaining in the Media: Regional Differences in Dissatisfaction Expressed in Letters to the Editor
Mentor: Robin Kowalski, Psychology
Students: Kelan Drake-Lavelle, Eliza Geary, Melissa Huff, Courtney Pfeiffer, Allison Toth, Elizabeth Whittaker, Brittany Zaremba

In spite of the prevalence of complaining in people's daily lives, little research attention has been devoted to the topic. One venue by which people might be expected to express their dissatisfaction is in letters to the editor. To examine the extent to which people complain in letters to the editor and the extent to which there are geographical differences in this effect, the present study was conducted. Eighty letters to the editor from 7 different papers representing different regions of the country were examined. Each letter was coded for the number of complaints expressed, whether those complaints were instrumental or expressive, the sex of the letter writer, and the location of the letter writer independent of the origin of the paper. The number of complaints in the letters ranged from 0 to 8 (M= 2.70;SD= 1.92). Most of the letters were written by men (n= 56). The number of complaints expressed did not vary by region of the country in which the paper originated, $p > .05$, but did vary by the location of the writer, $F(6, 73) = 2.38$, $p < .04$. Additionally, the number of expressive complaints also varied by the location of the writer, $F(6, 73) = 2.31$, $p < .05$. More complaints, and more expressive complaints appeared in letters to the editor written by individuals in the Southeast, Midwest, and Southwest. These results suggest that there are variations in complaining norms among people living in different regions of the country.

Poster #51
Assessing Culinary Capability Amongst Undergraduate Students
Mentors: Katherine L. Cason, Food, Nutrition and Packaging Sciences, Elizabeth Ramirez, Food, Nutrition and Packaging Sciences
Students: Haley Brimmer, Julia Decker, Cody Lefort, Megan Reilly

The obesity epidemic, in the US and worldwide, has reached unimaginable heights. The contributing factors are great and complex but a leading factor is dietary behavior. In the US, over one-third of the adult population is obese while over one-third of the child and adolescent population is either overweight or obese. Hectic schedules and the increasing availability of highly processed foods, even in food desert areas, provide an appealing opportunity to feed a family quickly and at a cost-efficient manner. Numerous studies have demonstrated that frequent fast-food consumption contributes to significant weight gain. Between the years of 2007 and 2010, Americans consumed an average of 11.3% of their total daily caloric intake from fast-food eateries. In an effort to combat the appealing nature of fast-food consumption, it is essential to arm adults and adolescents with the tools, skills, and knowledge necessary to provide themselves and their families with healthy home-prepared meals. The purpose of this study was to test the efficacy of the Generations Eating Together Through (G.E.T.T.) Cooking curriculum with a retired professional population, members of the Osher Lifelong Learning Institute at Clemson University. Results will be presented at the symposium.

Poster #52
An Educational Model of Atomic Force Microscope
Mentor: Vladimir Reukov, Bioengineering
Students: Michelle Schleicher, Maria Portilla Rodriguez, Maxwell Hoelzen, Clayton Evans, Caleb Dautel, William Bagnal

An Atomic Force Microscope (AFM) is an important tool in modern nanoscience. The AFM is capable of producing surface maps at resolutions below 1 nm, which is impossible for other methods. The goal of this project is to create a macro scale model, which will serve as an educational tool to introduce the principles behind AFM to undergraduate and high school students. Currently a fully automatic microprocessor-controlled surface scanning block has been built and successfully tested with a scan area of one square foot. Continued work includes designing and building of a topography measurement block that will work on the same principle as a real AFM does at nano-level. We expect that macro AFM building an image using AFM techniques will empower instructors to show the concepts, and to spark interest of potential students in Bioengineering. Sponsors for this project have been the Creative Inquiry Program and the Bioengineering Department.

Poster #53
The Influence of Slope on the Weathering Rates of Biotite Gneiss Bedrock
Mentor: Scott E. Brame, Environmental Engineering and Earth Sciences
Student: Jordan Berisford

Making correlations between map units in the Piedmont region of South Carolina can be difficult due to the lack of rock outcrops. This study investigated the potential of identifying rock type in the absence of outcrop from an analysis of soil cores in an area with moderately steep topography. Previous mapping had verified that the site is underlain predominately by biotite gneiss. The goals of this study were to (a) determine the potential of using hand coring tools to identify bedrock in the absence of outcrop and (b) assess the influence of slope change on the relative weathering rates of minerals present on the parent rock. Analysis of the weathering byproducts was used to infer the original minerals present. Soil cores were collected at discrete locations on a hillside using an AMS hammer and a 2.22 cm soil recovery probe. The hillside is characterized by two dominant slope angles. At the bottom of the hill, a 23° slope is present where the stream had over-steepened the hillside and created a small flood plain. About 12.5 meters up the hill from the floodplain the slope angle changes to 15° until it reaches the crest of the hill. Soil samples were analyzed using X-ray Diffraction to determine the weathering byproducts. The results indicate that this method has potential as a mapping technique using a basic knowledge of weathering byproducts. The comparison of the two slope types revealed that the steeper slope has a higher weathering rate compared to the gentle slope.

Poster #54
Neurochemistry of Attention-Deficit/Hyperactivity Disorder (ADHD)
Mentor: Rhett Smith, Chemistry
Students: Mikaela Conley, Carter Ellis, Lloren Hile, Connor Mairena, Sydney Moseley, Thomas Wert

There are numerous books about Attention-Deficit/Hyperactivity Disorder (ADHD) on the market. These books range from being very nontechnical, geared towards elementary educators and parents, to highly technical, geared towards medical and mental health professionals. To complicate matters further, the manner in which ADHD is defined and diagnosed has recently changed with the release of the DSM-V in 2013, which makes even relatively recent texts out-of-date. This Creative Inquiry project involves research into the most recent data on the neurochemistry behind what causes ADHD and comorbid conditions, as well as the neurochemistry of how drugs used to treat these conditions work to affect patient mental health. The goal of this project is to write and publish a book that begins with simple descriptions of these processes and builds to more technical language, providing parents and teachers with the ability to become experts in ADHD without a preexisting background in science.

Poster #55
Smart & Savvy Students: Year 2
Mentor: June Pilcher, Psychology
Students: Corine Tyler, Dale Palmer, Kimrey Holmes, Kathleen Clancy, Rosaria Bryan

Smart & Savvy Students' (SSS) main goal is to convert scientific psychological articles to understandable pieces of information for general audiences. We have a Twitter feed, Facebook page, and Instagram to spread the information to Clemson's student body and other audiences that we post to 3 to 5 times a week. Each tweet contains a 140-character tip written in a dialogue format. The tweets include links to the Facebook page, which has more information. The Facebook page provides links to scientific sources that support our claims. These links provide students with the opportunity to learn more about the topics. In addition, we post to an Instagram account that links back to Facebook and Twitter, which allows us to spread our information to the largest audience possible. Using popular social media, SSS targets students by including information on topics such as study skills, exercise and diet, and healthy habits, which can be applied in day-to-day life for more positive lifestyles.

Poster #56
The Boeing Company – Composite Fabrication
Mentors: Brian J. Melloy, Industrial Engineering, Aditya Vaze, Industrial Engineering, David Parker, Industrial Engineering, Melissa Dorlette Paul, Industrial Engineering, Shibi Karuppusamy,Industrial Engineering
Students: Alan Babilinski, Josef Hofer, Nicholas Malette, Lamonda Pete

In partnership with The Boeing Company, this capstone design project focused on streamlining the presentation of kits and point of use materials to cells 30, 40, and 50 within the Composite Fabrication of the Aft body. Through observations, interviews, and surveys the team was able to determine the needs and product specifications for the client. Once the product specifications were established, a root cause analysis was conducted where system losses were defined. The root cause analysis was followed by the team's generation of concepts where ideas were modified and combined through ranking. The concept generation phase focused on the top system losses: Mechanics leaving the cell to get materials and rearranging frame fillers. The best concepts were determined through ranking the concepts based on their primary needs and then combining certain concepts and repeating the process.

Poster #57
Indicator Displacement Assays Based on Polyelectrolyte:Dye Complexes
Mentor: Rhett Smith, Chemistry
Students: Nikolas Hopkins, Ashlynn Lawrence, Stephanie Amendola, William Kabrich

This Creative Inquiry project focuses on modification of polymers that include main-chain, positively-charged phosphonium units. Such polymers, often called ionomers or polyelectrolytes, have notable applications including remediation of contaminated water. This contribution will focus on preparation of polyelectrolyte:dye complexes and the use of these complexes in indicator displacement assays as a means of detecting anions through UV-vis spectroscopic analysis. The sensitivity and selectivity of each complex for common anions will be discussed. Anions of interest include certain amino acids, antibiotics, an anthrax biomarker, and more common anions found in ground water. Through appropriate selection of polyelectrolyte:dye complex the sensitivity and selectivity can be tuned for desired applications.

Poster #58
mHealth Devices and Cell Phone Applications: Smart Bottle
Mentors: Vladimir Reukov, Bioengineering, Ilya Safro, School of Computing
Students: Benjamin Shumpert, Maxwell Hoelzen, Mindy Earnest, Edward Bear, Paul LeCroy III

The importance of drinking the standard eight glasses of water each day is stressed. However, this amount should be adjusted based on various circumstances such as exercise and outside temperature. While there are already devices in water bottles that track the fluid drank through the bottle and phone applications that allow a user to record this data, a system has been designed to communicate this data between the bottle and a phone. A magnetic flowmeter was revised to record and send the amount of liquid consumed through the water bottle via Bluetooth, and an application is being developed to receive and save this information. When completed, the application will allow a user to input outside variables and compute an ideal amount for consumption. A progress report for the user will be developed on the smart phone. This application will be suited for people who exercise frequently or work outside. It will also benefit those who need to monitor fluid intake due to medical issues.

Poster #59
Training Process-Brake and ASA Assembly
Mentors: Brian J. Melloy, Industrial Engineering, Aditya Vaze, Industrial Engineering, David Parker, Industrial Engineering, Melissa Dorlette Paul, Industrial Engineering, Shibi Karuppusamy,Industrial Engineering
Students: Brian Eddy, Mary Hobbs, Katherina Jurewicz, Jeremy Turner, Irene Vogt, James Blackwell, Melinda Boggs, Andrew Furton, Robert Gillespie, Seth Stevens

Team A - In partnership with Meritor's manufacturing plant located in Manning, South Carolina, this capstone design project focused on improving the training program for new hires. The current training programs for building brakes and slacks takes approximately two weeks, does not engage the employees, and does not instill a sense of pride in the employees. Through observation, surveys, interviews, and competitive benchmarking, the customer needs and specification for the improved training program were determined. A Root Cause Analysis and Why-Why Analysis were performed in order to establish the causes of system losses. From this analysis, the best concepts for improving the training program were determined and suggestions for changes to the current program were made to the client. Team B - In partnership with Amsted Rail - Faiveley's Greenville manufacturing plant, this design project focused on reducing the time spent by machine operators on the changeover process between machining jobs in the CNC machine shop. Through data collection, interviewing, surveys, and conducting time studies, the customer needs and product specifications were determined. System losses were identified, such as wasted motion in processes, waste in walking, and machine or operator idle time waste. A subsequent root cause analysis was conducted to identify the causes of the losses, to which an iterative concept generation phase followed focusing on reducing wasted operations. The best concepts were determined for future implementation to the client.

Poster #60
Health, Business, and Gender Topics in Film
Mentors: Graciela Tissera, Languages, Juana Martin-Armas, Languages
Students: Margaret Boyd, Lisa Duenas, Rebecca Mcconnell, Margaret Osell, Rebecca Plasky, Courtney Sipes, Jose Hernandez, Jennifer Bolta, Danielle Stephens, Caleb Addis

This project will analyze different perspectives on health, business, gender, and related topics to explore their impact on Hispanic countries and/or 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, medical, and gender literature) by world renowned authors and film directors.

Poster #61
The DEN (Design & Entrepreneurship Network)
Mentors: John D. Desjardins, Bioengineering, Breanne Przestrzelski, Bioengineering, Michael Gara, Bioengineering
Student: Justin Shaw

There is a problem on Clemson's campus: hundreds, if not thousands, of students have original ideas that have never been developed into anything more than just that - an idea. The DEN (Design & Entrepreneurship Network) aims to solve that problem. The DEN is a multidisciplinary Creative Inquiry in which students bring an idea, form interdisciplinary teams, and receive mentorship from outside experts in the development of their product or company at weekly meetings. The DEN launched in January 2014 with four bioengineering majors

and one business major. Today, it has over 40 participants every meeting. Even though The DEN is young, it has already yielded at least one company, Accessible Diagnostics, which has gotten some international buzz and a commitment of $500,000 in private investment.
However, building companies is not the only metric by which The DEN measures its success. The DEN also measures success by its ability to provide a network, mentor access to students/faculty, and education to future entrepreneurs.

Poster #62
Adaptation of Soil Judging to Venezuela
Mentor: Elena Mikhailova, School of Agricultural, Forest and Environmental Sciences
Students: William Barwick, Keegan Bodiford, William Creech, Adam Forbes, Austin Long, Robert Marion, William Mcnair, Nicole Prohaska, William Rogers, Jacob Smith, Arthur Snellings, Amanda Arroyo

Field identification of soil types, their properties and interpretations for use are critical skills taught by soil judging to land managers. This project focuses on the adaptation of Soil Judging for Venezuela which does not currently have it. The objective of this study was to adapt Soil Judging to Venezuela by an undergraduate student from Venezuela and students from the U.S., who were trained using an undergraduate Creative Inquiry course in Soil Judging. Unlike the U.S., Venezuela has 8 soil orders with 3 soil orders somewhat similar to the ones found in the Southeast region of the U.S. A Southeastern Region Soil Judging Handbook was used for newly developed teaching materials for Venezuela (including tables of soil physical and chemical properties, topographic maps, and scorecards). Newly-developed training materials have the potential to improve soil education in Venezuela to address issues associated with land use management.

Poster #63
Using the Stress Response Along an Elevational Gradient to Understand Habitat Suitability of the Southern Gray-cheeked Salamander, *Plethodon metcalfication*
Mentors: Evan Apanovitch, Biological Sciences, Michael Sears, Biological Sciences
Students: Matthew Stewart, Molly Nielsen

Over the next 100 years, global mean temperatures are expected to warm. With warming climates, some environments may become unsuitable for an organism, resulting in local extinctions. Currently, nearly 50% of amphibians are threatened by habitat destruction, pollution, disease, and overexploitation. To make matters worse, warming temperatures may push more amphibians closer to extinction. However, many organisms can respond to rapidly changing conditions by changing their physiology. The stress response is a common mechanism that organisms use to allocate energy towards life-sustaining processes in response to changing environmental conditions. Here, we leveraged the natural changes in temperature and humidity that occur along an elevational gradient to determine how stress varies upon exposure to changing environmental conditions. We conducted a reciprocal transplant study at low, mid, and high areas within the elevational range of the Southern gray-cheeked salamander (*Plethodon metcalfi*) in a balanced experimental design. The relative level of stress between treatments was measured using neutrophil:lymphocyte ratio (N:L) from blood samples. Data suggests that mass and elevation contribute to salamander stress responses and may indicate that high elevation sites provide the most suitable habitat for Southern gray-cheeked salamanders.

Poster #64
Medication Management Improvement at the Cottages at Brushy Creek
Mentors: Brian J. Melloy, Industrial Engineering, Aditya Vaze, Industrial Engineering, David Parker, Industrial Engineering, Melissa Dorlette Paul, Industrial Engineering, Shibi Karuppusamy,Industrial Engineering
Students: Timothy Ahlgren, Dillon Davis, Krishna Patel, Clara Waddell, Mary Mercer, Lauren Pearson, Jacob Richardson, Arthur Winfield

Team A - The purpose of this senior design project is to improve the Medication Administration Process (MAP) at The Cottages at Brushy Creek, a subdivision of the Greenville Hospital System (GHS), in order to decrease process time requirements by 10%, and maintain a minimal error rate within a range of 5% of the current system. A mission statement was created; observations of and interviews were completed and translated into customer needs. Further analysis was completed using task analysis tools. Customer needs were used to create metrics, and specification values were assigned to these metrics using surveys and process documentation. High working memory demands and poor organization were identified as the most significant causes of medication errors and increases in process time requirements, key system losses through a root cause analysis. This process analysis will allow GHS to create a safer home for residents, as well as a safer, more satisfactory workplace for their nursing staff. Team B - Working alongside Greenville Health System's Cottages at Brushy Creek, this design project is centered on enhancing the efficiency of the Medication Management system in 12 units designed to host long-term and short-term care patients in need of skilled nursing and residential care. The medication administration process has the opportunity for improvements regarding effectiveness and accuracy. The medication storage room also needs aid with organization and proper space utilization. Medications are pulled from the storage room to be administered to patients multiple times in a day. Customer needs were determined by conducting interviews and surveys as well as observing the current system. Once needs were found, product specifications were created. The team identified system losses and conducted root cause analysis to determine the causes of the system losses. A new concept of the current system will be put into place after concept generation influenced by system loss results.

Poster #65
Increasing Our Scientific Knowledge of Invasive Plant Species of the Southeastern U.S. and Promoting Public Awareness
Mentors: Gaofeng Wang, School of Agricultural, Forest and Environmental Sciences, Lauren Pile, School of Agricultural, Forest and Environmental Sciences
Students: Carissa Adams, Timothy Brady, Tory Garland, Henry Hutto, Margaret Lund, Courtlin Myers, Matthew Raeckelboom, Hannah Spencer, Carlee Steppe, Daniel Thomas

The Southeastern U.S. was once characterized by frequent, low-intensity surface fires. To determine if historic fire-suppression might have contributed to the invasion of non-native woody plants, we examined Chinese privet (Ligustrum sinense) and silverthorn (Elaeagnus pungens) for characteristics that would confer an advantage after the effective removal of fire from this ecosystem by contemporary fire suppression. Bark thickness and stem growth rate were used as surrogate measures of fire-tolerance and competitiveness. Both species of varying sizes were destructively sampled from sites in the Clemson Experimental Forest in Clemson, South Carolina. Given that fire is not a major ecological factor in the native range of either species, we expect that they will have a thinner bark than native, fire-adapted tree species from the southeastern US, and rapid growth rates because they are highly invasive in the Southeastern U.S. Although neither species is adapted to frequent surface fire (i.e., thin

bark), they may survive fires once it is established because of their ability to resprout from the roots. Therefore, unless a frequent surface fire regime can be restored, fire alone may not be a practical management tool once Chinese Privet or silverthorn is well established. In order to rapidly detect and respond to the invasion of non-native plant species, it is important not only to develop sound science to understand their ecology, but also to increase the awareness and education of the public in regards to these plants. It is important to keep the public informed, and the knowledge gained from this study can help to inform the public about invasive species control and management, in a manner that is easy to understand. In addition, we created a booklet to provide updated information on the ecology, status and management of invasive plant species that impact natural areas in South Carolina. Information was gathered through a search from the recent literature on each species. In addition, we used GIS technologies to map documented regions of invasion of each species that is considered a severe threat to the state. Sound science and education concerning invasive species are key to protecting our native plant communities, and this project was developed to further our scientific knowledge of the ecology of invasive plant species and to increase public education and awareness.

Poster #66

Play and Social Inclusion: The Role of Play Spaces in Promoting Social Inclusion Among Clemson University Students

Mentors: Bernard Kitheka, CCIT Research Support, Teresa Tucker, Parks, Recreation & Tourism Management
Students: Annabelle Cooper, Caroline Cunningham, Erika Hubbard, Tyler Krieger, Danielle Langleyhairston, Eliza Lowry, Ellen Macnaughton, Matthew Massey, Jessica Resler, Samuel Richey, Jordan Roper, Charmaine Tay

Play in the society serves many valuable purposes for all people irrespective of age or culture. Generally, play is an activity that is performed solely because of the pleasure it affords the participant. Studies have found a strong connection between play and the development of healthy individuals, a sense of place and social inclusion. This is also applicable among university students who usually spend long periods separated from their usual environments. However, despite its perceived benefits, not everyone in a campus setting gets to play because of various constraints. Some issues that have identified to constraint play include accessibility of play facilities, disabilities, socio-economic status, age, gender and cultural difference. The aim of this research project is to investigate the role of play spaces in promoting social inclusiveness and equity among the Clemson University students' community as well as factors that may constrain play among Clemson students.

Poster #67

The Beneficial Effects of Royal Jelly on Healthspan

Mentors: Yuqing Dong, Biological Sciences, Min Cao, Biological Sciences
Student: Lauren Cook

Recent studies suggest that royal jelly and its related substances may have anti-aging properties. However, the molecular mechanisms of beneficial effects remain elusive. We report that the effects of RJ and enzyme-treated RJ (eRJ) on lifespan in *C. elegans* are modulated by the sophisticated interplays of DAF-16, SIR-2.1, HCF-1, and 14-3-3 proteins. RJ and eRJ increased *C. elegans* lifespan in a dose-dependent manner. The RJ and eRJ increased the tolerance of *C. elegans* to oxidative stress, UV, and heat shock stress. Our data showed that RJ/eRJ-mediated lifespan extension requires insulin/IGF-1 signaling and the activities of DAF-16, SIR-2.1, HCF-1, and 14-3-3 protein.

Poster #68

Finding Your Voice: An Outdoor Recreation Camp for Girls

Mentors: Denise Anderson, Parks, Recreation and Tourism Management, Kellie Walters, Parks, Recreation and Tourism Management, Teresa Tucker, Parks, Recreation and Tourism Management
Students: Mary Hyatt Baker, Danielle Brafford, Katherine Capurso, Ashley Davidson, Victoria Graham, Sarah Koering, Molly McCoy, Lauren Noone, Malory Sanders, Ashley Spiers, Holly Tuttle, Christina Wells

Individuals who are highly physically active are more likely to have a greater self-esteem, better body image, and increased physical activity self-efficacy. Currently, the average PE program provides less than 12% of the recommended daily amount of physical activity, with adolescent girls being the least active. Therefore, there is a need for programs that provide opportunities for adolescent girls to be physically active and to develop their sense of self-esteem and body image. Women who participate in recreation report becoming empowered to engage in a wider variety of activities (McNiel, Harris, Fondren 2012). However, little is known about the effects of outdoor recreation education in adolescent girls. The purpose of this research is to understand how participating in Finding Your Voice influences body esteem and physical activity self-efficacy. Preliminary data suggests this camp positively impacts those who attend, however since the camp will be held April 10th through April 12th, 2015 there is no data available regarding the efficacy of this camp.

Poster #69

Food Bar Food Safety: Transfer of Bacteria to and from Food Serving Tongs

Mentor: Paul Dawson, Food, Nutrition and Packaging Sciences
Students: Mark Bartz, Elizabeth Dawson, Lauren Johnson, Peter Marvin, Carolyn Musselwhite, Arliss Nicholson, Daniel Randar, Mark Ritterpusch

Foodborne illness is estimated to cost nearly $7 million and sicken 48 million people each year in the US. Cross contamination in food service is highlighted as a preventive measure by the National Restaurant Association with an emphasis on utensils. Person-to-person transfer of pathogens could be a vector causing illness in settings such as food bars where tongs are used by multiple people. In the current CI study, the transfer of bacteria from hands to tongs will be measured by inoculating hands with bacteria then measuring the transfer to tongs after individual handle the tongs. The transfer of inoculated tongs to clean hands will also be determined. Preliminary results indicate up to 60% of the bacteria on inoculated hands can be transferred to food bar tongs.

Poster #70

The Effect of Salinity on Growth and Activity in Sailfin Molly Fish (*Poecilia latipinna*)

Mentors: Margaret Ptacek, Biological Sciences, Kelly Hogan, Biological Sciences, Kristine Moody, Biological Sciences
Students: Kathleen Williams, Michelle Voytko, Rebecca Helstern, Grant Davidson, Caitlin Crawford, Robert Bennett, Amelia Abbott

This experiment explored the role of developmental environment on the ontogeny and swimming behavior of juvenile sailfin mollies (*Poecilia latipinna*). Specifically, we tested whether or not fish activity levels were affected by different salinity rearing environments. We hypothesized that sailfin mollies reared in a potentially stressful osmotic environment (freshwater) would exhibit a lower activity level relative to mollies reared in a developmentally normal environment (saltwater). Using a full-sibling design, we split broods at birth and reared sibling groups in either fresh or saltwater until sexual maturation. In addition, we filmed juveniles at day 21 in

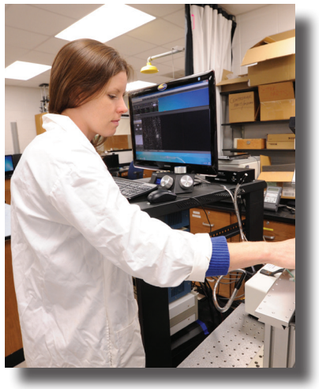
their home aquarium in order to measure the average time, distance, and speed in which juveniles moved in a thirty-minute period. We found that juveniles were more active (moved greater distances) and faster swimmers (greater speeds) when reared in the developmentally normal environment (saltwater) relative to the stressful environment (freshwater). Our results suggest that osmotic stress may induce a behavioral response in sailfin mollies by decreasing activity levels in non-optimal salinity environments.

Poster #71
Exploiting the Gastrointestinal Microbiota as a Therapeutic Target for Type 1 Diabetes.
Mentors: Kristi Whitehead, Biological Sciences, Daniel Whitehead, Chemistry
Students: Caitlyn Blakehedges, Bryn Davis, Adam O'Neil

Studies suggest that in addition to genetic factors, environmental factors such as diet and the gastrointestinal microbiota influence the onset of Type I Diabetes (T1D). Bacteroides are considered to be normal members in a healthy human colon that play an important role in digestion of complex polysaccharides, yet recent research articles have suggested that the normal proportion of Bacteroides species increases significantly in genetically susceptible children before the onset of T1D. Acarbose is an alpha amylase inhibitor that is approved for human use. We hypothesize that acarbose will also interact with Bacteroides alpha-amylase enzymes and therefore has potential as a novel therapeutic to prevent the onset or exacerbation of T1D by inhibiting the abnormal increase in Bacteroides. Our in vitro results demonstrate that acarbose inhibits the growth of *Bacteroides thetaiotaomicron* (*B. theta*) at concentrations of 50 uM. This inhibition appears to be specific to both the drug and the Bacteroides species. These findings have the possibility of providing a novel T1D treatment by preventing the bloom of Bacteroidesin genetically susceptible individuals.

Poster #72
Mobile Technology in Veterinary Clinical Medicine
Mentor: Vincent Gallicchio, Biological Sciences
Students: Caroline Andrews, Landon Bulloch, Taylor Dennison, Jordan Elder, Ashley Mitchell, Meredith Rivenbark, Kayla Schilling, Vincent Gallicchio

In today's constantly moving society the need for convenient ways to access technology is growing. A plethora of apps exist to make daily life easier for the common person. The medical field has started to integrate apps into their diagnostic toolset in order to treat patients. This form of personal care not only makes the visits easier on the patients, because tests and check ups are performed in only one location, but also some physicians believe they enhance the interaction between physicians and patient. Now one may wonder about the effect of mobile technology in veterinary clinical medicine. While human medicine may have already taken off with mobile devices for treatment the veterinary field is lagging. Through online survey research sampling a variety of veterinarians, results show a huge desire for mobile technology in veterinary clinical medicine. Preliminary results show veterinarians believe the use of mobile technology will allow them to practice medicine more effectively and thus a growing desire for the creation of mobile technology has begun. Mobile devices are prevalent and widespread among veterinarians. More than sixty percent of veterinarians surveyed strongly agree that mobile technology will advance patient care, client communication, access clinical data, and accessing medical literature. Gaining veterinarian's thoughts on mobile technology will help ignite the creation of veterinary apps and other mobile devices to clinically treat animals. The impact is to improve veterinary clinical medicine.



Poster #73
Mechanisms that Regulate Skin Resistance to Water Loss Rates in Plethodon Salamanders Across Various Body Sizes
Mentors: Eric Riddell, Biological Sciences, Michael Sears, Biological Sciences
Students: Meghan Matlack, Meredith Rutledge

The ecology and evolution of organisms can often be explained by specific mechanisms involving molecules, genes, and cellular characteristics. Being lungless, salamanders require moist skin to breathe. By maintaining moist skin, salamanders lose water to their environment, and consequently, the amount of time they can forage is determined by the rate at which salamanders lose water to their environment. Salamanders with high skin resistances (and thus lower water loss rates) can be active for longer periods, potentially increasing their fitness. In lungless salamanders, adults have a distinct advantage over juveniles due to their higher skin resistance to water loss. However, the mechanism by which adult salamanders have higher skin resistances than juveniles remains an unanswered question. Here, we use a variety of histological and lipid assays to determine differences between skin structure and skin secretion composition between large and small bodied salamanders. Skin secretions were collected from live individuals, stained with Sudan Black B, and analyzed using ImageJ to characterize lipid content. Skin samples were also stained with hematoxyline-eosin solution to investigate skin morphology. The results indicated that lipids may play an important role in determining skin resistance of small salamanders. The histological assays indicate dramatic differences in skin morphology across body sizes, with larger salamanders having much thicker skin. Therefore, the interaction between skin morphology and physiological responses will determine how salamanders respond to their environment.

Poster #74
Engineering *Yarrowia lipolytica* for Renewable Fuels and Chemicals from Lignocellulose and Waste Feedstocks
Mentor: Mark Blenner, Chemical and Biomolecular Engineering
Students: John Campbell, Jeremy Fowler, Lauren Gambill, Parker Hume, Sarah Knowles

Yarrowia lipolytica is an oleaginous yeast capable of producing lipids for biofuels and other valuable molecules. Its growth on waste products, such as rendered fats, and on renewable resources such as lignocellulose are of great interest. To that end, we have characterized numerous favorable attributes of *Y. lipolytica*, including its metabolism of xylose, its tolerance of ionic liquids used in biomass pretreatment, its tolerance of aromatic compounds associated with the breakdown of lignin, and its growth on solid animal fats from the rendering industry.

Poster #75
Probiotics Effect on Healthspan in the Model Organism *Caenorhabditis elegans*
Mentors: Min Cao, Biological Sciences, Yuqing Dong, Biological Sciences
Students: Andrew Gitto, Diana Nguyen, Steven Tran

In America, there are high rates of obesity and obesity related diseases partially due to a high glucose diet. Possessing a propensity towards reversing a glucose rich diet, probiotics, live microorganisms such as yogurt, were used to combat this. To experiment with humans let alone mice would be tedious, so, another organism-the microscopic nematode, *Caenorhabditis elegans* was used. Because *C. elegans* possesses homology with humans, they can be used to study probiotics with application in humans. Sponsored by the Creative Inquiry program, this project analyzed the relationship between different probiotics and their effect on lifespan. With *Escherichia coli* OP50 as the control and varying *Lactobacillus* strains as the experimental groups, lifespan assays were conducted.

Our results show that certain probiotics increase the lifespan and reverse the consequences of a high glucose diet. Conversely, certain probiotic species, such as *Lactobacillus plantarum*, can decrease and promote negative health consequences in *C. elegans*. From these results, the understanding of the human microbiome and better treatments for obesity and obesity related diseases can be made.

Poster #76
(Kangaeru) Helping Americans Bridge the Kanji Gap
Mentor: Toshiko Kishimoto, Languages
Students: Dylan Cowden, Maria Hawkins, Sophia Houtzer, Kazumasa Matsuhira, Mariah McMinn, Steven Mets, Alexander Young

For native English speakers, Japanese is one of the hardest foreign languages to master. One major culprit is kanji. With over 2100 kanji in everyday use, mastering them all is a daunting task. The way Japanese children and American students learn to use kanji is different, but often the same teaching methods are used when teaching both groups. Our goal was to design a smart phone application to facilitate better learning methods for American students of Japanese. This app would feature games for learning kanji in context, a reinforcement system to repeat previously mastered kanji for maximum retention, and writing practice. After completion, the progress of introductory Japanese students who use the app will be studied to further improve the app.

Poster #77
Medical Training Simulator for Central Venous Catheterization
Mentors: Delphine Dean, Bioengineering, Jiro Nagatomi, Bioengineering
Students: Julianne Jett, Jennifer Jacoby, Christopher Hicks, Arica Gregory, Samuel Foister, Alex Barrett, Rebecca Thomas

Our Creative Inquiry, in collaboration with clinicians, local hospitals, and MBA students, has involved the development, testing, and commercialization of a central venous catheterization training simulator. Medical training simulators are important tools for educating physicians without needing to practice on patients. Central venous catheterization is the insertion of a catheter into a sizable vein in order to deliver a large influx of drugs to the heart. The risky nature of the procedure comes from the proximity of the vein to the heart, lungs, and major arteries. Many complications can arise, often the cause of expensive and ineffective training methods. We have created an affordable simulator with features that address the limitations of current simulators, including a fully rotatable head, proper anatomical landmarks, and ultrasoundability. Our patent-pending design is currently being prepared for manufacturing and marketing in hopes of increasing the safety of CVC procedures. This project is supported by the Creative Inquiry Program.

Poster #78
Improving Efficacy of Hospital Stockrooms and Preventing Hospital Losses
Mentor: Delphine Dean, Bioengineering
Students: Jacob Turner, Christopher Levesque, Zachary LeMieux, Mary Hobbs, Anna Ford, Andrew Cobb

With rapid advancements in technology and growing demand for better healthcare, hospitals are struggling to find a balance between providing the best possible care and maintaining a responsible budget. This issue is especially evident in small hospitals lacking resources and infrastructure to keep up with ever-increasing, modern technology. The Engineering for Modern Healthcare Creative Inquiry is a multidiscipline collaboration between Industrial Engineering, Bioengineering, and Computer Science students which allows for promotion of different ideas and solutions to our goals. We have partnered with a hospital in Virginia and have identified a complex problem plaguing nurses: retrieving items from the stockrooms in a timely manner and making sure the item is linked to the patient's chart is nearly impossible. As a result, the hospital is ultimately losing money, and the nurses are frustrated with the complex systems that they are expected to use. We are working to develop a better inventory system that works alongside an app to improve the inventory experience for nurses while helping to prevent the hospital from losing money. Our app in combination with our proposed color-coding system may be the solution they are missing.

Poster #79
ICLEP: Interactive Cases for Learning Educational Psychology
Mentors: Penelope Vargas, Teacher Education, David Boyer, Teacher Education, Meihua Qian, Teacher Education
Students: Victoria Denardis, Elizabeth Mercer, Julia Roman

QUESTION: Does adding interactivity to case studies support educational psychology students' theory to practice connections? Students without classroom experience struggle to make connections. METHODS: Student survey and quiz data collected before and after using the case, student case interactions observed. Design-based approach used to adjust the case. RESULTS: Phase 1: Activity perceived as valuable. Suggested we improve design, clarity, and delivery. Phase 2: Shifted to html delivery with text, design altered for clarity. Students reported higher efficacy in ability to use theory. Placed higher value on theory. Recommended we add pictures and more strands. Phase 3: Strands and pictures added, instructions and feedback clarified. Results indicate increased efficacy and value beliefs. Test scores improved. CONCLUSION: The addition of interactivity to cases supports theory to practice connections as well as increased perceptions of the value of and ability to implement theory.

Poster #80
Assessment of Methods for Invasive Plant Removal and Reintroduction of Native Stocks: Building Blocks for a Campus Watershed Restoration Project
Mentors: Donald Hagan, School of Agricultural, Forest and Environmental Sciences, Calvin B. Sawyer, School of Agricultural, Forest and Environmental Sciences, Jeremy Pike, School of Agricultural, Forest and Environmental Sciences
Students: Bryanne Sidwell, Gary Pence, Donald Mcdaniel, Alicia McAlhaney, Carolyn Lanza, Rebeckah Hollowell, Johnson Dorn, Carly Basinger, Kelly Daniels, Stephannie Allen

This project seeks to restore native vegetation within the Hunnicutt Creek (HC) watershed on the campus of Clemson University. Restoration strategies will include invasive vegetation removal and reintroduction of native species. With financial help from a grant awarded by the SC Pest Plant Council and student volunteer efforts, removal of invasives in the watershed has begun. Native plant species are being propagated in preparation for Fall reintroduction. Geographic Information System (GIS) data will be used to create maps that showcase invasive species presence alongside landscape features that affect removal and reintroduction methods. Soils data will be collected to reinforce this map with a soil properties model for proper planting and management of introduced native species. The effects of prescribed grazing by goats will be analyzed using plant species composition data and fecal bacteria sampling. Preliminary results indicate the most effective method of invasive removal combines mechanical and chemical treatment. We hope through the continued efforts of this Creative Inquiry project that HC will be restored to its ideal, ecological state.

Poster #81
SAGE (Student Ambassadors for Global Engagement)
Mentor: Sharon Nagy, Global Engagement
Students: Misayo Welke, Samantha Verzella, Meghan Smith, Katherine McGreevy, Angela Garren, Caroline Cornish, Paige Atkins, Grace Winchell

This Creative Inquiry course, Student Ambassadors for Global Engagement (SAGE), works on initiatives that serve to integrate the international populations on the Clemson University campus. Beginning in the Fall 2014, students began researching two things: (1) the opportunity for Clemson students to become TEFL/TESOL certified and (2) the services available for International students at Clemson. Out of this research, the group came up with the idea of having Clemson domestic students assisting international students to improve their English language skills. This semester, we have put this idea into place. The group was trained by a professional TESOL instructor and then created two weekly sessions that we call "English Corners." After promoting these free tutoring sessions to the international graduate population, we had a successful turnout of 50+ students at our first session. We have continued to create weekly lesson plans and address new subjects and issues as they come along. Simultaneously, we have created two additional projects this semester. The first project addresses the need to establish better ties and connections with our international alumni after they leave Clemson. The second project aims to create informational videos for international students to better prepare them pre-arrival. At the forum, we would like to present the ideas of all three of these projects and share our current findings and what we envision for the future.

Poster #82
Print-A-Wish: 3D Printed Technology for Assistive Devices
Mentors: John D. Desjardins, Bioengineering, Jeremy Mercuri, Bioengineering, Jorge Rodriguez, Bioengineering
Students: Peyton Tharp, Daniel Scanlon, Brittany Sanders, Charles Pickens, Ian Mills, Ryan King, Javoy Johnson, Austin Hensley, Logan Fitzpatrick, Carson Brewer, Robert Barr, David Tiller

Congenital limb deficiency is a condition where a child is born with an absence or partial development of a limb in one or more extremity. One in thirty-three infants are diagnosed with congenital anomalies which result in long-term disability and significantly impact their daily lives. Since crutches require the use of the patient's forearm, patients that have an upper limb deficiency are limited to a wheelchair if they need a device to assist with walking. Partnered with Brian Kaluf and Ability Prosthetics & Orthotics in Greenville, SC, our Creative Inquiry is designing a primarily 3D printed interface between a child's residual limb, which is shorter due to a congenital limb difference, and a crutch which will enable the child to walk using forearm crutches. Right now, the child is forced to use a wheelchair, but has a goal of eventually using forearm crutches to walk. Our team created a customized forearm crutch interface that is comfortable and functional by allowing the child to walk using crutches. In the future, our Creative Inquiry team will partner with local physicians in order to create fully customized prosthetics for pediatric patients in which normal prosthetics are not sufficient.

Poster #83
Designing Medical Technology for the Developing World
Mentors: Delphine Dean, Bioengineering, John D. Desjardins, Bioengineering, Jorge Rodriguez, Bioengineering
Students: Jacqueline Veliz, Sarah Stafford, Justin Showghi, Jacqueline Rohde, John Murdy, Austin Herbst, Zachary Hawks

Our goal is to develop healthcare solutions that can be implemented in developing countries to reduce their dependence on donated medical equipment. We have focused on several devices: a monitor for premature babies, a bacterial sensor for infection diagnoses and water testing, and an infant automated breathing bag device to maintain breathing in newborns. Our designs minimize the use of consumables and provide better detection and/or treatment than currently available in-country. The baby monitor detects skin temperature and controls an electric warming blanket. The bacterial sensor quickly detects the bacteria in a sample without the need for lengthy culture times. The infant breathing device provides regular breathing support to newborns, relieving family from having to manually support breathing. All of our projects seek to answer critical medical needs in developing regions through reductions in costs, time, or both. Our group is partnering with local governments in Tanzania and Mexico to collaborate on our projects and work to accomplish the specific needs of these communities. These projects are partially supported by the Creative Inquiry program.

Poster #84
Rocket Investigations of Density and Turbulence with Ionization Gauges and Accelerometers
Mentor: Gerald Lehmacher, Physics and Astronomy
Student: Brandon Burkholder

The goal of this CI project is to explore the capabilities of a 3-axis accelerometer to determine if it could be used as a tool for atmospheric density measurement. We have previously looked at outputs of the device and performed spectral analysis on data from a simulated zero-g environment to characterize noise. On January 26, 2015 in Fairbanks, Alaska at Poker Flat Research Range, two sounding rockets were launched with these accelerometers in the payloads as a part of the MTeX (Mesosphere - Lower Thermosphere Turbulence Experiment) mission. Dr. Lehmacher of the Department of Physics and Astronomy was co-investigator for this mission. The main instrument of this payload was the CONE ionization gauge which measured neutral density and turbulence. The data from these launches can now be used to identify regions of turbulent activity and to describe turbulent transport in the MLT region. Comparison of the two data sets will reveal if the resolution of the accelerometer will be adequate to identify noteworthy structure on its own.

Poster #85
Many Majors, One Mission: Examining Factors Impacting Self-efficacy Among a Diverse Group of Undergraduate America Reads Tutors
Mentors: Linda B. Gambrell, Teacher Education, Anastasia Homer, Teacher Education
Students: Destin Jennings, Luca Kimbrell, Jordyn Hughes, Jemel Pooser

America Reads, a tutoring program for struggling readers in kindergarten through 3rd grade, is staffed by Clemson University students from a wide variety of backgrounds and academic majors. Tutors plan and implement one-on-one tutoring sessions involving read-alouds, word study, writing, independent reading, and educational games. The goal of the program is to improve children's reading achievement and increase motivation to read. Given the diverse backgrounds of the America Reads tutors, our team was interested in discovering how personal experiences and academic majors played into their self-efficacy and success with their students. Through interviews, observations, and analysis of lesson plans we conducted a case study of the America Reads tutor experience. The relationship between students and tutors was a focus during data collection, based on outcomes of prior studies conducted by the team suggesting its importance in student outcomes.

Poster #86
Layout Development for the Fabrication Department
Mentors: Brian J. Melloy, Industrial Engineering, Aditya Vaze, Industrial Engineering, David Parker, Industrial Engineering, Melissa Dorlette Paul, Industrial Engineering, Shibi Karuppusamy,Industrial Engineering
Students: Morgan Copeland, Howard Pendleton, Taylor Santos, Katherine Schnetzer, Paige Eber, David Haines, Jonathan Haines, Laura Manhard, Matthew Randzio

Team A - In partnership with the Schneider Electric Seneca Plant, this design team focused on improving the layout of the fabrication department to help decrease the work in progress time and the amount of fork truck traffic. The team observed both the second and first shifts as well as conducted interviews with truck drivers, machine operators, and upper management and gave out surveys to them. This process yielded the needs and metrics for the project. After determining the system losses, the team did a root cause analysis and found the main system losses to be fork trucks waiting for other fork truck traffic, fork trucks making 3-point or more turns, and movement of unused and/or hindering materials. The team then went through an extensive concept generation phase. ARENA models were made for the current layout and the generated concepts. Using these models the best solution was found and was suggested to the client. Team B - In partnership with Schneider Electric's Seneca facility, this capstone project focuses on redesigning the layout for the fabrication department in order to improve efficiency and material flow. Previously, as a new machine came in, it was placed where there was adequate room instead of placing it where material flow was optimal. First, we observed the process and conducted interviews to determine the needs for the layout. We then conducted surveys to determine the importance of each of these needs, and from this we created the specifications for the layout. We then performed time studies, determined the system losses using a pareto chart, and performed a root cause analysis using a fishbone diagram. We found that the main causes for a non-optimal layout are the aisles, the machine workspace, movement of materials and people through the facility, and safety. We now know what the most important aspects are and can concentrate on these for concept generations of an optimal layout.

Poster #87
The Beneficial Effects of Royal Jelly on Healthspan
Mentors: Yuqing Dong, Biological Sciences, Min Cao, Biological Sciences
Students: John Edmunds, Lee Gedney, Li-Chien Hsu, Mary Klauber

The worker honeybee (*Apis mellifera*) produces royal jelly. Royal jelly as a nutraceutical is known to extend lifespan of *C.elegans* and protect them against different stresses. Royal jelly has also shown to prolong lifespan of *C.elegans* against certain pathogens. Here, we aim to study the effect of royal jelly on the healthspan of C.elegans when fed on different pathogens. We study the healthspan of the worms by studying the bodybends of L4 worms grown on royal jelly supplemented plates. We are also investigating the effect of royal jelly on the affinity of *C.elegans* for different pathogens as food. The overall purpose of this study is to understand the role of royal jelly as a nutraceutical towards pathogen infections.

Poster #88
Greenville Memorial Hospital Respiratory Care Staff Productivity Improvement
Mentors: Brian J. Melloy, Industrial Engineering, Aditya Vaze, Industrial Engineering, David Parker, Industrial Engineering, Melissa Dorlette Paul, Industrial Engineering, Shibi Karuppusamy,Industrial Engineering
Students: Marcus Anderson, Brian Anthony, Melissa Jackson, Patrick Young, Arianna Cipollone, Justin Lozano, Michael Maher, Ray Price, Shannon Weill

Team A - Working with Greenville Memorial Hospital (GMH), this project aims to improve the Respiratory Unit in GMH. The objective is to analyze the process of the respiratory therapists (RT), and improve the efficiency and productivity of the process. The goal is to make the workload more attainable and to reduce the wasteful steps taken. The team began by learning the current system through observations, surveys, and interviews of the staff. The team then created a list of needs observed in the system, and metrics for each need. Losses were identified through surveys and observations. The team then performed a root cause analysis to better understand the core losses and to learn all causes of those losses. The major losses are labeling patient meds and inhalers, addressing patient comfort, and pausing for doctors and other staff. With losses identified, the team will now generate concepts to improve the system. Concepts will comply with the budget of a 2 year ROI. This research will help to improve the efficiency of the RT's processes. The conclusions and solutions proposed may be applicable to other departments. This research is sponsored by Clemson Industrial Engineering. Team B - In partnership with Greenville Health System (GHS) this design project focused on improving the Respiratory Care staff's productivity in the Acute Unit at Greenville Memorial Hospital (GMH). Currently the productivity of the respiratory staff at GMH is measured in relative value units (RVUs). Though valuable to some degree, this calculation of RVUs does not give a clear explanation of what a respiratory therapist (RT) completes during a shift. GMH is looking to understand what areas need improvement in order to achieve a higher level of productivity within respiratory care. The team has been shadowing respiratory therapists to get a better understanding of that they do on a "day-to-day" basis. During this time, team members interviewed stakeholders while also making their own observations to create customer needs. Once these customer needs were established, the team benchmarked several other hospitals and used the collected data to create product specifications. Also during the observations, the team investigated the root causes of system loss. Travel, charting, idle time, preparation, storage, and scheduling have been identified as the main causes of loss.

Poster #89
Material Flow and Storage Development Plan for Warping Department
Mentors: Brian J. Melloy, Industrial Engineering, Aditya Vaze, Industrial Engineering, David Parker, Industrial Engineering, Melissa Dorlette Paul, Industrial Engineering, Shibi Karuppusamy,Industrial Engineering
Students: Fierra Blount, Carson Fields, Matthew Gabriel, Christian Spiecha, Galen Givens-Rowlin, Genevieve Johnson, Alexander Smith, Abigail Vogt

Team A - In partnership with Glen Raven Custom Fabrics of Anderson, this capstone project focused on developing a materials flow and storage plan for the warping department for incoming raw materials and outgoing materials that optimizes the available space. Through observations of the current system, conducting interviews and importance surveys, the team was able to determine and rank the overall customer's needs. These needs were then made into product specifications and the measurements of theses specifications were determined. From there, the systems losses were looked into. Through a root cause analysis, the main areas of concern were found to be the pooling of materials and inventory as well as creeling downtown.
Team B - In partnership with Glen Raven's Anderson facility, this capstone design project focused on reducing

the number of steps taken by the employees in the warping department as well as maximizing the usage of the floor space in the warping department. The customers' needs, as well as product specifications, were determined through the use of observing the current system, interviewing employees and surveying the employees we interviewed. The team identified the system losses based on key business goals, time studies, and root cause analysis. The main system losses were determined to be excess walking result of moving plastic trays, retrieving creel out bins, and movement of raw materials as well as excessive lost time due to the repackaging conveyor being full. This research done will help improve the amount of time the employees at Glen Raven are working through decreasing the amount of time they are taking excess steps.

Poster #90

A Comparison of Potential Mixes in Two Southeastern Lakes: Lake Jocassee, SC and Carters Lake, GA

Mentor: John Hains, Biological Sciences

Students: Carolyn Lanza, Margaret Lund, Jenna Pruett, Michelle Voytko

The specific hydrodynamics of lakes, especially mixing frequency and depth, strongly influence all aspects of lake habitats and ecological relationships. While large deep lakes in the Southeastern USA tend to be warm monomictic lakes, there are examples of exceptional lakes, usually due to exceptional depth or morphometry. The biotic habitats of these lakes are strongly dependent on atmospheric contact and vertical transport of nutrients. Hydrodynamics controls both of these factors. Carters Lake is an example of one such exception as it qualifies as a meromictic lake (with a layer of deep water which never completely mixes). It displays both thermal and chemical characteristics of classical meromixis with a well-defined (in chemical terms) monimolimnion. Lake Jocassee is also a large, very deep lake and we are investigating its potential for meromixis as well, although historic data suggests that it has usually behaved as a warm monomictic lake with occasional years in which it did not mix completely. The thermal structure of those exceptional years, other factors remaining constant, provides clues to the factors controlling the mixing behavior.

We are investigating the potential factors that might influence or control its mixing potential. Our initial investigation is based on morphometry which is complex. We compare this and selected historical data from Lake Jocassee to the known characteristics of Carters Lake. In this manner we will formulate further working hypotheses and potential ways to test them.

This poster presents the initial comparisons of these two Southeastern reservoirs and their physical characteristics and mixing dynamics.

Poster #91

Perception of Gap Traversability and Safety of Actions

Mentors: Christopher Pagano, Psychology, Brian Day, Psychology, Leah Hartman, Psychology

Students: Reilly Mask, Alyssa Goebel, Rosaria Bryan

The purpose of this experiment was to investigate if people can accurately judge their ability to traverse a gap, and to observe if they exhibited a 'margin of safety' in their judgments. It is important that people are able to perceive their environment in such a way that promotes safe and successful action. Participants were asked to judge whether a gap was traversable. Participants were split into groups with varying constraints on the task in the experiment, where some participants had a time constraint and others did not. Participants gave a judgment for 36 randomized distances about whether or not they could cross the gap, whether they would step or leap over the gap, and how safe it would be to perform that action on a 7-point scale. We found that participants exhibited a "margin of safety" in their judgments. We also found that participants were able to recognize when a gap surpassed their actual maximum stepping ability and they exhibited increased safety ratings as a result.

Poster #92

The Influence of Light Activity on Academic Performance and Sleep Quality

Mentors: June Pilcher, Psychology, Drew Morris, Campbell Graduate Engineering Program

Students: Cameron Drummond, Stewart Bryant, Jesse Walker, Vanessa Macpherson, Rosaria Bryan

The goal of this study was to examine the effects of low level activity during study sessions on academic performance in college students. Students in an introductory psychology course completed 2 hours of prescribed studying each week after their first exam. Individuals were placed in the Regular Desk group (58, 62.9% female) or FitDesk group (59, 62.5% female). The FitDesk is a stationary bike with a desk top attachment. Sleep quality was subjectively measured weekly across the semester and compared with class grades using a regression. Sleep quality predicted class grades ($R=0.21$, $p<0.05$). Further analysis found that FitDesk users with high sleep quality outperformed Regular Desk students with low sleep quality on their exams ($p<0.05$). Finally, an interaction between sleep quality and group suggested FitDesk use mitigated gradual decrease in sleep quality ($p<0.05$). These findings suggest increased light activity have positive effects on sleep quality and academic performance.

Poster #93

Anti-tumor Potential of Compounds Isolated from *Physalis peruviana* (poha)

Mentor: Yanzhang Wei, Biological Sciences

Students: Alyssa Shearer, Haley Huggins, Alicia Burns, Stephanie Brierley

Physalis peruviana (poha) has been claimed to be beneficial for a number of human diseases. However, scientific evidence to support these claims is very limited. Our Creative Inquiry team is researching on the anti-tumor potential of compounds isolated from poha fruit. It is hypothesized that some of the compounds are able to decrease cancer cell growth. To this hypothesis, CellTiter 96 Aqueous Non-radiative Cell Proliferation Assays (Promega, 2012) were performed to screen the inhibitory activity of the compounds on two human cancer cell lines: lung carcinoma A549 cells and breast cancer MDA-MB-231 cells. The corresponding non-tumorigenic epithelial cell line: NL20 and MCF-10A will serve as controls. The cells triplicates were treated with the compounds at final concentrations of 0μg/ml, 2μg/ml, 5μg/ml, and 20μg/ml and incubated for 24, 48, and 72 hours, respectively. Cell numbers of each treatment at the designed time point were measured using the MTS cell proliferation assay. The preliminary results indicated that samples PPE37A, PPE28, PPE28A, and PPE21_2P3P effectively decreased tumor cell proliferation for MDA-MB-231 breast cancer cells and PPE28A, PPE21_2P3P also showed promising result for A549 lung cancer cell. Further TUNEL apoptosis assay will be performed for these promising compounds. We believe that the confirmation of anti-tumor potential of these poha derived compounds will provide cancer patients with more treatment options.

Poster #94

Are Lobsters From Disease-Free Habitats More Social?

Mentors: Kylie Smith, Biological Sciences, Michael Childress, Biological Sciences

Students: Ashley Ehlert, Lauren Fraser

Caribbean spiny lobsters are an important commercial fishery due to their gregarious nature. Their attraction to conspecific odors increases den sharing, which leads to more efficient trap fishing. However, recent studies have found their attraction to conspecific odor has declined. Increases in disease and loss of natural shelter may have increased the risk of den sharing. We hypothesized juveniles from regions with low disease and/or high shelter would be more social. We tested conspecific odor attraction using a Y-maze with lobsters from low and high disease habitats in areas with low and high shelter abundance. Conspecific odor attraction was negatively

influenced by low shelter availability but was unrelated to disease prevalence. Variation in odor attraction was influenced more by the odor source than by differences in the choosing lobster. Therefore loss of natural shelter may negatively impact odor attraction and reduce gregariousness of juvenile spiny lobsters.

Poster #95
Developing Peer Delivered Initiatives to Foster the Promotion of a Healthy Campus
Mentors: Martha Thompson, Institute on Family & Neighborhood Life (IFNL), Jennifer Goree, Student Health Center
Students: Alexis Hinson, Charity Shaw

The Creative Inquiry consists of Aspire Facilitators and Healthy Campus Interns. Aspire is a Clemson University new student requirement focusing on the topics of alcohol and other drug abuse prevention, interpersonal violence prevention, and mental health with an emphasis in bystander intervention. Does the Aspire program provide the education and resources to increase students' willingness to be active bystanders and change behavior? Utilizing an emailed pre-assessment survey, post-assessment survey, and four month follow-up survey that is sent to all first-year students who attend the required Aspire session, results showed that students were more likely to intervene in situations regarding alcohol and other drug abuse prevention, interpersonal violence prevention, and mental health in addition to increasing the likelihood of utilizing campus resources. This data will be used to make changes in the curriculum and improve Aspire Facilitator training sessions.

Poster #96
Biodiesel: The Next Fuel?
Mentors: Gary V. Gaulin, University Housing, Leidy Klotz, Civil Engineering
Students: Coleman Tolbert, Yongkun Liao, Carissa Adams

The focus of this project is to research the environmental and economic benefits of biodiesel. The motivation for this project came from the question of: "Does the cost of biodiesel justify the pollution reduction?" Research had to be done to gain the facts and knowledge to support the cause. This includes finding possible sourcing, pros, cons, costs, fuel mixes, environmental, and mechanical information as it pertains to diesel engines and even the potential use in the CATbus fleet. Secondly, CATbus would have to be contacted in order to gain their thoughts and share the supporting information on biodiesel. The outcome of this project should show that environmental effects are better when using biodiesel versus regular petroleum diesel, and that there is less impact on human life. Our conclusion is that we recommend CATbus to use biodiesel over regular petroleum diesel. Thanks goes to our advisor Gary Gaulin and the Creative Inquiry program for making this project possible.

Poster #97
The Final Frontier: A Historiometric Analysis of Leadership in Extreme Environments
Mentors: Marissa Porter, Psychology, Nastassia Savage, Psychology, William Kramer, Psychology
Students: Katherine McIntyre, Ian Bateman

Prior research has shown that distributed leadership successfully facilitates and manages team performance in complex environments. This study primarily focuses on historical extreme environment teams to find a dynamic relationship between leaders and followers through theoretical lenses of shared and distributed leadership using a historiometric approach. As NASA continues to push the edge of space exploration, the level of autonomy within the team traveling into space is expected to increase due to increased distance from earth and also delay of communication. From this lack of home base communication with earth leadership is extremely important for the teams to address the temporal dynamics of diversity and other stressors that can occur while on missions. Traditional leadership speaks for having one key leader and a group of followers, however recent views of leadership in complex settings argue for a distributed balance of leadership within the team. This has been found to be especially important when the team's tasks are centered on knowledge-based work; members of the team typically have high levels of expertise and naturally seek autonomy when deciding how to apply their knowledge and skills. Vertical Leadership however sets the conditions and allows for an environment that will be acceptable of shared/distributed leadership. It has been argued that team leadership creates the enabling conditions for effective team performance by creating and maintaining the shared behavior effect and cognition that facilitate explicit/implicit coordination, adaptation, and team self-regulation. This study is designed to begin close analysis in efforts to close the gap of how leadership may be manifested within long duration, distance exploration missions. The following questions are raised throughout our study: 1. What leadership processes emerge in highly autonomous teams? 2. Do hierarchical or shared leadership behaviors seem more prominent in long duration teams?

Poster #98
Identification and Detection Conspicuity Measurement
Mentor: Benjamin R. Stephens, Psychology
Students: Gregory Angeloff, Zoe Bartholomew, Sam Hawk, Evelyn Pickens, Miranda Scott, Nicole Sicilia, Anna Taffer

The "conspicuity angle" is a measure of "search conspicuity" for detection and identification of targets. There are differing reports of error rate in the literature. We explored a combined technique to determine if the technique could yield reliable and well-behaved estimates of conspicuity for four trained observers.The Bailey-Lovie eye chart was used as a target display. Targets were the central letter in each of 4 sizes at both high and low contrasts. On each trial, the observer slowly diverted their gaze horizontally from each target until they could no longer identify (or detect) the target. The observer indicated that location with a laser pen. Each measurement was repeated for all 16 conditions four times. The results suggest that observers, when asked to differentiate detection and identification criteria, are able to provide reliable estimates of conspicuity angle with a minimum number of trials. Implications of these results for field and forensic estimates of conspicuity will be discussed. In addition, we are currently comparing two methods of determining conspicuity for a target.

Poster #99
Taking a Bite Out of the Reef: Factors Influencing Parrotfish Foraging Patterns and Dietary Selectivity Indices
Mentors: Kylie Smith, Biological Sciences, Michael Childress, Biological Sciences
Students: Daniel Coster, Kelan Drake-Lavelle, Jaclyn Whitt

Reef herbivores, such as parrotfish, have been shown to play an important ecological role in maintaining healthy coral reefs. Parrotfish feed on a variety of substrate types including macroalgae, turf algae and corals. These fish can be categorized into functional groups based on their dietary preferences. In this study we conducted parrotfish behavioral observations and substrate surveys on 34 reefs across the Florida Keys National Marine Sanctuary. Reefs were classified into four types based on their substrate composition, depth, and complexity. We determined that dietary preference of the functional groups was correlated with reef type. We also saw differences in parrotfish abundance and their bite rate. These findings suggest that the role parrotfish play in coral reefs may depend on reef type. By understanding how the grazing behavior of parrotfish impacts coral communities, we will be better able to participate in the conservation of coral reef ecosystems.

Poster #100
Exploration in Novel Tissue Engineering Methods
Mentors: Jorge Rodriguez, Bioengineering, Aesha Desai, Bioengineering, Delphine Dean, Bioengineering
Students: Amanda Stastny, Madison Repp, Caitlyn Jones, Jeffrey Holmes, Kalli Garzon, Catherine Demos, Carolyn Arthur, Joseph Wortkoetter

This Creative Inquiry research focuses on new and upcoming cell culturing and tissue engineering methods. Three projects are underway in this CI, each investigating a problem faced with tissue engineering. The first of these projects focuses on growing 3D cancer cell spheroids for use in drug screening. Current, 2D methods for cell culturing limit intracellular interactions and cells do not mimic the cells found in the human body. Two human breast cancer cell lines are being cultured in 3D spheroids to imitate *in vivo* tumors. The spheroids are chemically and mechanically analyzed to determine likeness to realistic tumors and are then examined to see how tumors may react to cancer drugs. Another one of our projects focuses on 3D growth of chondrocyte cells in hopes to grow cartilage similar to that found in articular cartilage and give insight into the use of autologous cartilage as a therapy tool. Our final project aims to develop a new and more efficient method of cell culture. This approach grows cells on solar panels which will remove steps from the culture process that are very time consuming and lead to opportunities for contaminating the cells.

Poster #101
Program Development and Implementation for South Carolina Youth through Expanded Food and Nutrition Education Program (EFNEP)
Mentors: Katherine L. Cason, Food, Nutrition and Packaging Sciences, Kattia Blanco Acuna, Food, Nutrition and Packaging Sciences, Joyce Senior Angulo, Campus Recreation
Students: Jillian Clinton, Matthew Francis, Christen King, Ashley Knight, Courtney Lee, Ana-Lisa Patterson, Katherine Smith, Amanda Wells, Margaret Wynkoop

The Expanded Food Nutrition and Education Program (EFNEP) is a federally-funded program that aims at informing and educating limited-resource children, youth, and families in developing and maintaining a nutritionally sound diet, and a physically active lifestyle. Many of the intervention programs implemented through Youth EFNEP are created to be part of an existing school curriculum or as an after-school program. Currently, few programs exist that allow for easy transferability of these already existing curriculums to a summer camp setting.Therefore, the purpose of our Creative Inquiry was to develop the students' abilities to design and implement a Nutrition Education program for youth audiences in a community setting. Students' responsibilities comprised the analysis of lesson structure for grades K-12, development of lesson materials, implementation of the nutrition education lessons with youth audiences from surrounding community areas, and the application of Youth EFNEP evaluation tools.The 8-lesson curriculum is being pilot-tested during the fall of 2014 and spring of 2015 at Littlejohn Community Center in Clemson. The students have taken a leading role in the implementation of the nutrition education activities at the center, acquired the skills to work with low income audiences and have been actively providing the necessary feedback to improve the quality and content of the curriculum, so that one day it becomes a tool that can be used nationwide in summer camps by Youth EFNEP educators.

Poster #102
Race, Crime and Punishment in Early Twentieth-Century South Carolina
Mentor: Howard Bodenhorn, Economics
Students: Hannah Evans, Darien Hey, Grace Heyne, Alexander James, Gabriel Laneve, Kyra Palange, Devana Stewart, Ashley Welch

How law is enforced at a historical moment reflects contemporary social concerns, attitudes and prejudices. In America all should stand equal before the law, but not all do. Our research documents the gap between the ideal and the actual in Greenville County, South Carolina. Studies of racial bias in crime use differences in sentences upon conviction to reveal how prejudice negatively affects young African Americans. But sentencing is just one stage in the judicial process. Prejudice may appear in the decision to arrest, to charge, to try or to plea bargain. Our study provides insights into how race influences decisions made at these earlier stages of the criminal process. Using arrest records we find that blacks were disproportionately arrested. Between 1919 and 1925, the annual average arrest rate among white males ranged between 0.9 and 1.8%; for black males, it ranged between 1.6 and 4.5%. Evidence on the disposition of cases reveals that blacks were substantially more likely to be convicted. Our research reveals massive racial disparities at nearly every step in South Carolina's early criminal process.

Poster #103
Developing Initiatives to Reduce the Negative Impact of Alcohol and Drugs in the Greek Community
Mentors: Jennifer Goree, Student Health Center, Kelsey Rock, Student Health Center, Martha Thompson, Institute on Family & Neighborhood Life (IFNL)
Students: Victoria Craun, Carter Fiveash, Kathryn Gasque, John Major, Charles Williams

This "Greeks for Greeks" Creative Inquiry, consists of students representing various Greek organizations on campus. This Creative Inquiry sponsored by the Department of Health Sciences, is committed to developing initiatives to reduce the negative impact of alcohol and drugs specifically in the Greek community. Some of our mentors are from Healthy Campus to aide in the coordination of efforts to alcohol and drug issues among students. We have two projects that are currently under development: 1) a bystander intervention educational program that will be tailored to address the context and needs of Greek students, and 2) an educational "bar" that is campus outreach initiative pertaining to alcohol and drug use. The "bar", known as The Filling Station, is a platform to teach about responsible alcohol use and the consequences of alcohol over consumption, drug use, and other illegal activity. Creative Inquiry team members aim to use to educate students around more risky times of the year in terms of alcohol and drug use, such as Spring Break, Graduation, football season, and other occasions. Team members will collect knowledge data pertaining to learning outcomes that the students were already familiar with and what was novel information. This data will be used to identify educational needs and improve this and other initiatives to promote a healthy and safe campus and Greek community.

Poster #104
Focus Groups at an Elementary School
Mentors: Margaret Condrasky, Food, Nutrition and Packaging Sciences, Breanne Halteman, Food, Nutrition and Packaging Sciences, Duncan Darby, Food, Nutrition and Packaging Sciences
Students: Caroline Andrews, Grace Arney, Julia Brino, Martha Chapman, Jennifer Dill, Rachel Gates, Emily Lanier, Meagan Miller, China Moore, Madison Pouch, Sarah Riley, Caitlen Schmidt

This CI project was designed to facilitate interdisciplinary learning of students within the Food, Nutrition, and Packaging Sciences Department through teams developing healthy food products for children. The products developed were sweet potato pancakes, parsnip fries, sweet potato hummus and chocolate peanut butter banana smoothies. METHODS: CI students took samples of their products to an elementary school to allow children to taste and give feedback on the foods. The elementary students were asked to rate the appearance, aroma, flavor, texture and overall liking of the products on a scale from one to five, with one representing "dislike very much," and 5 representing "like very much." RESULTS: The overall liking scores on a 5-point scale, were 4.9 for the pancakes, 3.8 for the parsnip fries, 3.9 for the smoothies, and 4.1 for the hummus. CONCLUSION: Clemson students learned how to develop healthy food products for kids, which will help them not only in their upper-level classes, but also eventually in their careers as the next generation of food nutrition, and packaging scientists. This project was funded by a USDA HEC Grant.

Poster #105
The Effects of a Recreation-based Family Camp on Our Military Family
Mentors: Brent Hawkins, Parks, Recreation & Tourism Management, Teresa Tucker, Parks, Recreation & Tourism Management
Students: Hayley Pearson, Lindsay Neeley, Anna McWhorter

There have been 2.2 million service members deployed to combat since 2001 and 44% report difficulties readjusting to post-deployment life. There are many recreational and therapeutic interventions that are used to help service members and their families adjust to post-deployment life. Interventions that are directed towards the family as a whole can help reduce their stress. Family adaptability, cohesion, satisfaction, communication, and positive and negative affect of service members and their families post – deployment were measured during three recreation-based therapeutic family camps. Specifically, the purpose of this study was to determine the effects of Camp Twin Lakes' Family Warrior Weekend. Resultsfrom independent sample t-tests indicated that family communication, satisfaction, flexibility, total family functioning, and negative affect saw no significant change at the post-test, but increased at the two week follow-up. There was a decrease in positive affect, the opposite of what was hypothesized. However, no changes in scores were statistically significant. The study shows that the Family Warrior Week end may improve family functioning after the camp; however, additional study is needed to draw further conclusions.

Poster #106
GENE: Genetic Essentials in Undergraduate Nursing Education
Mentors: Julia A. Eggert, School of Nursing, Elizabeth Hassen, School of Nursing, Tracy Lowe, School of Nursing
Students: Rebecca Zobel, Denzel Anderson, Marshall Pritchett

The purpose of this research was to evaluate the amount of genetic content incorporated into the curricula within Clemson University's School of Nursing classes. This study evaluated all nursing specific classes' syllabi and textbooks for the Baccalaureate of Science nursing program. Genetic key words and phrases were searched within each syllabi, their correlating textbooks, and lab manuals. Preliminary analyses revealed less than a ninth of the syllabi had any mention of genetics, while the majority of textbooks contained genetic content. It may be concluded that genetic information is available but an emphasis on genetics was not evidenced in either clinical or didactic course objectives or syllabi content. Genetic information needs to be further incorporated into classes to ensure future nurses are prepared to incorporate genetic advances into practice and improve patients' health. This research project was supported by the Calhoun Honors College and the Creative Inquiry program.

Poster #107
Optimizing Internal On-Time Delivery for Customer and Transfer Shipments
Mentors: Brian J. Melloy, Industrial Engineering, Aditya Vaze, Industrial Engineering, David Parker, Industrial Engineering, Melissa Dorlette Paul, Industrial Engineering, Shibi Karuppusamy,Industrial Engineering
Students: Katelyn Blair, Joseph Calamoneri, George Kitchukov, Nathan McKeever, Mary Calk, Evan Graczyk, Shawn Lundskow, Christopher Wykoff

Team A - In partnership with Michelin of North America, this capstone design project focused on optimizing the internal on-time delivery of transfer shipments for passenger car replacement, original equipment, and truck tires from production sites to distribution centers. The goal of this project was to increase the rate of internal on-time deliveries to 85% while not negatively impacting lead time. After learning through observation the processes that occur at the production sites as well as the distribution centers and analyzing Michelin-provided Excel data, problem areas could be better identified. Through interviews with site managers and operators customer needs were created and product specifications were determined. The process of receiving trailers, many in damaged conditions, was identified as an area for improvement. The next step involved identifying system losses through statistical data and non-value added activities. Furthermore, root cause analysis, which consisted of creating a fishbone diagram and Pareto charts, determined areas in the system that contributed to loads being delivered past their given lead time. Team B - In partnership with Michelin Logistics, this design project focused on optimizing the internal on time delivery process in order to achieve a goal of 85%.The team determined customer needs by conducting surveys, interviews, as well as observations. From this point, the team was able to develop product specifications. System losses were developed next in order to help us understand the root causes, which were visually displayed in a fishbone diagram. The team will then perform further research on each cause to attempt to determine alternate concepts or suggest changes. This will ultimately help the team achieve our goal of increasing, or optimizing, Michelin's internal on-time delivery process and save Michelin money as well as customer satisfaction.

Poster #108
Enhancing Family-Centered Care in the Neonatal Intensive Care Unit
Mentor: Nancy K. Meehan, School of Nursing
Students: Jamie Dobbins, Elizabeth Wright, Allie Dowe, Jacquelyn Sutherland

Although there are limitations on how parents can care for their infant while in the Neonatal Intensive Care Unit (NICU), families need to be involved in their infants' health status and progress. This research study aims to address how educating and empowering NICU parents in areas of health and nutrition can improve their satisfaction during their child's hospitalization. They will have the ability to track the day-by-day progress of their baby by monitoring their child's temperature, weight, and nutritional care using an iOS app designed for NICU parents. Users will benefit from increased involvement in their child's care, and the ability to identify personal

health goals for their child. Parental satisfaction will be measured using a parent satisfaction survey following use of the NICU app. Collaboration with the research team, Greenville Hospital System and March of Dimes is continuing. A team from Dr. Roy Pargas' graduate computer science iOS class has created a pilot NICU app for the study, and the research team is now working to finalize the application for use on the "App Store". This research is supported by the Calhoun Honors College and Creative Inquiry program.

Poster #109
The Relationships Among Sleep Quality, Hostility, Blood Pressure, and Symptoms of Posttraumatic Stress Disorder, in Young Adults Without a Known Trauma History
Mentor: James A. McCubbin, Psychology
Students: Tracy McGee, Caitlin Lindberg, Stephanie Kinard, Jesse Hayes, Chelsea Green, Miranda Rodriguez

Posttraumatic stress disorder (PTSD) is associated with blood pressure dysregulation, sleep disruption and elevated hostility. It is presently unknown if these constructs are associated with subthreshold PTSD symptomology in healthy, young men and women without a known trauma history. Preliminary results show PTSD symptoms were associated with poorer sleep quality and higher hostility scores in the total sample. In young women, PTSD symptoms were associated with high hostility scores, but not sleep quality. In young men, PTSD symptoms were associated with poor sleep quality and higher hostility scores, but were also associated with higher resting diastolic blood pressure. Both hostility and sleep quality independently predict PTSD in men, but the association between PTSD scores and blood pressure in men was mediated, at least in part, by poor sleep quality. Behavioral interventions designed to increase sleep quality and restructure hostile attitudes could potentially serve as preventive interventions for PTSD and related anxiety symptoms.

Poster #110
Clemson Engineers for Developing Countries
Mentors: Jennifer Ogle, Civil Engineering, Dylan Bargar, Campus Recreation
Student: Mary Burgess

At Clemson Engineers for Developing Countries, we work with local communities in the Central Plateau of Haiti to develop sustainable solutions that improve the quality of life through interdisciplinary student-led initiatives that embody our core values in partnership with Clemson University, non-profit organizations, and industry. Project management teams work on projects that are developed for and eventually implemented in Haiti. Functional groups work on the organization's finances, technical support, trip planning, and external communications. Our past successes have included water systems and a biodigester. With over 60 students involved, we were able to expand our research efforts this semester. Current projects include; alternative energy, remote water data collecting, and reverse engineering donated medical equipment. With students from a variety of majors, we exist to serve the developing world while developing the students that serve.

Poster #111
Development of a Novel Biological Intervertebral Disc Scaffold
Mentors: Jeremy Mercuri, Bioengineering, Dan Simionescu, Bioengineering
Students: Clayton Compton, Austin Hensley, Alison Lehane, Jess Rames, Megan Skelly

Back pain is a major public health issue in our society, and is strongly correlated with the degeneration of intervertebral discs (IVDs). Current therapies are conservative or surgical, and no attempt to regenerate the IVD. 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. The goal of decellularization is to eliminate DNA content while retaining glycosaminoglycan (GAG) content. Eliminating DNA content will prevent a foreign body response by the host's immune system once the IVD is implanted. GAG is responsible for forming interfibrillar bridges with collagen fibrils and thus assisting in resisting compressive and tensile forces. By retaining GAG content in our decellularized IVDs we will maintain structural integrity of the extracellular matrix. The IVDs closest to the base of the bovine tail were targeted, because they are similar in size and biochemistry to the human IVD. We use a mix of conventional methods including freeze thaw, sonication and agitation in a solution of sodium dodecyl sulfate (SDS) and ethylene diamine tetraacetic acid (EDTA). After decellularization, half of each IVD was placed in a tissue cassette and put formalin in preparation for histological analysis, and the other half was frozen prior to biochemical analysis (DMMB and PicoGreen assay). Our results thus far are promising in eliminating DNA content but show we have a large room for improvement in retaining GAG content.

Poster #112
Culinary Nutrition and Recipe Development for Children
Mentor: Margaret Condrasky, Food, Nutrition and Packaging Sciences
Students: Kimberly Durante, Michelle Kuntz, Shannon Mahoney, Rhonda Reddish, Kathryn Shumaker, Elizabeth Treadaway

Nutrition and Culinology® students learn to incorporate nutrition education, culinary nutrition skills, and recipe development in health care applications. The team provides nutrition services and volunteers for local Children's Health programs and weight management sessions. Students research and develop recipes for children that are both nutritious and delicious in an attempt to increase the awareness of childhood nutrition among undergraduate students as a future career option. Example of a menu follows: pork loin and low sugar BBQ sauce, broccoli slaw, cauliflower mashed potato casserole, and baked apples. Another favorite menu consisted of meatballs, veggie sauce, whole grain pasta and a smoothie. The project takes on a multi-faceted approach in order to provide nutrition services, create relationships with professors and professionals in health care settings, while enhancing students' experience for their future careers. This year teams presented culinary demonstrations and fielded questions from family participants in Greenville, SC.

Poster #113
Soil Inventory of Private Lands in South Carolina
Mentors: Elena Mikhailova, School of Agricultural, Forest and Environmental Sciences, Christopher Post, School of Agricultural, Forest and Environmental Sciences, Julia Sharp, Mathematical Sciences
Students: Katherine Brock, William Chapman, Jacob Derrick, Michael Gouin, Christopher Hardin, Shelby Moody, Marisa Pitman, Alison Rehfus, Jessica Rutland, Joel Turner, Tyler Wall, Sydney Watts, Andrew Williams, Elizabeth Yahnis

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 suitabilities 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 #114
Assessment of Bacterial Survival on Disposable Lab Coats Used in Microbiology Teaching Labs
Mentors: Kristi Whitehead, Biological Sciences, Krista Rudolph, Biological Sciences
Students: Erin Koch, Madison Scott

In the past few years, there have been multiple incidences of individuals becoming ill after participating in microbiology teaching labs at universities. This has led to altered safety recommendations, including the use of disposable lab coats in microbiology labs. The purpose of this project is to determine whether the levels of bacterial transfer and survival of paper lab coats is high enough to justify requiring Microbiology Departments to issue lab coats for every student in each lab. *Escherichia coli* has been used as model organism since it is a common teaching laboratory bacterium. Various methods of recovery including replica plating, swabbing, and vortexing portions of lab coats in order to dislodge bacteria have been utilized. Our results show that significant levels of *E. coli* survive on the lab coat for at least 20 minutes after inoculation. Preliminary results also indicate that a portion of the *E. coli* is transferred through the layers of the lab coat. Our research indicates that lab coats are a possible source of contamination, and it suggests that using disposable lab coats, which are not taken home with the students, may be a valid safety recommendation.

Poster #115
Conservation Drones for Land Use Decision Making
Mentors: Christopher Post, School of Agricultural, Forest and Environmental Sciences, Elena Mikhailova, School of Agricultural, Forest and Environmental Sciences
Students: Marshall Clyburn, Jemel Pooser, Ryan Pruitt, Philip Pstrak, Caitlyn Schulze

New advancements in open source autopilots allow for development of low-cost unmanned aerial vehicles (UAVs) that have the potential to revolutionize aerial mapping. This study was conducted to create platforms and workflows to help expand applied use of UAVs in the agricultural and natural resource areas. Both commercial and open-source based UAVs are used to take high-resolution images that are subsequently merged into ortho-mosaics and are classified into different land covers using Geographic Information Systems software. This study was supported by the Clemson University Creative Inquiry Program.

Poster #116
Use of Social Media as a Tool to Identify Symptom Needs in Children with Autism
Mentor: Julia A. Eggert, School of Nursing
Student: Erika McMillion

The primary purpose of this research is to determine if there is an association between Autism Spectrum Disorder (ASD) and gastrointestinal (GI) symptoms. Literature suggests frustrations with misunderstandings between caregivers and clinicians about this problem. If a correlation is identified this information could assist caregivers of children with ASD to talk with clinicians about GI problems. Radian 6 software will be used to analyze target words from social media posts. Using this method, the research team can collect descriptions from social media of the "lived experience" of persons with ASD and their caregivers. Data will be collected for 2 weeks, threads will be identified that contain words related to ASD and gastrointestinal disorders, data will be cleaned using NVIVO software, and word clouds of most frequently used descriptors will be created. Word clouds contain the most popular words that appear in search threads on Radian 6. The word cloud can show that gastrointestinal symptoms are a measureable concern of caregivers and individuals with ASD. This research was supported by the Calhoun Honors College and Creative Inquiry program.

Poster #117
Wellness Programs: Utilizing Incentives to Shrink Americans' Waistlines
Mentors: Caitlin Moore, Clinical Ed/Pract&Med Surv Pro, Nancy K Meehan, School of Nursing, Paula Watt, Clinical Ed/Pract&Med Surv Pro, William W Mayo, Clinical Ed/Pract&Med Surv Pro
Student: Gabrielle Tantillo

Chronic illnesses are becoming an epidemic in the United States. The concern of healthcare providers is how best to combat these health concerns. The purpose of this research is to revise CU WELL, Clemson University's employee wellness program, by identifying successful qualities of incentivized wellness programs. The CU WELL program has a Health Activity Tracker (HAT), which allows participants to track and earn points for healthy lifestyle choices. The team revised the HAT to include activities that are relevant and appealing to Clemson University employees. In addition, the team chose incentive rewards that encourage healthy lifestyles. In order to measure the effectiveness of CU WELL, the team created an online survey to be administered in 2016 to evaluate the intentions and motivating factors of participants for joining and continuing participation in CU WELL. In conclusion, transforming CU WELL into an incentive-based program will encourage Clemson employees to take an active role in improving their health. Calhoun Honors College and Creative Inquiry sponsored this research.

Poster #118
Monitoring the Impacts of Macroalgal Competition and Grazing on Coral Transplant
Mentors: Kylie Smith, Biological Sciences, Michael Childress, Biological Sciences
Students: Mary Burgess, Randi Sims

In response to the Caribbean wide decline in coral cover, researchers have started transplanting reef building coral species in order to restore reef ecosystems. Studies suggest these transplants are susceptible to competition from macroalgae, which can out-compete corals for nutrients and space. Studies have also found that herbivores play an important role in coral health through grazing. In order to test the impacts of macroalgal competition and grazing on coral transplants, we compared the survival of two species of transplanted corals on seven reefs in the Florida Keys over one year. Transplanted coral fragments were caged in either an open or closed Vexar mesh cage. Our results show that season significantly affects macroalgal growth, while neither cage treatment nor macroalgae had a significant impact on coral. Additional monitoring will be conducted to determine long term effects so that this experiment may help understand conditions optimal for successful coral restoration.

Poster #119
CEDC Solar Energy Team
Mentors: Dylan Bargar, Campus Recreation, Jennifer Ogle, Civil Engineering
Students: Megan Waite, Jason Marshall

Solar energy is one of the alternative energy project management groups in Clemson Engineers for Developing Countries. The goal of this group is to implement solar energy solutions in Haiti in order to improve the quality of life in a manner that is both reliable and sustainable. There are many aspects to consider when deciding upon what strategies are going to be most effective for realistically contributing solar energy solutions to a rural village in Haiti.

The job of the solar energy team is to establish where the priority lies in terms of who could benefit the most from the use of solar energy and establishing what they could use it for. Currently, the team has considered options of creating icehouses or providing solar refrigeration units, as this seems to be a route that would benefit many. Some possibilities for where and how this could be done include providing refrigeration for medical vaccines, for individual homes or at the local vocational school. Icehouses have also been considered to provide ice to the people in Haiti so they can use it as it benefits them the most individually. Beyond establishing the logistics of solar energy, this project management team is also in charge of designing a system that can be brought to Haiti practically and cost efficiently. The team is comprised of economics and engineers students who are collaborating in order to bring new technology to Haiti in such a way that it will make a lasting impact.

Poster #120
Intelligent Zero Net Energy Construction for Disaster Relief
Mentor: Rajendra Singh, Electrical and Computer Engineering
Students: Yongkun Liao, Joshua King, Matthew Humphrey, Gregory Howard, Benscott Dehaven, Robert Combs, Akshit Bhandari, Michael McDonald, Justin Shook, Benjamin Sternick, Szymon Wisniewski

The goal of our Creative Inquiry project is to create a home that can be placed on-site following a disaster without the need for accessing a potentially damaged or stressed utility grid. This prototype will embody the concept of Intelligent Zero Net Energy (IZNE) construction. By relying solely on Photovoltaic (PV) solar panels, batteries, and high efficiency 'smart' devices, our home will stand independent of any outside energy sources. To achieve maximum energy savings, direct current (DC) electricity will be generated and used without any costly energy transformations. The true merit of our research lies in a simple fact; solar energy is poised to transform the world but no new invention is needed for that to happen. Our group's innovative approach is to take mature technologies and implement them in an exciting new way.

Poster #121
Optimization of Production and Purification of Recombinant Laminin Protein and its Activity on Breast Cancer Cells
Mentors: Thomas R. Scott, Animal and Veterinary Sciences, Heather Dunn, Animal and Veterinary Sciences, Katie Elliott, Animal and Veterinary Sciences
Student: Haley Puckett

Integrins can stimulate cellular growth, apoptosis, and are often dysregulated in cancer. To assess their involvement, a recombinant protein of the G3 domain of laminin-5 (rG3) that binds the alpha integrin subunit expressed on MDA-MB-231 cells was produced. Optimization of production, purification, and study of treatment-induced signaling changes can improve understanding of metastatic cell growth. rG3 was produced with an N-terminal 6x histadine tag and two techniques were used for isolation- the Qiagen Fast Start Ni-NTA kit with the binding factor nickel-nitrilotriacetic acid and the Dynabead Invitrogen magnet bead separation technique with Cobalt-based technology. Preliminary results confirm that rG3 can be produced consistently and purified using both methods investigated. Future studies include treatment of cells with rG3 to determine the effect on downstream signaling pathways, which will be a helpful tool in understanding the dysregulated signaling mechanisms of cancer cells.

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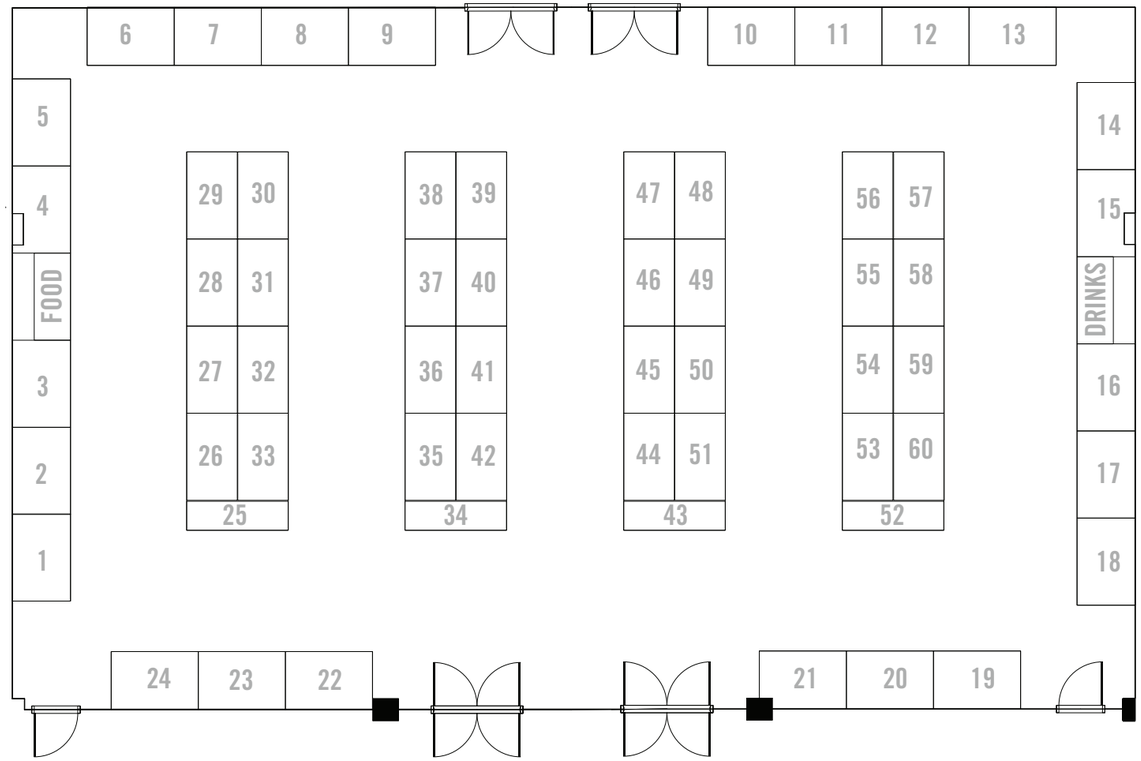
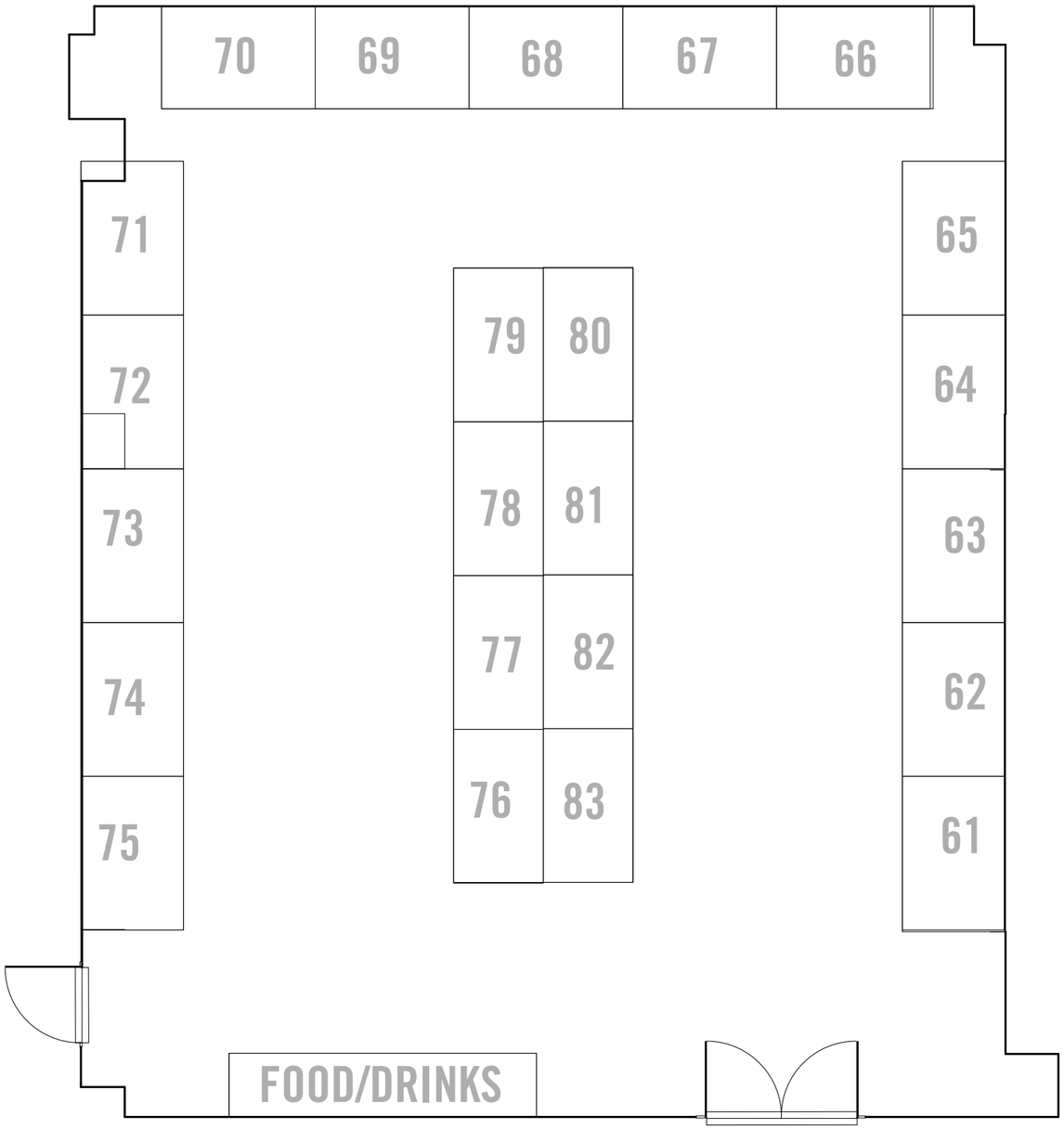
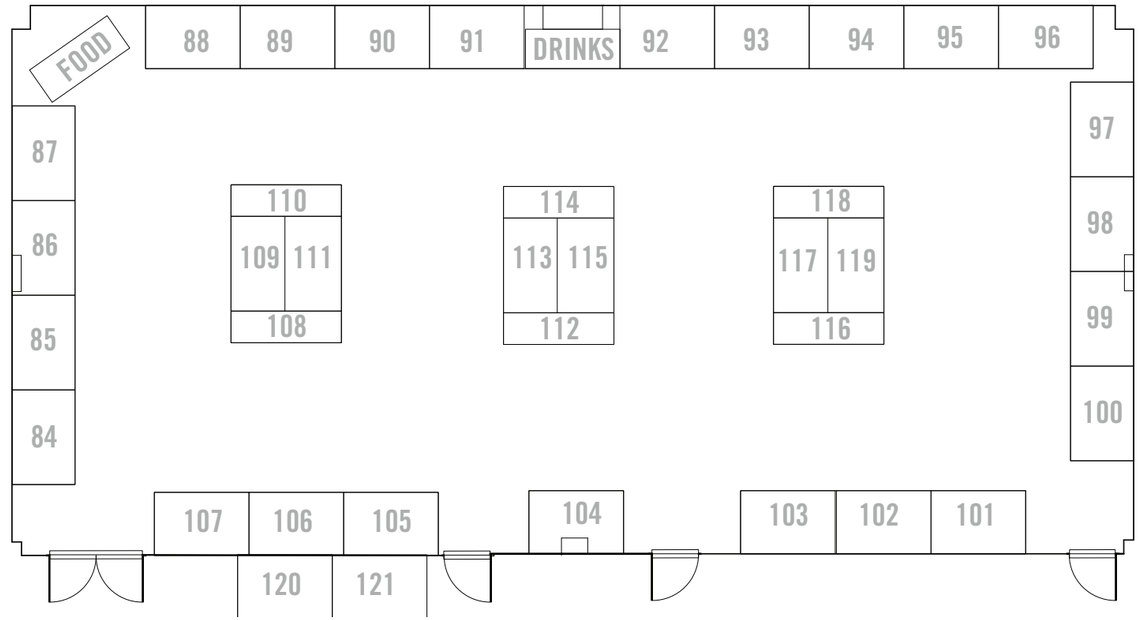


Map - Multipurpose Room



Map - Meeting Room



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