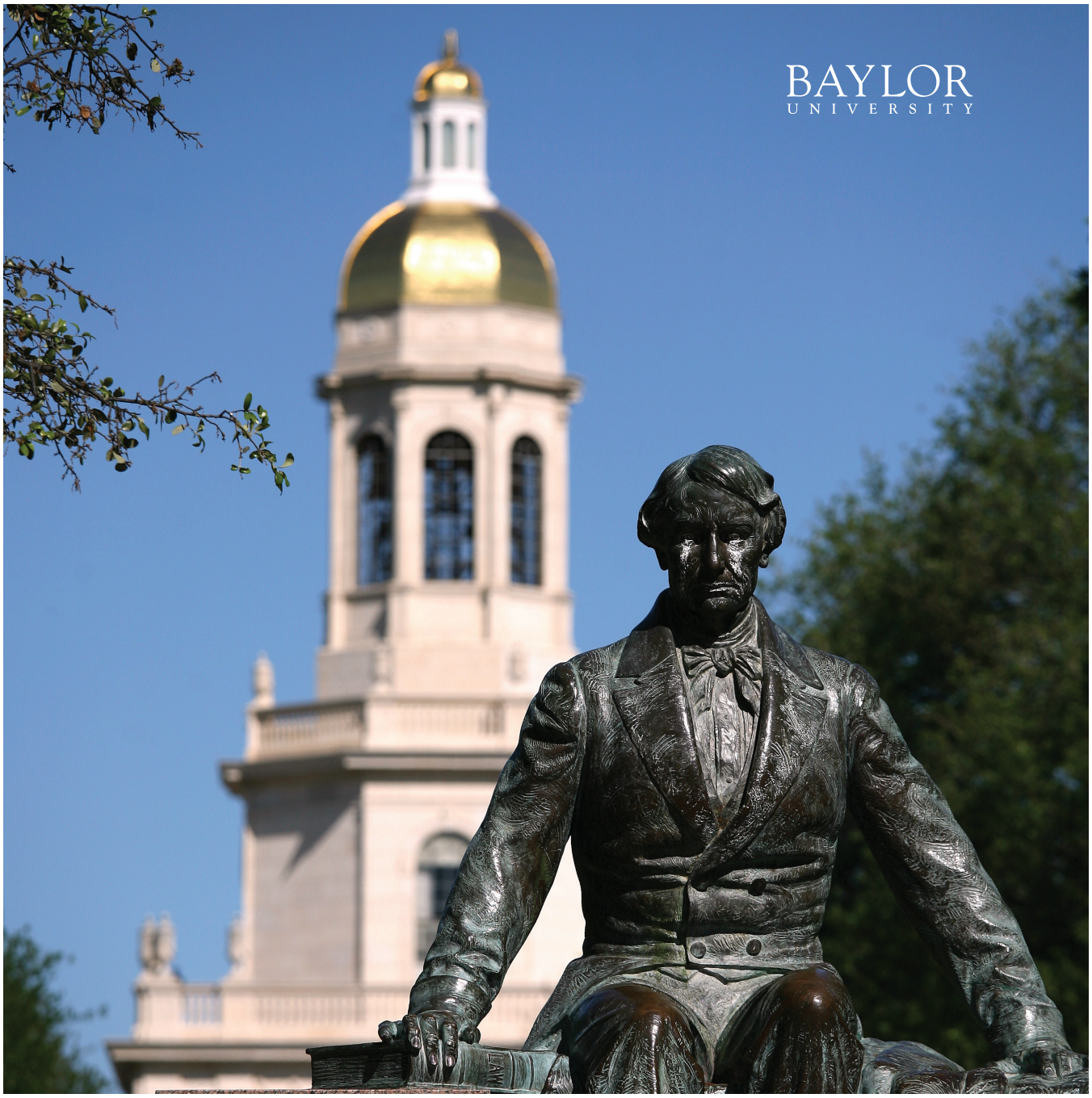

Undergraduate Research and Scholarly Achievement (URSA)
Presents

Scholars Day Abstracts

April 4th - April 7th, 2011

Dear Colleagues:
Welcome to Baylor's fourth annual celebration of undergraduate research. Scholars Week began as Scholars Day and continues to expand each year, a testament to the vibrant teaching and learning partnerships our students enjoy with Baylor faculty.

Individual mentoring that extends beyond the classroom is a hallmark of the Baylor undergraduate experience. The presentations in this program are proof positive that our faculty continues to excel at building those relationships, providing our undergraduates with transformative academic challenges that will continue to impact them for the rest of their lives.

Thanks for your participation in this celebration of Baylor students and faculty.

Truell W. Hyde, Ph.D.
Vice Provost for Research

Table of Contents

College of Arts and Sciences 1

Department of Anthropology, Forensic Science, and Archaeology 1
Department of Biology 5
Department of Chemistry and Biochemistry 18
Department of Classics 20
Department of English 22
Department of Environmental Science 24
Department of Geology 28
Department of History 35
Department of Mathematics 38
Department of Modern Foreign Languages 38
Department of Philosophy 43
Department of Physics 44
Department of Political Science 47
Department of Religion 49
Department of Sociology 50

School of Engineering and Computer Science 51

Department of Electrical and Computer Engineering 51
Department of Mechanical Engineering 51

School of Education 52

Department of Curriculum and Instruction 52
Department of Educational Psychology 53

Information Systems 54

Department of Information Systems 54

College of Arts and Sciences
Department of Anthropology, Forensic Science and Archaeology

Carol Azeesz, Nikki Rangel, and Hadleigh Stone
Faculty Mentor: Dr. Sara Alexander
In the Wake of Disaster: Exploring Connections between Lifeways and Resilience in Belize
(Anthropology, Forensic Science and Archaeology)

In the aftermath of climate-related events, such as tropical storms or flooding, households are forced to adjust by making changes in the way they access and use resources, including social resources (such as support from friends and family to meet basic needs), and economic resources including property, farm land and liquid assets. The capacity of these households to respond and adjust successfully to these events, or their resilience, depends on a range of factors. This project examines the following variables: occupational diversity and stability, social connectedness and willingness of family and friends to aid each other in times of crisis, and the frequency and intensity of food shortages – as they all influence how people adjust in the aftermath of a climate-related shock or events. We hypothesize that occupational stability enables households to secure financial resources after a shock that then allows them to repair and/or rebuild, while households that are more vulnerable in terms of employment resort to social networks for assistance and may have delays in addressing property loss.

Abby Byrd
Faculty Mentor: Professor Carol Macaulay
Living on the Leon – A Comparative Study of Hunter-Gatherer Housing Structures
(Anthropology, Forensic Science and Archaeology)

During excavations at the Upper Sprague site in Hamilton County, the Baylor Archaeological Field School discovered remains of a possible wattle and daub structure. Feature Five is an arc-shaped concentration of burned daub which arcs through three units. Its north-south extent is approximately 100cm and its east-west extent is slightly less. Many burned daub nodules exhibiting stick impressions were also recovered. Despite the paucity of hunter-gatherer structures in the archaeological record, Binford (1990) states, “There are no known cases among modern hunter-gatherers where shelter is not fabricated in residential sites, regardless of the expected occupational duration.” It is my goal to compare Feature Five to other hunter-gatherer structures discussed in the archaeological literature. Structures used for comparison include those found at an Apache site (Seymour 2007), !Kung sites (Lee and DeVore 1976), Kua sites (Kroll and Price 1991), and various Central Texas prehistoric sites.

Alexis Casiano
Faculty Mentor: Professor Carol Macaulay
Evidence of Deer-Hide Processing Activities at the Upper Sprague Site in Hamilton County, Texas
(Anthropology, Forensic Science and Archaeology)

Three features were encountered in Area D of the Upper Sprague site (41HM54) in Hamilton County during the Baylor 2008-2009 Archaeological Field Schools. Features 10 and 12 are shallow basins, one meter in length, 80cm in width, and 15cm in depth. These were side by side, at the same elevation and oriented in the same direction. Feature 11, located adjacent to Features 10 and 12, is a circular pit containing charcoal. This pit is similar in size to those documented by Binford (1967) as smudge pits used to smoke hides. In order to understand the purpose of these three features, the hypothesis put forward in this presentation postulates that the two shallow basins and the pit hearth found at Area D represent deer hide processing facilities – soaking basins and a ‘smudge pit.’ Ethno-historic accounts and experimental hide processing found in the archaeological literature support the hypothesis presented here.

Ashley Durham
Faculty Mentor: Professor Carol Macaulay
Analysis of the Lithic Artifacts Recovered from the Upper Sprague Site, Area D, Hamilton County, Texas
(Anthropology, Forensic Science and Archaeology)

During the 2007-2010 Baylor University Archaeological Field Schoolsat the Upper Sprague site, Area D (41HM54) in Hamilton County, we recovered many projectile points and stone tools dating to the Austin and Toyah Intervals of the Late Prehistoric Period. This poster outlines the methods we used in the analysis of the lithic assemblage, and presents photographs of the projectile points, formal tools and utilized flakes. Spatial analysis, using Spatial Analyst (a function of ArcMap [ArcGIS 9]), displays the distribution of formal tools and density of lithic debitage (primary, secondary, tertiary, and heat-treated flakes) across the excavation block. These analyses provide information on tool-use and maintenance at the site.

Chelsea Garrett
Faculty Mentor: Dr. Lori Baker
Maya Sacrifice in Guatemala: An Osteobiography
(Anthropology, Forensic Science and Archaeology)

Human sacrifice is a practice that has occurred in the Maya world for thousands of years. There are diverse styles of ritual and reasoning behind the act of human sacrifice among the Maya regions. Regardless, there are similarities in what anthropologists are describing as sacrifice and how to distinguish it from other mortuary practices. The Maya of Guatemala performed ritual sacrifice for many reasons, primarily to please the gods in times of crisis; however, other reasons consist of violence in warfare and companion burial involving royal figures.

This project consists of a skeletal analysis of a Maya sacrifice (burial 14) from the site of Yaxha, located in the Petén Jungle of the Guatemala lowlands. A biographical profile is formed using data from craniometrics, stature estimations, as well as age and sex determinations. The profile, known as an osteobiography, provides necessary data to the anthropologist pertaining to who the individual was and how they came to be deposited in their final resting place.

Burial 14 was examined subsequent to excavation from Yaxha. It consisted of both surprisingly intact cranial and postcranial elements. Upon further analysis, the suspicious manner in which the individual was buried was determined to be a rather clear representation of human sacrifice, probably corresponding to warfare. The individual was buried face down, with the hand and cranial bones commingled at the spine. The positioning, along with other osteological finds, suggests that the individual was sacrificed prior to burial. The osteobiography helps determine the context of the burial, and what role Maya sacrifice played in the demise of the victim.

Emily Grassbaugh
Faculty Mentor: Professor Carol Macaulay
Past and Present Fauna of the Leon River Riparian Zone and Surrounding Uplands in Hamilton County, Texas
(Anthropology, Forensic Science and Archaeology)

During the 2007-2010 Baylor University Field School at the Upper Sprague site (41HM54, over 2,000 bones were recovered from Area D, the majority of which were less than 2cm in length and too small to be identified. This poster presents 1) the zooarchaeological analysis of the faunal assemblage conducted by Art Tawater, 2) accounts of animal species encountered by Hamilton County settlers in the 19th century, and 3) an inventory of modern species of the Cross Timbers Ecological Region of north-central Texas.

Elizabeth Joyce, Amanda Martinez, Chelsea Garrett, and Tabatha Nichols
Faculty Mentor: Dr. Sara Alexander
Can You Outsmart the Weather? Linking Education and Coping Strategies in the Context of Climate Change
(Anthropology, Forensic Science and Archaeology)

Belize, located in northeastern Central America, is a small, private enterprise economy, where reef-based tourism is the number one foreign exchange earner followed by exports of marine products, citrus, cane sugar, bananas, and garments. With a population of approximately 314,000 people, 71% of Belize's population is employed in the services sector, in occupations supporting the tourism industry. Unfortunately, the tropical location of Belize means the country is frequently subject to hurricanes, tropical storms and coastal flooding, all of which can negatively impact tourism. When severe, these climatic events can cause displacement from homes, destruction of crops, and disruption of livelihoods. Usually during the hurricane season, residents of coastal communities become progressively more vulnerable in a number of ways, and when climate-related events occur, resort to various types of coping strategies to try to mitigate against the consequences. Using data from household surveys administered in several coastal communities, our project examines relationships between education levels, occupation types, felt stress and the coping strategies residents use when there are serious weather events. We hypothesize that education levels may influence perceptions of stress, which in turn, may influence the nature of coping strategies people use in climate-related disasters.

Nikki Rangel and Laurel Witt
Faculty Mentor: Professor Carol Macaulay
Hammerstones, Broken Bones, and Metatarsal Soup: Replicating Lipid Extraction from Bones
(Anthropology, Forensic Science and Archaeology)

During the summer of 2010, the Baylor University Archaeological Field School completed its excavation activities at the Upper Sprague site. Ninety percent of the bone recovered was less than 5cm in length and the majority of the assemblage exhibited fresh break fractures. Curiosity compelled us to examine experimental studies (Madrigal and Holt 2002, Outram 2001, Church and Lyman 2003) on bone fracturing as well as to conduct experiments of our own. In an attempt to understand prehistoric bone processing for marrow and grease extraction, white-tailed deer metatarsals were broken apart using a hammerstone and anvil. The bone fragments and marrow were then placed in a pot of water heated to 212 ˚F using stones heated in a hearth. After an hour and a half of boiling, we found that lipids were no longer accumulating on the surface of the water. This paper presents the methods and results of our experiment.

Ashley Truitt
Faculty Mentor: Professor Carol Macaulay
An Analysis of Gastropods Recovered in Area D of the Upper Sprague Site, Hamilton County, Texas
(Anthropology, Forensic Science and Archaeology)

The objective of this study is to contribute information about terrestrial and aquatic snail taxa found in archeological sites in north-central Texas. Over the course of four years of excavations conducted by the Baylor University Archaeological Field School, nearly 5,000 snails have been recovered from Area D of the Upper Sprague site in Hamilton County. The snail assemblage was separated into six genera – Rabdotus, Polygyra, Oligyra, Praticolella, Anguipira and Planorbella, by unit and level. Information on the habitat and food preference of each taxon is listed. An analysis of the distribution and density of each genus across the excavation block by 10cm levels using ArcMap's Spatial Analyst is presented. These data contribute to our understanding of the microenvironment of the site's locale as well as propose questions concerning snail concentrations within an archaeological site.

Tabatha Nichols
Faculty Mentor: Professor Carol Macaulay
Revealing Microscopic Signatures of Fire-Cracked Rock
(Anthropology, Forensic Science and Archaeology)

Over the course of four field seasons at the Upper Sprague site (41HM54) in Hamilton County, the Baylor University Archaeological Field School exposed two basin-shaped hearths, associated fire-cracked rock scatters and clusters, and two mussel shell middens. To answer questions as to how the fire-cracked rock from these scatters and clusters were used, an experimental earth oven and stone boiling area were constructed. The objective of the experiment was to produce fire-cracked rock similar to those found at the site for comparative purposes. The experimental sample and the archaeological sample were analyzed microscopically. This paper presents the results of this experiment.

Grace Tuttle
Faculty Mentor: Professor Carol Macaulay
Feast or Famine: Mussel Exploitation at a Late Prehistoric Site in Hamilton County, Texas
(Anthropology, Forensic Science and Archaeology)

During the 2010 Baylor University Archaeological Field School at the Upper Sprague site (41HM54) in Hamilton County, a midden composed of mussel shell and fire-cracked rock was uncovered in the northwestern portion of Area D. This midden is located directly to the north of a basin-shaped hearth and encompassed six square meters. This presentation will describe the mussel species found within this feature, as well as present a dietary and nutritional analysis. Several theories will be presented to explain the importance of mussels in the diet of the hunters and gatherers who lived along the Leon River during the Late Prehistoric Period.

Chelsey Wasson and Melissa Windham
Faculty Mentor: Professor Carol Macaulay
Inventory of the Edible and Medicinal Plant Species of Hamilton County, Texas
(Anthropology, Forensic Science and Archaeology)

Along the Leon River in north-central Texas, many multi-component prehistoric sites have been recorded and documented. This brings to mind the question of what plants the prehistoric inhabitants of the Cross Timbers riparian and upland zones utilized. Although no floral remains have been recovered at the UpTaygen95

per Sprague site (41HM54) in Hamilton County, its prehistoric inhabitants exploited many species of native plants. This poster presents an inventory of the native flora of this region, as well as information on how these plants have been utilized for food and medicine by Native American groups. The Native American Ethnobotany Database from the University of Michigan was used to gather information about plant uses.

Department of Biology

Alexandria James
Faculty Mentor: Dr. Marty Harvill
Large Crawfish Algae Consumption vs. Small Crawfish Algae Consumption
(Biology)

The goal was to create an experiment that will discover whether a large or a small crawfish consumes more filamentous algae. One gram samples of filamentous algae were paired with each crawfish. The crawfish were separated according by mass into either large or small categories. Algae play a vital role in the ecosystem. Algae are at the base of the ecosystem and if there is an excess, an algal bloom occurs which causes contamination and pollution. Organic matter makes up a larger proportion of crawfish diets when compared to animal material (Soucek & Taylor, 2010). The experiment was done to see how much algae crawfish consume, and potentially what part they could play in controlling algal growth. Knowing this, one can determine what size crawfish consumes more algae. The results suggest that smaller crawfish consume more algae.

Alvarez, Frank; Cornejo, Chelsea M; Damoiseaux, Jolene S; Dossey, Josh; Drum, Bayless; Fashina, Funmibi; Howard, Catherine; Johnson, Rachel; Kang, Ki Eun; Kuhn, Jimmy; Meese, Anna; Nelson, Victoria; Nguyen, Kristie K; Orr, Andrew; Raley, Morgan A; Rosenthal, Elllie; Rosenthal, Meridith K.; Smith, Luke D; White Laura; Wilson, Alix; Yanney, Rayce D
Faculty Mentor: Dr. Bryan Gibbon and Dr. Tamarah Adair
Isolation and Characterization of Mycobacteriophages
(Biology)

Bacteriophages are a class of virus specific to bacteria, found in almost any environment, both inside and outside bacteria cells. Mycobacteriophages, in particular, are viruses whose host is one or more Mycobacterium species. They include both temperate and virulent types, and possess relatively small genomes with remarkably high levels of genetic diversity. Int his study, we report the isolation and characterization of 24 different mycobacteriophages found by Baylor University students in different geographic locations. Each bacteriophage culture underwent rigorous rounds of purification through titration and plaque screening on plates of infected *Mycobacterium smegmatis*. Following purification, the phages were characterized by isolating and purifying the DNA, as well as assessing the head and tail size via electron microscopy. The phage DNA was then restricted with five specific endonucleases and electrophoresed for comparison of its restriction map with those of other known mycobacteriophages and if possible assigned to a known cluster. Further research into the genomes of mycobacteriophages may lead to the development of new molecular tools for research or a vaccine or novel treatment again tuberculosis.

Alvarez, Frank; Cornejo, Chelsea; Damoiseaux, Jolene S; Dossey, Josh; Drum, Bayless; Fashina, Funmibi; Greenstein, S; Howard, Catherine M; Johnson, Rachel; Kang, Ki Eun; Kuhn, Jimmy; Meese, Anna; Nelson, Victoira; Nguyen, Kristie K; Orr, Andrew; Raley, Morgan A; Rosenthal, Ellie; Rosenthal, Meridith K; Sotelo, J.; Smith, Luke D, White, Laura; Wilson, Alix; Yanney, Rayce D
Faculty Mentor: Dr. Bryan Gibbon and Dr. Tamarah Adair
Genomic Characterization of Mycobacteriophage Benedict
(Biology)

Bacteriophages are a class of virus specific to bacteria, found in almost any environment, both inside and outside bacterial cells. Mycobacteriophages, in particular, are viruses whose host is one or more Mycobacterium species. They include both temperate and virulent types, and possess relatively small genomes with remarkably high levels of genetic diversity. In the fall of 2010, 24 Baylor Biology students isolated and characterized 24 uniques mycobacteriophages from soil samples. One phage was chosen for genomic sequencing (a turbid and haloed phage named Benedict). When the DNA sequence was returned, it was analyzed using the bioinformatic tools Glimmer, GeneMark, Apollo, BLAST, and Phamerator to define the potential genes and assign putative function. Benedict was shown to be of the morphotype Siphoviridae and of subcluster A5. This genome has defined physical ends, and possesses numerous novel genes. Here we report the genomic structure of this mycobacteriophage and describe the probable gene products. Further research into the genomes of bacteriophages may lead to the development of new therapeutics (in which phage could be used to kill specific disease-causing antibiotic-resistant bacteria), assist in finding new discoveries in genetics (such as using phage to move DNA around for cloning), as well as providing a useful tool for studying biodiversity and epidemiology.

Tarin Ahmed, Roshan Patel, Fiyan Abraham
Faculty Mentor: Dr. Marty Harvill
Algal Growth in the Lake Waco Wetlands
(Biology)

The purpose of this project was to determine the growth of algae in different parts of the Lake Waco Wetlands. The intention for this research was to determine if algae could reproduce greater in a specific part of the Wetlands or not. The preliminary experiment was to compare the algal growth in mediums from the first cell and the fifth cell of the Wetlands. The method used to establish this was obtaining water from these different cells in the Wetlands and placing a fixed amount of algae into containers of water from these cells for a four week period to determine which cell has a better growth in algae. After a four week period, the data collected concluded that algae did grow significantly more in the containers from the first cell. This ideal location where algae can grow the most successfully is the first cell of Lake Waco Wetlands.

Balpreet Pamma
Faculty Mentor: Dr. Tamarah Adair
The Effect of Blue Light on the Growth of *Staphlyococcus aureus*
(Biology)

The prevalence of antibiotic resistant bacteria has necessitated exploration of alternative approaches to treat infections. The aim of this study was to determine if blue light (470nm) would completely eradicate *Staphylococcus aureus*. First a cost efficient blue light box was developed to determine the effect of blue light on bacteria. *S. aureus* broth cultures of the reference strain ATCC® 2523 ™ and unique isolates from healthy carriers were exposed to 470 nm blue light using an LED light source at 120 mW/cm². The LED lights were positioned 5 mm above 500 ul of dilute cultures in BHI broth in a 24 well cell culture plate. Exposure times lasted 120 minutes and statistical differences were measured using colony counts. For all isolates tested, 97%-100% inhibition was observed. Further studies will test the effects of using blue light on cells grown in an artificial mucous medium, the differences between planktonic cells and biofilms, and potential resistant mechanisms. These results indicate that blue light is potential preventative treatment for *Staphylococcus aureus* infections.

Jessica Castrillon, Tiffany Goines & Hanna Wiswall
Faculty Mentor: Dr. Marty Harvill
Hypoxia in a Freshwater Ecosystem related to varying levels of nutrients
(Biology)

There is evidence that nutrient pollution and eutrophication of water result in hypoxia, with levels of dissolved oxygen below 2ppm. The goal of this preliminary study was to provide data on the maximum levels of nutrients that will result in positive effects on an environment that do not lead to hypoxia. This was tested by adding gradually increasing levels of fertilizer to six separate, identical microenvironments. Measures of carbon dioxide, dissolved oxygen, pH, and nitrate were taken weekly. The results demonstrated high levels of fertilizer cause dramatic fluctuations in DO, while even a relatively low level still leads to hypoxia. Future studies in this area are advised to use lower increments of fertilizer.

Cory Hanks
Faculty Mentor: Dr. Kenneth T. Wilkins
A Comparative Study of Wing Morphology and Echolocation Call Characteristics among Sympatric Bat Species in Sam Houston
(Biology)

Prescribed burn management can improve habitat conditions for certain forest-dwelling species (e.g., red-cockaded woodpecker). However, the effect of such management practices on the forest-dwelling bat community in southeastern piney forests is not well understood. Through comparative study of wing morphology, echolocation call characteristics, and the relationship between these two variables, we can better understand and address the limiting factors of interspecific resource partitioning in sympatric bats. We conducted our study in Sam Houston National Forest in eastern Texas, a large tract of mixed pine-hardwood forest that characterizes much of the southeastern United States. This forest comprises two districts: managed on western and unmanaged on eastern side of the forest. We expected bat communities of managed and unmanaged areas to be comprised of species displaying significantly diverse body size, aspect ratio, wing loading and ranges of call frequencies in correlation to the amount of vegetative clutter present. We netted bats by using triple-high nets. Bats were identified to species, and their age, sex, and reproductive status were recorded. We took digital pictures of the wings to determine wing parameters and recorded echolocation calls. We evaluated data for Seminole, evening, and big brown bats only as others had samples sizes less than 10 which did not allow us to draw any conclusions related to echolocation calls or wing morphology. MANOVA analysis showed that these three bat species differed significantly in respect to wing loading, mean characteristic frequency (MeanFc), and mean duration ($NumDF = 6$, $DenDF = 52$, $P < 0.0001$).

Frany Dadhania, Josh Fernelius & Sammy Raad
Faculty Mentor: Dr. Marty Harvill
Fire Ants: Enchance Soil Nitrate Levels?
(Biology)

Fire ants have invaded ecosystems and may have a profound impact on soil nutrients and plant growth (Lafleur, 2005). This preliminary experiment was designed to test whether the fire ants have beneficial effect on soil nitrate level in Lake Waco Wetlands. The hypothesis that the fire ant population increases the soil nitrate level was accepted. The results demonstrated that the soil taken from ant piles has a higher level of nitrate ions than the control soil samples (taken 1 meter away from ant piles).

Dan Daugherty, Ellie Powell & Keith O' Dwyer
Faculty Mentor: Dr. Marty Harvill
Conductivity Study through Cells of the Lake Waco Wetlands
(Biology)

The Waco Wetlands was established in 2001 as a habitat mitigation project and as a result of the Lake Waco Pool Rise ("Functions of a Wetland" par. 4). Since its creation, a great collection of microorganisms, insects, amphibians, reptiles, mammals and wide variety of plants have inhabited wetlands. An added benefit of the wetlands is the cleaning of water by plants living inside the environment. Wetlands cleanse water better than that of other natural systems ("Water-Cleaning" par. 5). A measure of the cleaning efficiency and overall health of an aquatic environment is conductivity. Samples are run with a low electric current. The conductivity of the water increases as the Total Dissolved Solids (TDS) increases. TDS is a term describing inorganic salts and small amounts of organic matter ("Total Dissolved Solids" 1). An environment that is efficiently cleaning water will be lowering the TDS. The design for our experiment dispersed 15 markers throughout the five cells of the Waco Wetlands. Once every week for four weeks the conductivity was measured at these markers with a conductivity probe. Our hypothesis established that if the wetlands were indeed cleaning the wetlands, lower conductivity should be measured the further away from the original inflow. Results of the experiment revealed a general trend that indicated the wetlands were cleaning the water.

Ashley Eisele & Erica Nichols
Faculty Mentor: Dr. Marty Harvill
Lethal Doses of Fluoride in Shrimp
(Biology)

The objective of this experiment was to determine the lethal dose (LD) of fluoride in the Waco Wetland Palaemonetes paludosis (grass shrimp) population. This level of fluoride was found by way of gradually increasing fluoride concentrations within the habitat water. To determine the LD of fluoride in the specified shrimp population, shrimp were divided into 3 identical trials. Dosage was increased by 0.01 mg/L twice a week for each container, with the exception of the controls. Results indicated some statistical evidence of negative effects of fluoride on the survival of shrimp but required additional studies to establish a positive trend. The positive correlation confirmed research on the issue that discussed the neurotoxic effects of the chemical on larger organisms (Mullenix, Phyllis). Therefore, it can be said conclusively that the species Palaemonetes paludosis, although resilient in nature, is subject to similar chemical risks and indicates a fatal reaction to fluoride specifically.

Amanda Flynn, David Garcia, & Bekah Hernandez
Faculty Mentor: Dr. Marty Harvill
Nitrate Absorption between Pickerel Weed (Pontederia cordata) and Duck Potato (Sagittaria latifolia) in the Lake Waco Wetlands
(Biology)

Two common plants to the Lake Waco Wetlands are Pickerel Weed and Duck Potato. This preliminary experiment was performed to determine which plant absorbs more nitrates. Our hypothesis is that, due to its size and structure, pickerel weed would be the more efficient of the two plants. The results show that pickerel weed consistently absorbed the most nitrates.

Bradley Scott Gary, Juliet Garcia, & Erin Hall
Faculty Mentor: Dr. Marty Harvill
Effects of 17-B Estradiol on Male Crawfish Aggression
(Biology)

As the findings of Depledge and Billinghurst (1999) stated, increased estrogen levels in aquatic environments have caused morphological changes and endocrine disruption in several species of fish. Pintor et. al. (2008) noted that behavioral aggression changes of male crayfish were evaluated due to their extremely aggressive nature. By exposing a group of male crayfish to estradiol, the main component of the female hormone estrogen, increased levels of aggression were observed in this research.

Suzie Jacob, Dalia Jawad, & Sindhuja Ram
Faculty Mentor: Dr. Marty Harvill
Nitrate Comparisons between Typha Domingensis and Schoenoplectus
(Biology)

The purpose of this research was to compare the nitrate removal in Typha domingensis (cattail) and Schoenoplectus californicus (bulrush) from the Lake Waco Wetlands. This experiment was based on nitrate removal in the water of Lake Waco Wetlands, in Waco, Texas. The experiment design included the setup of twelve containers containing wetland sediment and water with two Cattails and one Bulrush that were relatively the same weight to compare their efficiency in removing the nitrogen from the water over a four week period. Two different amounts of nitrogen were added to saturate the water as a method to standardize the high and low range of nitrate. The HACH DR/890 Colorimeter was used to test the nitrate levels, in Cattail and Bulrush. In the duplicated containers it was found to have an increase of nitrate removal in the cattail plants as compared to the bulrush. The difference in removal of nitrogen between cattails and bulrush was not enough to sustain the hypothesis. However, due to the statistical evidence of the change in weight, the data supports the hypothesis that cattails removed more nitrogen than bulrush.

Kayla Fricke
Faculty Mentor: Dr. Tamarah Adair
Variation in Biofilm Formation in *Staphylococcus aureus*
(Biology)

This experiment has two main objectives: 1) to develop and optimize the microtiter assay method to measure biofilm formation for *Staphylococcus aureus* and 2) to measure the effects of blue light on biofilm formation. The formation of biofilm complicates the treatment of *Staphylococcus aureus* infections because antibiotics are unable to penetrate the cells. The use of blue light is being investigated as an alternative treatment to the use of antibiotics, and has been shown to be effective against *Staphylococcus aureus* in planktonic cultures. This experiment begins by measuring the variance in biofilm formation in assorted *Staphylococcus aureus* strains that were isolated from healthy carriers. Cultures were grown for 48 hours in a sterile 24-well microtiter plate. The plates were then washed with deionized water followed by an ethanol fixation step, stained for 10 minutes with crystal violet, and solubilized with acetic acid. The amount of biofilm was measured at an absorbance of 540 nm on the Biotek Microtiter Plate Reader. Initial results reveal that biofilm formation varies among strains, with a range between 0.66 and 1.54 optical densities. Future study will test the effect of blue light on the formation of these biofilms. If blue light inhibits biofilm formation in *Staphylococcus aureus*, then this has the potential to serve as an alternative treatment or as a preventative in a clinical setting.

Aman (Amy) Kaur, Melissa Hahn, & Jade Webb
Faculty Mentor: Dr. Marty Harvill

The Effects of Wetland Soil on Bulrush Plant Growth

(Biology)

1. Background and Rationale:

The research that needs to be completed in order to carry out this experiment is investigating the different nutrients (nitrogen and phosphorous), species, and vegetation that grow in the different 3 sample soils. Information about the growth of Bulrush, such as the best environment for its survival, also needs to be gathered.

2. Specific Objectives:

We are attempting to discover which soil in the wetlands supports the greatest amount of growth in Bulrush plants.

3. Potential Significance:

Elements in the soil benefit plant life, which in turn benefit the wetlands. Identification of these elements (nitrogen and phosphorous) in the soil will reflect how well the wetlands clean the water.

4. Plan of Work (procedures and methods). Please include a brief project timeline:

We will begin with researching information about the different elements that will be utilized in our project, such as the different soil types and Bulrush plants. An experiment with a hypothesis and procedure will be created before the actual experiment is conducted. Once all the prepatory work is completed, our next task would be to purchase any materials that will be needed. The experiment will then be conducted in the Waco wetlands. Prior to the experiment, 3 of the soil samples collected will be sent off to the Texas A&M Testing Laboratory to check for nitrogen and phosphorus content. There will be 9 buckets with 3 buckets that have the same type of soil. The 9 buckets will be placed into a single mesocosom filled with Lake Waco Water. Five holes will be drilled in the bucket so the water can seep through. After the Experiment is completed, the soil samples will be sent to the lab once again to see if any of the nitrogen and phosphorous levels changed. The growth of the Bulrush will be recorded twice a week on Sunday and Monday. The experiment will last for 4 weeks in total. The growth (height) of Bulrush will be the variable that we will measure (m) and graph in relation to the different types of soil (wetland pond soil, shore soil, and land soil). The soil samples will be sent off to a lab to get tested for phosphorus and nitrogen before and after the experiment is conducted. Once all the data is acquired, the information will be presented visually on a display board. The board will consist of the hypothesis, procedure, data, conclusion and any other graphs or charts we may decide to include.

5. Specific Role of Undergraduate Researcher(s):

By working together, we will develop a detailed outline of the experiment parameters. These parameters consist of independent variables, dependent variables, and constants, which will then lead us to the production of the hypothesis and procedure for our research project. As a group, we will purchase the necessary materials (staying within our set budget). The soil samples will be collected from three different locations in the wetlands before we conduct the experiment, and the samples will be sent to a group of scientists to decipher the nutrient content (nitrogen and phosphorous). We will transplant the same amount of Bulrush into each soil. Specific dates will be set aside for each of us to travel to the wetlands and collect data for our experiment. The group plans on going to the wetlands 2 times a week; once with the class on Wednesday and once alone on Sunday.

6. Plans for Publication/Dissemination of Project Results:

We hope to present our research project at the Scholars Program in 2011.

Jason Lambert, Kelley Keiser, & Steven Hughes
Faculty Mentor: Dr. Marty Harvill
Lead Accumulation in Crayfish at the Lake Waco Wetlands
(Biology)

The goal of this project was to compare lead accumulation in tissues of crayfish within the Lake Waco Wetlands. Crayfish1, as well as plants2, have shown to accumulate lead within their tissues. Crayfish were captured, kept in cages for 4 weeks, had their tail tissues extracted, and sent to a lab for analysis. The results showed that there was lead in the tissues, but there was no statistical difference from cell to cell, a cell here being a part of the wetlands. However, this does not prove nor disprove the hypothesis. This preliminary trial was successful, but more trials and larger samples are needed to accurately compare cell to cell accumulation of lead.

Laura Beard
Faculty Mentor: Dr. Kenneth T. Wilkins
Multiple captures of pygmy mice and harvest mice: evidence for social traveling?
(Biology)

Multiple captures of small mammals (finding >1 animal in a single trap) are often used to infer pair-bonding activity in arvicoline and cricetine rodents. We analyzed captures of fulvous harvest mice (Reithrodontomys fulvescens) and northern pygmy mice (Baiomys Taylori) from a 2-year trapping study to test the hypothesis that these species form heterosexual, long-term pair bonds. A significant majority of multiple capture events (MCEs) in R. Fulvescens were heterosexual, which is consistent with reproductive co-travelling. Sex composition of pairs in B. Taylori did not differ from random. Multiple capture frequency was not associated with season in either species, but was significantly correlated with density in both species. Density dependence was stronger in B. Taylori than R. Fulvescens. Masses of singly-captured and multiply-captured individuals were not significantly different in either species, contraindicating but not ruling out trap bias. Only 1 co-captured heterosexual pair was recaptured as a pair (in R. Fulvescens) and several animals of both sexes in both species were co-captured with multiple individuals. We concluded (1) that R. Fulvescens co-travels with mates for short periods of time but that the lengths of such associations are highly plastic, and (2) that multiple captures of B. Taylori can be explained by a socially null model.

Amy Liu & Melanie Walker
Faculty Mentor: Dr. Kevin Gutzwiller
Brown-headed Cowbirds are associated more with the edge density within a small extent than with edge density within a large extent
(Biology)

The Brown-headed Cowbird (Molothrus ater) parasitizes nests near vegetation edges in agricultural and woodland landscapes. Brown-headed Cowbirds are a conservation concern due to their potential influence on the reproductive success of other bird species. We hypothesized that cowbird presence was more associated with woodland edge density than with the density of other edge types, and that cowbird presence was more related to edge density within a small spatial extent than within a large extent. We studied birds at 75 study sites in the Oaks and Prairies region of Texas during the middle of the cowbird breeding season. We used logistic regression to relate cowbird presence to edge density for four cover types (woodland, grassland, agriculture, and developed area) within a small extent (1.8 km radius) and within a large extent (24.1 km radius). The densities of agricultural edge and woodland edge within the small extent were positively related to cowbird presence; woodland edge density appeared to have a slightly greater influence than did agricultural edge density. Edge density variables measured at the large extent were not related to cowbird presence. Our results suggest that woodland and agricultural edges have greater influences on cowbird presence than do grassland and development edges, and that density of woodland and agricultural edges within smaller extents have greater influence on cowbird presence than do densities of these edge types within large extents. Conservationists should be cognizant that different edge types, and edge densities within multiple spatial extents, may have different relative influences on cowbird presence.

Lucy Xu
Faculty Mentor: Dr. Diane Hartman
Gram-Negative Flora of Aquatic Turtle Habitat
(Biology)

Turtles can be carriers of bacteria of the genus Salmonella and studies have documented Salmonella shedding in many captive populations. Because turtles are closely associated with their natural environment, water samples were collected from different sites to determine the prevalence rate of Salmonella. Dilutions of 0.1mL, 0.2mL, 0.3mL were inoculated on the Salmonella/Shigella (SS) agar, spread with a glass hockey stick, and then incubated at 35 degrees Celsius for 24 hours. Colony forming unites were calculated. Colonies were sorted by hydrogen sulfide producers (black), inability to ferment lactose (tan) and lactose fermenters (pink). The results from the Waco creek sites reflected higher bacterial numbers at site 1 and 5, and lower numbers at site 3 and 4. In all samples the predominant group was nonfermenters of lactose including organisms such as Pseudomonas aeruginasa. Hydrogen sulfide producers were isolated from all sites of Waco creek. Only 1 isolate was identified as a Salmonella organism with the majority of hydrogen sulfide producers being Citrobacter freundil, proteus vulgaris, and Proteus mirabilis. The artificial pond at the wetlands was constructed from August to October and contained no vegetation or turtles yet. Wetlands water was used to fill the sump and comparable, higher bacterial numbers were found in these sites. When the pump is operational, water will move from the pond to the gravel pit for filtration, then to the sump, and back to the pond. Future studies will sample the artificial pond compartments after turtles and vegetation are added.

Rashmi Krishnappa & Robert Hausler
Faculty Mentor: Dr. Marty Harvill
Competition between Algae and Bulrush
(Biology)

The objective of this experiment is to study the effects of competition on the biomass of green algae and bulrush. The experiment will be composed of three concurrent trials over a three week period. Each trial will contain three mesocosms with water from cell one. Mesocosm one will contain 10 grams of green algae and mesocosm two will contain 100 grams of bulrush. Mesocosm three will contain 10 grams of algae and 100 grams of bulrush. Due to the larger size of bulrush and the larger density of algae we are using one-tenth the amount of algae. Mesocosm's one and two will be controls. The bulrush and algae from mesocosm three will be compared to the correlating controls to determine the final growth results. After the data has been collected from each trial they will be averaged together to see the overall change in growth. A study between green algae and aquatic weeds in limited nitrogen has shown an inhibition of phytoplankton by aquatic weeds because of competition (Fitzgerald). Speculation has been made as to whether this was caused by nutritional or antibiotic factors. Based on this study our research should yield results favoring the bulrush.

Rafael Deliz-Aguirre
Faculty Mentor: Dr. Bessie W. Kebaara
Copper Tolerance of Nonsense-Mediated mRNA Decay mutants in *Saccharomyces cerevisiae*
(Biology)

The nonsense-mediated mRNA decay (NMD) pathway, present in most eukaryotic cells, is a specialized pathway that leads to the recognition and rapid degradation of mRNAs with premature termination codons, and some natural mRNAs. Natural mRNAs with atypically long 3'-UTRs are degraded by NMD in *Saccharomyces cerevisiae*. A number of *S. Cerevisiae* mRNAs undergo alternative 3′-end processing producing mRNA isoforms that differ in the length of their 3′-untranslated regions (UTRs). Some of these alternatively processed mRNA isoforms have atypically long 3'-UTRs and would be likely targets for NMD-mediated degradation. Here we investigated the role NMD plays in regulation of expression of *CTR2*, which encodes a vacuolar membrane copper transporter. *CTR2* pre-mRNA undergoes alternative 3'-end processing, producing two mRNA isoforms with atypically long 300 nt and 2 kb 3'-UTRs. We show that the accumulation of the longer *CTR2* mRNA isoform is regulated in an NMD dependent manner. The regulation of *CTR2* mRNA by NMD has physiological consequences since *nmd* mutants are more tolerant to toxic levels of copper, relative to wild-type yeast cells and the copper tolerance of *nmd* mutants is dependent on CTR2.

Katia Palza
Faculty Mentor: Dr. Owen Lind
The effects of different nitrogen forms on the growth of the nitrogen-fixing and toxic cyanobacterium, *Cylindrospermopsis raciborskii*
(Biology)

To answer the question "what are the effects of different nitrogen forms on the growth of the nitrogen-fixing and toxic cyanobacterium, *Cylindrospermopsis raciborskii*?", I tested the hypothesis that given equal concentations of nitrogen, population growth based on ammonium chloride and sodium nitrate nitrogen is equal.

Five dilutions of BG-11 media (=250 mg N l-1) for each nitrogen source were inoculated with *C. raciborskii* (five replicates for each dilution). Growth, as chlorophyll fluorescence, of the *C. raciborskii* was measured weekly for five weeks. Growth in the presence of nitrate-nitrogen was significantly ($p < 0.05$) greater than with ammonium-nitrogen. However, growth was not proportional to nitrogen concentration. I propose that this lack of direct response was caused by nitrogen-fixation in the cultures that compensated.

Suk Namkung
Faculty Mentor: Dr. Tamarah Adair
Phage K infectivity of Staphylococcus aureus isolated from healthy carriers
(Biology)

Antibiotic resistance in *Staphylococcus aureus* has increased in the past decade and bacteriophage therapy has been introduced as a possible alternative treatment. With the introduction of phage therapy it is essential to test phage infectivity in different strains of *S.aureus*. This experiment tested the infectivity of bacteriophage K, a well-studied phage in the Myoviridae family reported to be active against a wide range of Staphylococci. *S. aureus* isolates were collected from the anterior nares of healthy carriers at Baylor University. *S. aureus* broth cultures were grown overnight, mixed with top agar, and transferred to 24 well plates containing an agar base. Phage K solution was then spotted on top of the *S.aureus* bacterial lawn and incubated overnight. Lysis was observed in approximately 50% of all strains. These results demonstrate that phage therapy against *S. aureus* via Phage K will not provide a definitive cure. The lysis of many strains of *S.aureus* by Phage K, however, indicates that there is potential for bacteriophage therapy, but a better understanding of the mechanism of resistance is needed.

Suk Namkung
Faculty Mentor: Dr. Patrick Danley
Common Ancestry or Convergent Evolution? Evolution of Diversity in New and Old World Genera of Band-Winged Grasshoppers
(Biology)

In nature similar morphologies are often observed in organisms distributed in different geographical regions. These similarities can be the result of either common ancestry, or convergent evolution, indicating the operation of similar selective pressures acting on distantly related groups. Band-winged grasshoppers represent an ideal model system for the study of such pattern of similarity. The group has a cosmopolitan distribution, is species rich and displays comparably little morphological variation throughout its range, except in wing morphology. The Palaeartic genus *Sphingonotus* and Nearctic genus *Trimerotropis* share a narrow wing morphology whereas the Palaearctic genus *Bryodema* and the Nearctic genus *Circotettix* share a broad wing shape. Given the observed morphological similarities and biogeographic distributions, two alternative hypotheses concerning their relationships can be constructed: 1) Genera that share a similar wing morphologies are closely related but span the Palae- and Nearctic ecozones, or 2) genera may be united by their geographic distribution such that broad and narrow wings are found in both the Paleactic and Nearctic clades and similar wing morphologies are a product of convergent evolution. In my study I sequenced 2 mitochondrial (COI and ND5) and 2 nuclear (ITS2 and H3) gene fragments in order to reconstruct the phylogenetic relationships of the studied genera. My results indicate the presence of 3 distinct clades: *Circotettix* and *Trimerotropis* represent a Nearctic clade, while *Bryodema* and *Sphingonotus* form two distinct Paleactic lineages. These findings indicate that the observed morphological similarity between Nearctic and Palaeartic genera of Oedipodinae grasshoppers is due to convergent evolution.

Taylor Kohn
Faculty Mentor: Dr. William Hillis
Atrial Natriuretic Effect Inhibits the Production of Aldosterone in Rat Adrenal Gland Explants Cultured In Vitro
(Biology)

The hormone aldosterone is produced by the adrenal cortex and functions in sodium retention in the kidney. Sodium retention is linked to water retention which affects blood pressure, among other things. An excess of aldosterone leads to the clinical manifestation of Conn's Syndrome, a cause of secondary hypertension. Atrial natriuretic peptide (ANP) is a protein produced in the atria of the heart in response to chamber distension and functions in sodium excretion, followed by water excretion. In an effort to understand more clearly the control mechanisms of aldosterone production, cultures of rat adrenal cells affixed to a collagen matrix were grown and exposed to varying concentrations of ANP. Aldosterone levels were measured by an ELISA technique after 24 and 48 hours' growth, with ANP administered to the variable group after 24 hours at concentrations of 240 pg/mL and 480 pg/mL. The samples taken after 48 hours were compared to the samples taken after 24 hours, to determine a percent decrease of aldosterone production. At a concentration of 240 pg/mL of ANP, a decrease in aldosterone production of 17.4% was found in the control group versus a decrease of 25.3% in the variable group containing ANP ($p = NS$). However, when the concentration of ANP was increased to 480 pg/mL, the variable group decreased 54.3% compared to a 35.2% decreased in the control ($p = <0.0005$). By comparing the percent decrease of aldosterone production, a dose-responsive curve became apparent.

Tiffany Goines
Faculty Mentor: Dr. Diane Hartman
Prevalence of Carriage Rates of Methicillin-Resistant Staphylococcus aureus Among Undergraduate Students
(Biology)

The purpose of this experiment was to investigate the prevalence of Methicillin-Resistant Staphylococcus aureus (MRSA) carried in the nasal passages of students. This bacterium is commonly found on the skin and nasal passages in healthy humans. A recent study found that MRSA cases have tripled in the United States between the years of 2000 and 2005, and an estimated 94,360 people are infected and 18,650 die annually, killing more people annually than HIV. This important information is imperative for not only students, but to the rest of the community. This strain of bacteria is contagious, as it is primarily a skin infection. Students used a sterile swab to sample each nostril. Next, we inoculated Mannitol Salt Agar and looked for evidence of fermentation after 24 hour incubation at 35° Celsius. in which Staphylococcus aureus will ferment. The Gram stain identified isolates that wer gram positive and cocci. Hydrogen peroxide was used to identify catalase positive isolates. The last test to confirm that we have a Staphylococcus.aureus was the coagulase test, in which it will test positive due to the protein conversion that enables the conversion of fibrinogen to fibrin. Using the Kirby Bauer method, we were able to distinguish Methicillin-Sensitive Staphylococcus aureus (MSSA) from MRSA. The antibiotics we tested: penicillin, neomycin, oxacillin, rifampin, nitrofurantoin, amikacin, gentamicin, erythromycin, clindamycin, ciprofloxacin, doxycycline, trimethoprim, and sulfa. The conclusion that was reached due to experimental and statistical analysis performed indicates that there is a 1.0% prevalence of Methicillin-Resistant Staphylococcus aureus on campus. This is within the range reported by the CDC of 1-3% of MRSA carriage rates. 20% of the undergraduate student population was found to carry MSSA. This is also within the range reported by the CDC of 20-30%. None of the responses on the survey were correlated in that there was an increased incidence of MSSA or MRSA as compare to the non-carrier population.

Carlo Manzana
Faculty Mentor: Dr. Tamarah Adair
Correlation between *Staphylococcus aureus* Prophage Integrase Genes and Resistance Patterns
(Biology)

Staphylococcus aureus harbors various prophages within its chromosome. Understanding the characteristics of these prophages may help in understanding the differences in *S. aureus* resistance patterns. This experiment looked to identify the integrase gene of *Siphoviridae* bacteriophages in 20 different *S. aureus* isolates and correlated the data with the isolates' resistance patterns. The *S. aureus* isolates were obtained from the anterior nares of healthy carriers. The resistance patterns were determined by Kirby-Bauer disc diffusion and a Phage K lysis assay. DNA from both MRSA and MSSA was extracted and analyzed using PCR to categorize the integrase gene. Seven different integrase types for *Siphoviridae* are known and were modeled to classify the isolates in this experiment. After identifying the integrase gene, the data was compared to the resistance patterns of the isolate to determine if any correlations existed. So far, no significant connection between integrase and resistance has been found. Further isolates will be tested to increase the sample size. The ability to de-integrate the prophage from its host isolate is significant in treatment of Staph infections, as induced prophages have been known to lyse their parent isolate. Identifying the induced prophages' host range and correlating it with the integrase gene type is a possible future research study that could aid in the development of novel bacteriophage treatment options.

Bianca Guerrero
Faculty Mentor: Dr. Diane Hartman
Determining *Staphylococcus aureus* carriage rate in Baylor University Staff and Faculty
(Biology)

The purpose of this research was to determine the carriage rate of Methicillin Sensitive *Staphyloccocus aureus* (MSSA) and Methicillin Resistant *Staphylococcus aureus* (MRSA) in the faculty and staff of Baylor University. Each subject completed a 1 page lifestyle survey. Questions included age, sex, ethnicity, presence of children in the household, pet ownership, history of smoking, use of public workout facilities/showers, travel, participation in sports, recent infections and antibiotic use, and MRSA incidence in subject or family members. Students assisted with collecting 102 nasal swabs. Swabs were transferred to Mannitol Salt Agar (MSA). Isolated mannitol fermenting colonies were transferred to Tryptic Soy Agar (TSA) plates. After 24 hours of incubation, these samples were gram stained, tested for catalase activity, and inoculated into coagulase plasma. All catalse positive, coagulase positive, and gram positive cocci cultures were identified as *Staphylococcus aureus*. The Kirby-Bauer method was used to determine antibiotic sensitivity patterns for each *S. aureus* isolate. Of the faculty and staff participants, 23 carried MSSA and 1 carried MRSA. These values are in line with those reported by the Centers for Disease Control (CDC) for nasal carriage rates of MSSA and MRSA: 25-35% MSSA carriage and 1-2% MRSA carriage. Only 1 person carried MRSA and there were no unique attributes. Previously reported risk factors include: previous infection with MRSA, family members diagnosed with MRSA, recent hospitalization, contact with children, participation in contact sports. Surveys of MSSA carriers were evaluated. There was no statistically significant difference in any survey parameter between MSSA and MRSA compared to the non-carrier populations.

Alexeis Baqui
Faculty Mentor: Dr. Diane Hartman
The Microbes in the Marsh: A quantitative analysis of bacteria presence in a wetlands environment
(Biology)

Microorganisms, their composition, and role are important to the full understanding of various environments. There is generally more research pertaining to bacteria in human pathogenesis than studies of environmental bacteria. This study calculates and classifies the average gram positive halophiles and average gram negative organisms of varying sites in water environments. Water samples are collected from two main locations: a creek containing water from the Brazos River, and areas in the Lake Waco Wetlands. Gram positive halophiles are selected using Mannitol Salt Agar (MSA), gram negative organisms are selected using MacConkey's Agar (MAC), and total data are collected from both gram positive and gram negative organisms using Tryptic Soy Agar (TSA). Gram positive halophiles ranged from 10 CFU/ml to 717 CFU/ml, Gram negative organisms ranged from 196 CFU/ml to 3047 CFU/ml, and total bacteria colony counts from TSA ranged from 530 to 4700 CFU/ml. Isolates from samples are classified into genus and species using biochemical assays listed in the materials and methods.

Department of Chemistry and Biochemistry

Ashleigh Locke
Faculty Mentor: Dr. Kevin G. Pinney
Inhibitors of Cathepsin L as Potential Anti-Metastatic Agents in the Treatment of Cancer
(Chemistry & Biochemistry)

The propensity of certain types of cancer to spread from a primary tumor to separate and distinct locations in the body (a process known as metastasis) remains a major problem in successful patient treatment and disease outcome. Cathepsin L is a cysteine protease that is up-regulated in some tumors and plays a key role in cancer cell migration and invasion, in part. Our hypothesis is that potent, bioavailable inhibitors of cathepsin L will inhibit cancer metastasis. To date, there has been no clinical evaluation in humans of a cathepsin L inhibitor against cancer. Recent studies in our laboratory have identified several series of thiosemicarbazone-based, small-molecule inhibitors of cathepsin L. These molecules include a wide variety of functionalized benzophenone thiosemicarbazone analogs along with related aromatic and heteroaromatic derivatives. Current studies focus on the synthesis of new molecular templates, such as thiochroman, tetrahydronaphthalene, and related fused ring systems along with selected chemical modifications of the thiosemicarbazone moiety, in an effort to identify improved small-molecule inhibitors of cathepsin L. Details regarding molecular design, chemical synthesis, and biochemical evaluation against cathepsins L and B will be presented.

Melinda Soeung
Faculty Mentor: Dr. Mary Lynn Trawick
Structure-Activity Relationship of Novel Low Nanomolar Thiosemicarbazone Inhibitors of Cruzain
(Chemistry & Biochemistry)

Annually, around 16 to 18 million people in Latin America acquire Chagas' disease, and approximately 200,000 of these infections are fatal. Chagas' disease is caused by a flagellate protozoan known as Trypanosoma cruzi and is the leading cause of heart disease in Latin America. Currently, there is no cure for Chagas' disease, and the medications that do exist tend to be highly toxic and overall ineffective after the initial infection has been established. Research has shown that cruzipain, a protease that is essential for the parasite's survival and a member of the papain family of cysteine proteases, is a validated target for potential therapeutic drugs. A microplate reader was used to perform fluorometric assays. The release of 7-amino-4-methylcoumarin from a fluorogenic substrate was monitored in a 96-well plate format to determine the concentration of compound that would inhibit the enzyme reaction 50% (IC50 value). A library of substituted monobromo-benzophenone thiosemicarbazones that had produced a number of effective inhibitors of the cysteine protease cathepsin L (Kumar et al., Bioorg. Med. Chem. Lett., 2010, 20; 6610-6615) was tested against cruzain, a recombinant form of the target protease. Several of these analogs demonstrated low nanomolar IC50 values against cruzain. One compound, in particular, showed great promise with an IC50 value of less than 15 nM. The 3,3'-dibromobenzophenone thiosemicarbazone, previously shown to be an effective inhibitor of cruzain, was used as a reference for these experiments (Siles, R. et al., Bioorg. Med. Chem. Lett., 2006, 16; 4405-4409).

Lindsey Snyder and Victoria Soeung
Faculty Mentor: Dr. Mary Lynn Trawick
Fluorometric Analysis of Novel Thiosemicarbazone Inhibitors of Cathepsin B
(Chemistry & Biochemistry)

Cathepsin B belongs to a group of lysosomal cysteine proteases which are characterized by a catalytic cysteine residue at their active sites. Acting as a multifunctional enzyme, cathepsin B is involved in several cellular processes including protein turnover and tumor progression. Cathepsin B is an attractive anti-cancer target since it has shown to be over-expressed in numerous cancers and in tumor cells. The protease's primary mechanism of action involves its ability to degrade the cell's extracellular matrix (ECM). The remodeled ECM permits the migration of cancer cells. The resulting cancer cell proliferation stimulates the formation of tumors and promotes the process of angiogenesis. Because it is known that a positive correlation exists between cathepsin B activity and cancer metastasis, a novel inhibitor of this protease could potentially impede the development and the spread of cancerous cells. Generally, inhibition of cysteine proteases involves a chemical warhead that can react with the enzyme's catalytic thiol group. This study proposed that within a specified library of thiosemicarbazone (TSC) compounds (Kumar et al., Bioorg. Med. Chem. Lett., 2010, 20 (22); 6610-6615), an effective inhibitor of cathepsin B exists which exhibits low toxicity. In order to determine the efficacy of the inhibitory effects, the concentration of the tested TSC compounds that would produce 50% inhibition of the cathepsin B reaction (IC50 value) through the use of a fluorometric microplate assay were analyzed. By studying the cysteine proteases involved in the process of tumorigenesis, a therapeutic drug may be found that targets and inhibits these enzymes.

Peter Vednor
Faculty Mentor: Dr. Charles Garner
Azulene-containing polysiloxanes for capillary gas chromatography stationary phases
(Chemistry & Biochemistry)

Azulenes are fascinating fused bicyclic aromatic molecules, being both intensely colored and also far more polar than hydrocarbons typically are. We had previously observed that azulenes are much more strongly retained during capillary gas chromatography (GC) analyses than are other hydrocarbons of comparable molecular weights. This is at least partly due to the remarkably large (0.8 Debye) dipole moment azulene exhibits, equivalent to that of HBr. We reasoned that if azulene is retained on a methylsiloxane phase, an azulene-containing stationary phase would exhibit more retention for other molecules than current alkyl or alkyl/aryl siloxanes do. Better selectivity for various analyses might be obtained this way, but azulenes have never been employed in GC stationary phases. We attempted to prepare polysiloxanes with specific azulene contents (5% and 35%) for direct comparison to the corresponding phenyl phases which are commercially available. We used a platinum-catalyzed hydrosilation reaction to attach the azulenes. However, the azulene component appeared to "poison" the catalyst and prevented the hydrosilation reaction. We were able to demonstrate that azulenes poison even unrelated hydrosilation reactions. Approaches to circumvent this difficulty are under study.

Department of Classics

Danielle Washington
Faculty Mentor: Dr. Brent Froberg
Hawthorne and his Chimera: Reading, Imagination and Retelling of Classical Myth
(Classics)

In an attempt to rescue children's literature from the bore that it had become, Nathanial Hawthorne wrote *A Wonder Book* for children. His *Wonder Book* is a compilation of myths which Hawthorne strategically retells in order to encourage simple, yet sublime imagination. The last of the myths which he retells is that of Bellerephon and the Chimera.

This paper compares Hawthorne's retelling of the myth of Bellerophon and the Chimera with an original account of the myth found in Book six of Homer's *Iliad*. In the *Iliad*, Glaucus tells the story of his lineage to Diomedes on the battlefield. Glaucus emphasizes the brief passage of generations before relating his story, but Hawthorne demonstrates that such tales, not confined to their original forms, have the power to endure forever through belief and imagination. My purpose is to show that Hawthorne has turned the myth of the chimera into an allegory for the way literature should be approached and read.

Hawthorne deviates from the original accounts in order to demonstrate the power of myth to transcend time and reach a hybrid of reality and imagination. The central theme of Hawthorne's version is belief and each of his characters demonstrates different stages of belief. However, the story as a whole emphasizes the importance of having a simple, child-like faith while reading literature.

Caroline Barta
Faculty Mentor: Dr. Jeffrey Fish
"Recalling *Repetentia Nostri* in *De Rerum Natura* 3"
(Classics)

In *De Rerum Natura* 3, Lucretius adds another layer to an age-old philosophical dilemma by combining the certainty of palingenesis, or reincarnation, with the problem of identity. Lucretius posits the following scenario: suppose the atoms that currently comprise you are reassembled five hundred years from now—at that time, will you *qua* you have returned to life? Rather surprisingly given his materialistic viewpoint, Lucretius replies in the negative, stating the self is lost because the *repetentia nostri* (the recollection of ourselves) is broken.

To explain this apparent paradox, this paper suggests that *repetentia nostri* should not be viewed as merely either a criterion for identity or another proof against the fear of death; rather, this memory of self defines positively the worth of having a particular identity. Thus, this paper contends that Lucretius' use of *repetentia nostri* points to a facet of Epicurean life rarely considered in this context: the importance placed by the Epicureans on expressing gratitude (*gratia*) for life.

In order to make this claim, a brief consideration of the philosophical problem of identity will be outlined. After this introduction, the section introducing the palingenesis scernario will be explicated (*DRN* 3.843-3.861) in light of the rebuke by the personified *Natura* (*DRN* 3.928-974).

By considering the concept of *repetentia nostri* alongside the focus upon *gratia* for the gift of life, the connection of these two deeply Epicurean terms becomes the means to a subtler understanding of the Epicurean conception of a virtuous life.

Stephen Margheim
Faculty Mentor: Dr. Alden Smith
The Rhetoric of Response: Agamemnon's Response to Achilles in *Iliad* 1
(Classics)

In this presentation, I analyze how Agamemnon "answered" Achilles' threat in Book One of the *Iliad*. Such close analysis reveals how Agamemnon uses the power of words, the structure of thought, and the ambiguities of meaning to meet Achilles on the field of a rhetorical battleground. The violent exchange of words between the two heroes in Book One offers the close reader fertile ground for analyzing the subtleties of political rhetoric as found in this archaic Greek epic.

In his 15 line response, Agamemnon recapitulates three words key to Achilles' complaint: *alegizô* (to take heed of), *afaireô* (to take away), and *apeileô* (to threaten). Furthermore, Agamemnon refocuses Achilles' appeal to *timê* (honor), shifting from Achilles' use of the negative-value adjective (*atimos*) to Agamemnon's use of the positive-value verb (*timaô*).

Agamemnon also does much by way of his verbal structures. He uses parallel constructions to compare Achilles' hypothetical retreat to his own return of Chryseis to her father (lns. 179 and 183). He also uses conditional statements throughout his response—comparing Achilles' 'hypothetical' strength to his own 'real' power (*kareros* versus *ferteros*).

Finally, it is Agamemnon's shifting of words' meaning and the context in which they are used that makes his "answer" so rhetorical complex—a characteristic perhaps not expected in such an 'archaic' poem. By considering the specific techniques by which Agamemnon responds to Achilles, one may gain insight on what made Agamemnon a "lord of men."

Department of English

Alyssa Leavell
Faculty Mentor: Dr. Dianna Vitanza
What Must Come Will Come: Fate in *Tess of the d'Urbervilles* and *Oedipus the King*
(English)

Although many Victorian authors looked to classical Greece for their subject matter and themes, Thomas Hardy is unique in his adoption of the overarching Hellenic worldview. The role of fate in *Tess of the d'Urbervilles* demonstrates Hardy's particular reliance on *Oedipus the King* of Sophocles. The plight of Tess mirrors that of Oedipus; Both Tess and Oedipus are forewarned by omens, prophesies, and a family curse. Both stumble unknowingly upon their fate due to chance circumstances outside of their control as well as character traits which propel them into their eventual destinies. In the end, both Tess and Oedipus must accept their sufferings, not based on some rule of divine justice, but simply because, in the words of Tess, "what must come will come." Yet neither Tess nor Oedipus is really defeated in the process; instead, they manage to achieve honor according to the Greek concept of arête, the code of the hero that arises from endurance and dignity in the face of suffering.

Rebecca Bovio
Faculty Mentor: Dr. Dianna Vitanza
Dickens' Character Archetypes: The Solution to Socioeconomic Tension in Victorian England
(English)

In Victorian England, citizens did not wholeheartedly examine or attack the issue of socioeconomic equality. Rather, a working middle class began to grow and upper class citizens began to look upon the lower class with shame and disgrace. This thesis analyzes Charles Dickens' character archetypes in order to explore his solution to this socioeconomic problem. Throughout most of his novels Dickens presents the reader with extremely poor or destitute characters in order to awaken his readers to the plight of the poor. Dickens ' novels also present benevolent characters, which he uses as an example for his readers to imitate. He also creates several working, middle class characters that demonstrate the incorrect way to view the lower class. My last chapter ties all types of characters together showing that humanity comes full circle. Every member of each socioeconomic class has the potential to be connected through acquaintances, intimate relationships, or situations. Therefore, citizens must take responsibility for one another, claim a common humanity, and reach out to lower class citizens on an individual basis.

Caroline Northedge
Faculty Mentor: Dr. Dianna Vitanza
Negative Polarity Items
(English)

In this project we analyze the behavior and usage of Negative Polarity Items(NPIs). NPIs are words and phrases which are restricted to sentences with negation (e.g. *any, at most, much, any more*) and present many theoretical challenges in syntactic and semantic fields of linguistics. Our work centers around the research of Brown (1999) as a foundation for understanding NPIs and negative concord. Focusing on expanding Brown's data for English and French NPIs as well as adding new data from Arabic led us to refine her approach. Unifying her notions of NPIs, negative quantifiers, and negative concord, our redefined analysis produces more easily defined possibilities and understandable categories of negative constructions in language universally. In addition, looking at attested instances of double negation in English (i.e *I didn't do nothing*) led us to conclude that speakers of modern English can access the negative-concord meaning in double-negation constructions without any difficulties. This is contrary to the common belief that double-negation is somehow illogical and linguistically ill-formed.

Elizabeth Weinrich
Faculty Mentor: Dr. Lydia Grebenyova
The Problem of the Second Person Plural Pronoun in English
(English)

This presentation explores the hypothesis that the use of *you* for both singular and plural second person pronouns creates ambiguity and that native English speakers will compensate for this ambiguity by creating a second person plural pronoun (abbreviated [2plu; pro]). This hypothesis is based on the principle that language evolves to be as simple as possible and as clear as possible at the same time. If this is true, English speakers will try to offset the leveling of the [2plu; pro] and the [2sing; pro].

Specifically, presentation focuses on the substitutions *you all*, *all of you,* and *ya'll*. I test whether or not these substitutions act as phrases or phrasal pronouns by exploring their syntactic structure. The presentation includes a discussion of the Russian and Spanish [2plu; pro] by way of comparison, survey evidence showing the use of substitutions for [2plu; pro], and a discussion of floating quantifiers (specifically *all*) and their relationship to pronouns.

I conclude that though *you* and *all* can act independently of each other, the necessity of these substitutions to remove ambiguity in some contexts may indicate language change in progress.

Audrey Johnson, Jose Reyna, Shanna Taylor, and Kimberly Gibson
Faculty Mentor: Dr. Jeannette M. Denton
Variability in the early spread of a new Texan feature: the constriction of postvocalic r
(English)

Bailey, Wikle, and Sand (1991) claim that the presence of constricted *r* in words like *forty* (as opposed to *fohty*) in Texan speakers was an innovation of white speakers that started after WWII and was nearly complete at the time of their article's publication. Sociolinguistic theory, namely the concept of "apparent time", predicts that native speakers of Central Texas English who were learning how to speak prior to WWII would therefore not have had significant rhotic (*r*) constriction in this position. This paper describes a project that investigated whether this claim was borne out, i.e., whether Central Texans were indeed *r*-less prior to WWII. Ten informants were chosen from Institute of Oral History recordings of both black and white Central Texan woman born between 1896 and 1920. Their interviews were examined for the degree of constriction each demonstrated and this information was considered in light of the ethnography of each speaker. Constricted *r* was found to be present to varying degrees in both black and white female speakers, but consistent with Bailey, Wikle, and Sand's claim, white speakers were in advance of black speakers in the use of constricted *r*. These findings suggest that if the presence of postvocalic *r* was not a native feature of the Central Texas dialect, it was being reintroduced significantly earlier than the 1940's. Indeed, the variable use of constricted *r* in these ten women suggests that this was a language change already well underway by the first quarter of the 20th c.

Jaclyn Drake
Faculty Mentor: Dr. Richard Russell
Capturing the Unimaginable: Holocaust Imagery and Symbolism in Samuel Beckett's Waiting for Godot
(English)

The critic Michael Billington once asked of Samuel Beckett's plays: "Is this the art which is the response to the despair and pity of our age, or is it made of the kind of futility which helped such desecrations of the spirit, such filth of ideologies, come into being?" Samuel Beckett was not just a playwright who significantly contributed to what is now called the Theatre of the Absurd; he was a man concerned with the tragic story of the Holocaust. He understood the lasting affects such a tragedy would have, not only on the Jewish community, but also on humanity as a whole. In his own way, he captures this concern in his 1952 play Waiting of Godot.

Beckett's Waiting for Godot is not strictly Holocaust drama. It does nevertheless invite an interpretation of multiple of its elements in light of the Holocaust. The struggle with mental and physical limitation, as well as restricted means of expression and tainted memory, directly correspond to events of the Holocaust and conflicts the Jews faced before and after their imprisonment. Through his exploration of the role of the audience, Beckett paints a vivid picture of the dangers of indifference and hatred. Waiting for Godot begs to be remembered, but not just because it is an insightful look at human nature. It tells a story that is quickly fading in both the minds of those who experienced the Holocaust first hand and in the mind of the world. Beckett engages and challenges his audience to preserve this story. Even more importantly, through Waiting for Godot, he gives the audience the knowledge of inhumane origins of the Holocaust, so that they can keep the story from repeating itself.

Department of Environmental Science

Amelia Hudson
Faculty Mentor: Dr. Susan Bratton
Diameter, Weight, and Length of Twigs from Monk Parakeet (*MYIOPSITTA MONACHUS*) Nests in the Dallas-Fort Worth Metroplex
(Environmental Science)

Invasive species are the focus of many ecological studies because of their potential to adversely affect habitats and wildlife, and their ability to cause ecological or economic harm. The monk parakeet is one such species. An invasive parrot from South America, the monk parakeet has established populations in many parts of the United States. In northern Texas the monk parakeets build their nests on electrical structures, which can result in power outages and costs to electrical companies. We conducted this study to examine the nest twig selection preferences of monk

Parakeets in the Dallas-Fort Worth Metroplex. We measured the diameter, weight, and length of 1,005 twigs gathered from 24 electrical structure locations in the Metroplex. Our study revealed that statistical measures of twig diameter, weight, and length were fairly consistent throughout the study site. From the results, we concluded that monk parakeets in the study area are capable of carrying twigs that weigh approximately 3-4% of their body weight while still maintaining flight.

As no previous studies have examined the sizes and weights of nest twigs, these results can be used in the study of nest building and maintenance, and the representation of twig weights a monk parakeet carries can be used for telemetry transmitter attachment purposes.

Tim Bransford
Faculty Mentor: Lynne Baker
Evaluating Selection and Use of Sleep-Tree Sites by *Avahi peyrierasi* in a Forest with High Tourist Traffic, Parc National de Ranomafana, Madagascar

(Environmental Science)

Between late May and early August 2010, I investigated the effects of tourism on a nocturnal lemur, *Avahi peyrierasi*, in Ranomafana National Park, southeastern Madagascar. The park, primarily a mid-altitude moist forest, contains high levels of plant and animal biodiversity, including several lemur species, within its 43,500ha area. Due to its unique biodiversity and relative ease of access, the park receives thousands of tourists each year. The main goal of this study was to determine if and how tourism was affecting *A. peyrierasi* in its sleeping sites during the day. I compared my results with research conducted two decades ago when tourism was minimal and Ranomafana did not yet have national park status. Results showed that *A. peyrierasi* increased the height of its sleeping sites from an average of 3m (Harcourt 1991) to 10.53m. Tourist activity is also forcing the species farther from tourist trails, which is in turn causing tourists to move off the main trails to view the animals. Additionally, tourists are not following protocols set forth by the park regarding maximum group size, which are 5 people. I observed tourist groups of up to 35 people near a single tree where a group of *A. peyrierasi* was sleeping. Results from this study will aid conservation efforts and management of sustainable ecotourism operations in Madagascar.

Andra Nava and Marcus Keck
Faculty Mentor: Dr. Susan Bratton
The Impact of Non-native Shinning Privet (*Ligustrum lucidum*) on Regeneration of Native Oak Species in William Cameron Park, Waco, TX

(Environmental Science)

Invasive non-native, evergreen privet (*Ligustrum lucidum* and spp.) is potentially suppressing native oak regeneration, in Cameron Park, Waco, TX. We established 180 5 x 5 meter plots, centered on living oaks greater than 10 cm in diameter at breast height (dbh), dead deciduous trees, and at random points on a gradient from ridge tops to the bottom of ravines. Field teams measured the dbh of all woody species over 2 m height, and categorized seedlings and sprouts into five height classes: < 10 cm; 10 to < 25 cm; 25 to < 50 cm; 50 to < 100 cm, and 100 to < 200 cm. Both the dbh of the largest privet within a plot and the total basal area of privet displayed significant negative correlations to the total number of oak seedlings, sprouts and saplings under 2 m height ($p=.0002$). Considering individual oak species, however, the presence of Shumard's oak (*Quercus shumardii*) reproduction was significantly negatively correlated to privet dbh ($p=.004$), while bluff or Durand's oak (*Q. sinuata durandii*) provided a trend toward significance ($p=.082$). Privet dbh was not significantly correlated to the presence of escarpment live oak (*Q. fusiformis*) ($p=.142$), or bur oak (*Q. macrocarpa*) ($p=.318$) reproduction. DECORANA found privet and Shumard's oak occupy similar topographic ranges relative to the moisture gradient, which potentially increases the impact of privet on Shumard's oak, while escarpment live oak, which prefers more xeric ridges, and bur oak, which prefers moister stream and river bottoms, were less affected by the non-native tree.

Corinne Schuele, Katherine Johnson, Brett Heflin, Michael Hannon, and Pate Barnes
Faculty Mentor: Dr. Susan Bratton
Day Hiker Valuation of the Trail Environment as Influenced by Urbanization of the Route, Type of Hike and Number of Hikes

(Environmental Science)

Day hikers reported their perception of nature based on the environment, the type of hike, and the number of hikes taken, for urban and non-urban settings in the Waco area and for wilderness in Great Smoky Mountains National Park. The type of environment has a significant effect on 19 values of 25, while type of hiking (goal, nature, or meditative) influenced 9 values. Nature oriented hiking was more effective than goal oriented hiking in raising appreciation for the environment as fascinating or awing. Twelve values increased significantly with a greater number of hikes, while one decreased significantly (challenge). All values except those related to hiker feelings of stress and of aloneness or crowding were influenced by the urban to wilderness gradient. Nature and contemplative hiking tended to increase valuation, particularly concerning factors related to interest and heightened sensory perception. Greater numbers of hikes increased valuation of the environment in terms of its effect on inner feelings of the hiker, and in terms of heightened sensory perception.

Maria Gannon
Faculty Mentor: Professor Julie King
Dissecting a Disaster: The Deepwater Horizon Oil Spill

(Environmental Science)

The purpose of this research is to present a clear and detailed picture of the Deepwater Horizon oil rig disaster. In April 2010, an explosion on the Deepwater Horizon oil rig set off a chain of events that resulted in millions of gallons of crude oil gushing into the waters of the Gulf of Mexico for nearly three months. This disaster would ultimately be the largest and most catastrophic oil spill in the history of the United States. This research provides an in-depth look at the events leading up to the explosion on the rig and presents an analysis of the ecological and legal ramifications that have yet to be resolved.

Nathan Robins, Sky Toney, Amelia Hudson, Lynette Wysocki, Tim Bransford, Austin Cook-Lindsay, Ben Belz, Katie Ross, and Kevin Hermesch
Faculty Mentor: Dr. Susan Bratton
The Impact of Urbanization on Day Hiker Personal, Spiritual and Natural Experience in Central Texas

(Environmental Science)

Fifteen college students in their early 20s participated in 97 day hikes, oriented toward either: 1) a geographic goal, 2) nature study, or 3) meditation, in either an urban or more natural wooded or wetland environment in central Texas. Subjects responded to statements using a 1 to 5 scale assessing personal, natural, and spiritual experience. Kruskal-Wallis tests (SPSS 17.0), found only 1 of 11 personal experience statements was significantly influenced by type of hike ($p=.05$), while 4 of 11 were significantly influenced by urban versus natural settings. Type of hike significantly influenced 5 of 10 statements concerning experience with nature, and the natural context influenced 9 of 10 including learning experience about nature. Type of hike significantly influenced responses to 9 of 10 statements concerning spiritual experience, while the natural context only significantly influenced 1 of 10. Type of hike did not affect whether the natural environment on the hike was pleasing ($p=.30$), the hike inspired hikers to think about responsibilities to care for the environment ($p=.175$), the hike relieved stress ($p=.33$), hikers felt a sense of accomplishment ($p=.37$), or they considered the hike to be fun ($p=.82$). Urbanization of the hiking environment did not affect self-reported learning concerning human damage to the environment ($p=.16$), the level of stress relief ($p=.26$), or time spent reflecting on personal relationships ($p=.44$). While the natural settings were superior for most forms of environmental learning, the differences in environmental context were more equivocal concerning self-reflection and actualization.

Nathan Robins
Faculty Mentor: Dr. Susan Bratton
Establishment of experimental composting and container gardens for Caye Caulker, Belize
(Environmental Science)

Composting is the widely practiced process by which biodegradable waste can be turned into a nutrient rich soil additive. Individuals or communities can decrease their solid waste output, and in turn create a valuable product. The purpose of this research was to assess the viability of composting and evaluate a number of different composting methods on Caye Caulker, an island off of the coast of Belize. Though composting has been carried out almost everywhere in the world, a small island in the tropics presented a unique set of anticipated problems such as availability or materials and supplies, transport of material, and the nature of the waste stream. Once the project began, a number of additional problems were recognized, including scavenging animals, and the differing plans and goals of the various people involved. The project was delayed by a change in focus, having become a composting and gardening project at the desire of the village council, and by a stronger desire for tangible results to justify the funding provided by the aforementioned body. At the conclusion of the project several small home composting units had been created and were in use, though the process began late and little evaluation could be done, two container gardens were created, and plans were established for expanding the project further. Students at the school and volunteers on the island have continued the effort, and several additional container gardens have been constructed and successfully used to grow cilantro.

Austin Cook-Lindsay
Faculty Mentor: Dr. Bryan Brooks
Influence of climatological and antropogenic factors on pH and associated impacts of select heavy metals in aquatic systems.
(Environmental Science)

The interplay among climatological and antropogenic influences on water quality challenges efficient water resource management. Influence of interannual rainfall variability results in decreased runoff and inflows of surface waters. Such variable flows influence physical, chemical and biological characteristics of inland waters. In urbanizing watersheds, the influences of river flows on the hazards presented to aquatic life by antropogenic contaminants, including heavy metals requires additional understanding. This study examined an existing dataset from a recently completed U.S. Environmental Protection Agency project of water quality gradients of Texas river inflows to reservoirs located across an urbanization gradient.

During this study, field observations were collected from eight stream-reservoir transition zones in four reservoirs between a typical year (2005) and an extreme drought (2006). Our primary hypothesis was that nutrient enriched surface waters influenced by urbanized subwatersheds would exhibit higher daily pH variability than less urban water bodies, and the magnitude of this variability would be most pronounced during drought conditions. In urban watersheds, metals can degrade water quality by entering aquatic systems through direct (wastewater treatment plant discharges) and indirect (stormwater runoff from municipalities) routes, and pH influences metal toxicity to aquatic organisms. Thus, laboratory experiments were be performed to define the influence of pH variability from the reservoir datasets on the toxicity of selected heavy metal silver to a model aquatic invertebrate, *Daphnia magna*. The findings of this project will specifically support environmental management of heavy metal risks to various rainfall and urbanization signatures in freshwater ecosystems.

Department of Geology

Tyler Landers
Faculty Mentor: Dr. Steven Driese
Influence of Medieval Warm Period – Little Ice Age Climate Change on Floodplain Deposition, Erosion, and Soil Formation Along Williams Creek, Central Texas, USA
(Geology)

Understanding channel and floodplain evolution is necessary to prepare for future changes in climate and agriculture. Few studies characterize channel and floodplain evolution during the last major climate interval: Medieval Warm Period-Little Ice Age (MWP-LIA) in Central Texas. We used floodplain stratigraphy, pedology, and sedimentology to assess the potential effects of MWP-LIA climate change and land-use on the Williams Creek floodplain.

Soil descriptions from transverse-valley auger borings were used to identify three major allostratigraphic units based on the presence of buried soils and erosional surfaces. The most significant unit consisted largely of poorly developed soils near its base, which led upward to a well developed A horizon, indicating rapid alluviation and then a period of stability around 1500 A.D. according to previous research. Our allostratigraphy is consistent with findings in the Williams Creek basin shown in the Baylor Geological Society (BGS) Fall 2010 Fieldtrip Guide, and findings in the adjacent Mill Creek basin. As stated in the BGS Field Guide, this correlation may be a result of an allocyclic mechanism acting regionally, such as climate.

An age-depth model, combined with particle size analysis, was constructed on a cutbank trench, revealing a decreasing trend in grain size through time that is statistically significant ($p < 0.05$). We suggest this may be due to increasing discharge during wetter LIA climate. However, we cannot discount the effects of other contributing factors. Future research would further our understanding of which factors carried the greatest influence on regional floodplain development during this time interval.

Alex Dale
Faculty Mentor: Professor Bruce Byars
Using GIS for Site Selection of Petroleum Pipelines to Diminish Environmental Impacts in Central Texas
(Geology)

In previous decades, selection of pipeline placement has relied mostly on cost efficiency, i.e., the cheapest way to get product from point A to point B is in a straight line. This practice has caused companies to expend more dollars in environmental litigations and penalties, during the construction or during operational leaks, rather than finding an alternate route that could lessen the environmental impact of pipelines. Geographic Information Systems (GIS) can now be utilized to find these alternative routes that could potentially save transport companies operating in central Texas a great deal of time and money from lawsuits, as well as attempt to protect as much of the environment in the path of the pipeline as possible. The objectives of using GIS for pipeline pathway selections are to: (1) address the environmental parameters of a potential pathway, (2) obtain spatial information of the potential pathway, and (3) incorporate this information into a GIS to make informed decisions about the placement of petroleum pipeline pathways.

Brett Wittman
Faculty Mentor: Dr. Stacy C. Atchley
Stratigraphic Interpretations of the Marble Falls and Smithwick Formations of the Southwestern Fort Worth Basin
(Geology)

The Marble Falls Limestone and Smithwick Shale Formation (Morrowan-Atokan) crop out in central San Saba County, overly the Barnett Shale (Mississippian), and lie beneath the Strawn Group (Desmoinesian).

This study evaluates the stratigraphic history of the Pennsylvanian Fort Worth Basin, which experienced episodic carbonate platform drowning and siliciclastic poisoning. Earlier studies attempted to create a complete distribution map of the environments of deposition for the studied formations in the area, but were unable to produce detailed maps because of a lack of cored well data, and because available surface outcrops are significantly spaced apart.

A spatially close group of cored wells from the Texas Bureau of Economic Geology (BEG) allowed for an unprecedented opportunity to correlate facies distributions in a subsurface dimension. The cored wells and the outcrops were studied with a gamma-ray spectrometer and x-ray fluorescence device. Description and visual interpretation of formations were derived from the five depth-calibrated cored wells. Stratigraphic surfaces as shown from the amplified gamma-ray spectroscopy results and the observed core were matched to adjacent conventional well logs. The x-ray fluorescence allowed for greater precision in determining rock composition. These methods allowed the interpretation of rock characteristics to be farther reaching than previously allowed by the cored well extent.

Features found in subsurface core, on well log “kicks”, and outcrops support the westward migration of the carbonate sedimentary system during a transgression. The temporal and spatial results from this study improve the state of understanding of the Pennsylvanian strata in the southwestern Forth Worth Basin.

Cody Welch
Faculty Mentor: Dr. Steven Driese
Unearthing Krakatoa’s Past in Order to Forecast its Devastating Future
(Geology)

During the hours between the 26th and 27th of August 1883, the world felt and heard the loudest noise ever recorded, with reports of it being heard nearly 3,000 miles from its point of origin. Krakatoa, a volcanic island in the Sunda Strait, had erupted catastrophically, and in the process destroyed two thirds of the island and collapsed its caldera. The eruption itself ejected approximately five cubic miles of rock, pumice, and ash, and the resulting seismic sea waves (known as tsunamis) were devastating to the surrounding islands. After the cataclysmic eruption, average global temperature fell by as much as 1.2 degrees Celsius the following year. The island was believed to have been sterilized and dormant following the eruption however, after quiescent for 43 years, Krakatau produced a newly born, active volcano named Anak Krakatau in 1929. Anak Krakatau is an active volcanic island that is currently growing at an average of five inches per week. This study will attempt to track the birth of Krakatoa to its death in 1883, and relate its history to the newly birthed Anak Krakatau, tracking its birth to its unknown and precarious future.

Gregory E. Sprengel
Faculty Mentor: Dr. Steven Driese
Mississippi Valley Type (MVT) Lead-Zinc Ore Deposits with Emphasis on the Virburnum Trend in Southeastern Missouri; Its Pennsylvanian Genesis, Economic Value and Environmental Impact
(Geology)

Mississippi Valley Type (MVT) deposits are epigenetic, sulphide mineral bodies primarily hosted within carbonate platform rocks and are composed mainly of sphalerite, galena, pyrite, marcasite, calcite and dolomite. They are found worldwide in districts ranging from hundreds to thousands of square kilometers and account for around 27% of the world's lead and zinc resources. Deposits are most commonly associated with regional- to sub continental-scale migration of warm saline metal-rich basinal brines by means of compressive or extensional tectonic regimes.

The Virburnum Trend in Southeastern Missouri is a 70 kilometer long, 150 meter wide North-South trending deposit contained within the Upper Cambrian Bonneterre Dolomite. The lead-rich ore was most likely mineralized within its Bonneterre host rock as a result of the Pennsylvanian Ouachita Orogeny. Missouri has some of the largest and most important MVT deposits in the world. The Virburnum Trend has an uncharacteristically high percentage of the lead-bearing mineral galena, which has made this deposit economically invaluable to Missouri as well as a major environmental concern. Missouri has led the country in lead production for well over 70 years and continues to produce almost three quarters of the country's lead and a significant amount of zinc. Over 300 years of mining in this area has left major environmental impacts on the streams, soils, forests and humans. Although many environmental measures have since been taken to reduce lead contamination, the enduring success of Missouri's lead district has created serious and irreversible consequences to its environment.

Hope Sepela
Faculty Mentor: Dr. Steven Driese
Fluvial Response to Climate and Sea-Level Change: A Critical Review and Look to the Future
(Geology)

Analysis of long-term fluvial system dynamics and response to external controls play central roles in understanding both global change and sequence-stratigraphy, as well as in the study of dynamic interactions between tectonic activity and Earth surface processes. The purpose of this paper is to provide a historical perspective of the advancement in the fields of geomorphology versus sedimentology, and then to summarize the key processes which operate to produce alluvial stratigraphic records over a specific time-scale. This paper investigates the change in discharge regimes, sediment supply and sediment storage from source terrains to sedimentary basins to analyze the influences of climate change on continental interior rivers, as well as the influence of interacting climate and sea-level change on continental margin systems. Using the late Quaternary (last few tens to hundreds of thousands of years) stratigraphic records gathered from the Loire, Mississippi, Colorado and Rhine-Meuse Rivers, we illustrate the changes in climate and sea-level. The paper concludes with a look at the future of studies of fluvial response to climate and sea-level change. The paper will investigate the viewpoints of climate affects on sea-level change, based upon the global change community's understanding of dynamics of climate and sea-level change, the sequence-stratigraphic community's need to study the climate change, and what are the forcing mechanisms, and lastly, the modeling community's ability to generate models of the surface processes and their stratigraphic results. This paper demonstrates a current dearth in research needed to comprehend the fluvial response to climate and sea-level change, and the need for more detailed sedimentological, stratigraphical and geochronological frameworks.

John Fisher
Faculty Mentor: Dr. Steven Driese
Evolution Observable in the Fossil Record: The Remarkable Completeness of Cetacean (Whale and Dolphin) Development from Terrestrial Progenitors
(Geology)

Cetaceans (whales and dolphins) provide a stunning fossil record that demonstrates an essentially continuous progression of evolution through the past 55 million years. Recent discoveries, especially in India and Pakistan, show conclusive evidence for the early cetacean adaptation from a terrestrial to a marine environment, and findings in Australia, Oregon, and Louisiana prove the divergence of the baleen whales (suborder mysticeti) from their toothed counterparts. Visible in the fossil record is an intriguing timeline of hind limb degeneration, plus the evolution of filter feeding and echolocation. In this paper, I discuss the development of these morphological characteristics, in addition to the dynamic changes order Cetacea underwent, from their earliest notable ancestors - the four legged, terrestrial pakicetids in the Eocene - to the present diversity of dolphins and whales.

Jon Brown
Faculty Mentor: Dr. John Dunbar
A Short-Term Study of Moisture Flow Within a Clay-Rich Soil (Vertisol) Using Electrical Resistivity
(Geology)

Vertisols are a poorly understood soil order rich in expandable clay minerals. These soils play a significant role for Texas and Waco, and constitute a significant portion of the land area, which is dominated by Vertisols and known as the Blackland Prairie. One aspect that has not been well-studied is moisture flow. Whereas soil-mechanics models can provide some information, preferential flow through macropores and other mechanisms prevent these models from adequately describing soil behavior. Using a pair of electrical resistivity profiles, we were able to image short-term moisture flow within a clay Vertisol hillslope. We processed each profile to see where the moisture was within the hillslope, and then created a time-lapse profile to get a better picture of moisture changes within the hillslope. From these profiles, we found that moisture flow localized near the surface, with little change within the hillslope.

Joshua Helms
Faculty Mentor: Dr. Steven Driese
Structural Analysis of a Relay Ramp in Arches National Park, Utah as a Conduit for Fluid Flow
(Geology)

Relay ramps associated with overlapping faults are commonly viewed as efficient conduits for fluid flow across potential sealing intra-reservoir fault zones. Current studies have demonstrated that structural heterogeneity in the wide damage zone of relay ramps could represent possible baffles to intra-ramp fluid flow. Networks of ramp-diagonal, ramp-parallel, and curved cataclastic deformation bands cause compartmentalization of the ramp studied in Arches National Park, UT. The purpose of this paper will be to analyze the potential of relay ramps as conduits across sealing faults in an oil and gas production situation. Analysis of such controlling factors for the formation of structural heterogeneities includes sedimentology, stratigraphy, burial history, and deformation mechanisms. Whereas relay ramps represent effective pathways for the migration of hydrocarbons over a period of geologic time, their effectiveness in production situations is unclear. By carefully analyzing relay ramps using quantitative methods this paper will illustrate the importance of these structures without a gross overestimation of their effects.

T. Keith McVey
Faculty Mentor: Dr. John Dunbar
3-D Analysis of Extensional Fault System in Central Texas
(Geology)

A 3-D time-volume seismic survey covering a 15.5km2 area in Central Texas was analyzed to determine deformation of the subsurface strata. Key horizons and major fault networks were mapped and labeled throughout the data set. Both the vertical, as well as the horizontal displacements along the faults, were measured on an SMT (Seismic Micro Technology) workstation in order to determine how the strata reacted to deformational stresses. The throw gradient was used to estimate how the deformation was distributed around the fault. The extensional fault system was analyzed and mapped to determine the potential to trap hydrocarbons.

Lyndsay DiPietro
Faculty Mentor: Dr. Daniel Peppe
Paleoclimate Interpretation Using Clay Mineralogy for Early Miocene Fossil Localities of the Hiwegi Formation on Rusinga Island, Lake Victoria, Kenya
(Geology)

The Early Miocene fossil localities on Rusinga Island, Lake Victoria, Kenya contain an abundant early primate fossil record that is of great importance for understanding ape evolution. The excellent fossil preservation on the island also provides a rich source of information regarding the fauna living during this time period. However, there are little conclusive data concerning the paleoclimate; many different paleoenvironmental interpretations have been made based upon fossil evidence, sedimentology, and paleosols (fossil soils). Paleosols are arguably the best proxies to use to reconstruct paleoenvironment as they can be assessed using both qualitative and quantitative approaches to the problem.

In the Hiwegi Formation on Rusinga, we observed very slight changes in the development and type of paleosols through the Formation. Using x-ray diffraction (XRD) of oriented clay aggregates, the clay mineralogy of several paleosols throughout the Hiwegi was determined. The clay mineral suites in the paleosols are largely consistent throughout the Formation. The paleosols also have 2:1 expandable phyllosilicates (smectite) and little to no illite. This indicates that burial illitization has not occurred and that diagenesis of the clay minerals is unlikely to present problems in future research. The homogeneity of the clay mineral suites suggests that climate over the time represented by the Hiwegi remained fairly constant and that any minor variations in the paleosols are more likely a product of exposure time before burial. X-ray fluorescence (XRF) of the samples will be used to estimate mean annual precipitation to further test this conclusion.

Savannah N. Soileau
Faculty Mentor: Dr. Steven Driese
Yellowstone's Future: A View from the Past
(Geology)

The Yellowstone caldera is a "super volcano" that occurs within the states of Wyoming, Idaho, and Montana on the North American plate. It is an anomaly due to the sudden appearance of its first caldera in the North America rock record approximately 17Ma (Ma = millions of years ago). The hotspot that the Yellowstone caldera sits over defines an east to northeasterly progression, leaving a trail of older calderas and basalt flows that extend to the west-southwest of its current location. Through observations made from older basalts, which comprise the Snake River Plains, and from older calderas, it is apparent that Yellowstone has had a very active history. Old ash fall deposits tell a great deal about how extensive these eruptions were, as well as how detrimental they were to the environment. One may derive how frequently this volcano has erupted through the same method. Observing modern Yellowstone's activity remains an indicator of what may lay ahead. Increased hydrothermal activity, seismicity, crustal deformation, and gas expulsion are indicators that Yellowstone is a living and breathing volcano with eruption potential. Yellowstone is approximately 40,000-70,000 years overdue for an eruption, considering that it has erupted about every 600,000 years since its formation. The environmental and societal implications of such an eruption would be catastrophic. Global temperature could decrease from ash being suspended in the atmosphere, leading to crop failures and global starvation. Living beings would suffocate from gas and ash inhalation. Through studying the geologic history of Yellowstone, modern volcanism, and the environment observed at the caldera, it is possible to predict and possibly even buffer the effects of an eruption. After all, what is observed from the past may help to predict what is to come in the future.

Stephanie LeBlanc
Faculty Mentor: Dr. Steve Dworkin
Reconstructing Late Triassic Environmental Conditions Using Paleosol Mineral Assemblages from the Chinle Formation, Arizona, USA
(Geology)

The Chinle Formation, located in the Petrified Forest National Park in northeastern Arizona, is composed of alluvial channel and over bank deposits. The Chinle is comprised of several members, which include (from youngest to oldest): the Mesa Redono, Blue Mesa, Sonsela, Petrified Forest, and Owl Rock members. One of the most distinctive features of the Chinle Formation is the presence of fossil soils (paleosols) that formed on the overbank muds. Soils that are preserved in the rock record provide information about the Earth's ancient climate because they form at the interface between the lithosphere, biosphere, hydrosphere, and atmosphere.

In order to reconstruct environmental conditions during Chinle deposition, the mineralogy of paleosol samples from each of the members were evaluated using x-ray diffraction (XRD). These studies revealed that the lower members of the Chinle Formation contain relatively large amounts of kaolinite and diminished amounts of feldspar, whereas the younger members contain lower amounts of kaolinite and increased amounts of feldspar. Additionally, calcite is absent from the younger paleosols, but becomes volumetrically significant in the Sonsela, Petrified Forest, and Owl Rock members. These trends in paleosol mineralogy indicate the environmental conditions changed during Chinle deposition with the lower part of the section experiencing wetter conditions, which then changed to drier and hotter conditions in the upper Chinle.

To further investigate the origin of paleosol mineralogy, oriented clay mounts will be analyzed using XRD to identify and quantify the abundance of clay minerals in each sample. The paleosol clay mineralogy will then be compared with the volcanic content of correlative sandstones to determine what, if any, relationship exists between volcanic activity and quantities of smectite and illite.

Ryan Danielson
Faculty Mentor: Dr. Joe Yelderman
Temperature Methodologies to Better Understand Groundwater-Surface Water Interactions
(Geology)

Groundwater-surface water interactions are integral parts of the hydrologic cycle and their understanding is critical in conjunctive-use water management. Because groundwater and surface water are affected differently by weather, they often exhibit differences in temperature. Temperature is inexpensive and easy to monitor and as such, measuring temperature differences between groundwater and surface water is a potentially efficient method for evaluating their interactions. This study evaluated temperature as a methodology for studying groundwater-surface water interactions stemming from the Brazos Alluvial Aquifer, a minor aquifer of the State of Texas with the potential to be a significant water resource. As an influent stream, the Brazos River is dependent upon groundwater to maintain perennial flow. Therefore, identifying the locations of inflow can be important. Temperature readings were collected by a high-temperature infrared laser, thermometers, and temperature data loggers at springs, seeps, and surface water bodies. The results suggest that the impact of temperature differences were related to groundwater flow rate, volume, and seasonal changes. Although not applicable in all situations, temperature could be used to locate and perhaps quantify groundwater-surface water interactions. These methods may be an efficient alternative to chemical tracers and more invasive monitoring or sampling techniques.

Benjamin Phrampus
Faculty Mentor: Dr. R. Jay Pulliam
Analysis of Broadband Seismic Station Coverage for a Seismic Survey Across the Texas Gulf Coast
(Geology)

Texas' Gulf Coast is called a "passive margin" because it marks a transition from a continental craton (North America) to oceanic crust (underlying the Gulf of Mexico) and there is no active faulting taking place today. Worldwide, passive margins are explored and studied intensively because their high sedimentation rates tend to produce natural gas and oil. Texas' passive margin has been one of the most productive and is distinguished by a large magnetic anomaly along the coastline, which is not fully understood nor mapped.

In Summer 2010 we installed 21 broadband seismographs from Matagorda Island to Johnson City, TX in order to understand the origin of the magnetic anomaly and how it relates to the opening of the Gulf of Mexico. Data from the broadband recordings of earthquakes will contribute to a project called "GUMBO" (Gulf of Mexico Basin Opening). GUMBO's goal is to understand the rifting that created the Gulf of Mexico.

My part of the project analyses the station coverage across the surveyed zone to determine whether detailed structures that may be associated with the anomaly can be resolved. Synthetic data are computed by back-projecting P and PKP waves through a previously proposed model (Mickus et al., 2009) from actual earthquakes to our stations and then inverted to analyze the resolving power of the stations. If the current distribution is not adequate we will need to move stations, add stations, or leave the stations in place longer than the planned two years, in order to capture more earthquakes.

Tia Barrington
Faculty Mentor: Dr. R. Jay Pulliam
Seismic Anisotropy, Edge-Driven Convection, and the Rio Grande Rift
(Geology)

The evolution of distinct tectonic provinces in the southwestern United States since the Cretaceous period, including the Great Plains, the Colorado Plateau, and the Rio Grande Rift (RGR), has been linked to flat subduction of the Farallon plate (~80 Ma) and then its subsequent foundering (~40 Ma). However, there has been a resurgence in tectonic activity more recently (~10 Ma), so there is no clear connection between the Farallon plate's foundering and present tectonic activity. Small-scale, edge-driven convection is a possible explanation for this renewed activity.

Edge-driven convection, if it is occurring, should extend to the north and south along the margin of the Proterozoic Great Plains craton. Convective flow should have a signature in the upper mantle's seismic anisotropy and our goal is to determine whether patterns of anisotropy, as determined from SKS splitting that may be consistent with small-scale convection.

I made SKS splitting measurements were made for 126 broadband stations located on the eastern flank of the Rio Grande Rift. Seventy-one of these stations were part of the SIEDCAR deployment; the remainders are EarthScope Temporary Array stations. SKS splitting patterns conform both to surface physiographic features as well as to models of the subsurface produced independently.

Department of History

Catherine Neilson
Faculty Mentor: Dr. Gabrielle Sutherland
Claurura in the Age of Medieval Nuns
(History)

Imagine a devoted nun in Cistercian black walking through the darkness of the monastery halls she helped build, praying to have an impact on the lives of those she encounters because all she desires is God's will. Next, imagine those walls becoming boundaries she is forbidden to traverse rather than walls that used to hold her sleeping and planning hours, now enclosing her, determining the limits of God's will. Would the extent of the Cistercian nuns be as small as the walls that enclosed them? In recent years, researchers have sought to discover whether Cistercian nuns actually existed. Findings show that nuns helped establish the Cistercian Order as the counterparts to the monks. Why did the monks discredit the nuns? What really went on behind the enclosed monastery doors? What influence did Cistercian nuns really have? Historians pose these questions; yet, the answers lurk in the depths of the darkest corners of the very monasteries that enclosed the nuns, waiting to be discovered by someone seeking the truth about these women. Learning about the enclosure of the Cistercian nuns reveals what actually happened as women were forced out of the order they helped create. It seems the monks believed their female associates and former partners should not be allowed to have as great an influence on those they came into contact with, yet women helped found the Cistercian Order. What triggered these events, and how or when was the enclosure of the nuns removed? The Cistercian nuns spread their beliefs to everyone they encountered, but not many historians know the extent of the influence. Researching what happened in the monasteries when the nuns encountered "clausura" will show that there are many different ways to spread influence without being heard or seen.

Jillian Buttecali
Faculty Mentor: Dr. Stephen Sloan
Mr. Tate's Hometown: Universalization of Incorporation in Texas Towns
(History)

This paper, which will be presented at the Southwestern Social Science Association's annual meeting in Las Vegas, NV this March, is the recipient of a 2010-2011 URSA grant. Through oral history and analytical research on town and city development in Texas, I narrow down specific problems that are typically faced by struggling incorporated towns or developments considering incorporation and how to combat these problems.

I utilize three methods of research: in-person interviews, text-based research, and a case-study on The Woodlands, TX. Additionally, this paper provides three distinct outcomes. The first is an analytical description of historical problems within Texas communities, such as socio-economic disconnect; poor development and utilities maintenance; and failing to create a sustainable tax-base and small-scale infrastructure. Second, I give a time-line on the basic requirements towards successful incorporation (becoming an official city or town) and how communities can best proceed whether or not they choose municipal incorporation. The last component is a case-study of The Woodlands, TX. This allows me to apply my multiple hypotheses to an actual planned community preparing to vote on incorporation in 2014. The case-study is placed at the end of the paper to demonstrate how my two previous components can be applied.

H. Clay Tate, who wrote "Building a Better Hometown" and is the inspiration for my paper, was a rebellious youth and successful newspaperman in mid-century Illinois. His book "is a story of those who no longer run away from the problems of their own communities to seek Utopia elsewhere, but stay at home to build better communities." It is to this point that I hold my conjectures and research accountable.

Preston Yancey
Faculty Mentor: Dr. Gabrielle Sutherland
The Silence of the Lambs: The Role of Silence in the Spirituality of Regular Canons and Monks in the Twelfth Century and the Modern American Christian
(History)

In 1959, Jean LeClercq claimed there was no difference between the conception of cloistered spirituality of monks and regular canons in the twelfth century. Since, scholars have sought to clarify the existence of particular disparities between the two groups.

One such difference is the role of silence and its economy in the life of a monk or a canon. Drawing upon the scholarship of Caroline Walker Bynum, this paper develops a study of the spiritual politicization of these groups in France. Using C.H. Lawrence, Beryl Smalley, and David Knowles, this paper examines the rhetoric of silence between monks and canons. For monks, it is a disposition of learning directed exclusively toward God. For regular canons, it is verbo et exemplo, learner and teacher oriented toward the good of the Other, then toward God. These differing methodologies constitute two major theological deviations, out of which grew the spiritual movements of the thirteenth century, namely the development of the hierarchical clergy and the friars.

Yet, this thinking is not so far removed from us. This paper concludes that the rhetoric of silence between the monks and the canons is not unlike its employ in contemporary American Christendom, by showing how the split between emergent and orthodox American Christianity is reliving an argument nearly a millennium old, and accordingly anticipating a major shift in the American Christian worldview in the coming century, the role of silence in the Faith, and the increasing abandonment of old ideals for a sensitivity to globalization.

David Moore
Faculty Mentor: Dr. Gabrielle Sutherland
Pope Innocent III and Lateran IV: Reading between the Lines
(History)

Lotario dei Conti de Segni, 37 years old and not yet an ordained priest, ascended the papal throne mere hours after the funeral of Celestine III. Credited with elevating the power of the papacy to new heights, Innocent III, was nevertheless a fitting continuation in strong line of learned and prestigious popes. The importance of the formative first years of Innocent's papacy can hardly be underestimated: he dove into international affairs with a bravado and charisma that perhaps only youthful vigor can ascribe. His willingness to plunge into the mire of medieval politics and utilize every tool at his disposal allowed him to firmly establish his position as an international power very early in his reign. Because of this, Innocent was able to free the papacy from its biggest pitfall: external control by a foreign sovereign. Thus, Innocent was free to explore and manipulate papal prerogatives in the judicial, political, and theological spheres. As one of the most pivotal figures of the Middle Ages, it can be difficult to separate Innocent from his legacy. Lateran IV was the summation and capstone of Innocent's pontificate, but the tendency to analyze his pontificate in anticipation of Lateran IV—looking forward to the end result of his actions rather than accounting for their contemporary significance can lead to misunderstandings of the time and of this well known pope. Ultimately, the actions and rhetoric of Innocent's first years as pope laid the blueprint for his pontificate, which would ultimately manifest in the indelible legacy of Lateran IV.

Catherine Gibson
Faculty Mentor: Dr. Joan Supplee
The OAS and the Coup d'états in Venezuela and Honduras
(History)

The overwhelming majority of the Western Hemisphere's governments have exhibited dedication to democracy through the many resolutions and declarations of the Organization of American States (OAS), in which all but two states actively participate. In 2002 and 2009, Venezuela and Honduras respectively suffered major coups that initiated responses from the OAS and its individual member states, further emphasizing their commitment to democratically elected governments. César Gaviria and José Miguel Insulza, the Secretary Generals of the OAS at the times of the coups, led the democratic west in its denunciations of aggressive anti-established democratic government uprisings. By examining the leadership abilities of both Secretaries and the actions of the OAS through resolutions and declarations, this paper will attempt to compare and contrast the two coups and the reactions to each by the OAS and its member states.

Department of Mathematics

Adam Moran
Faculty Mentor: Dr. David Arnold
Congruent Numbers and Elliptic Curves
(Mathematics)

This paper is a survey of congruent numbers, natural numbers which are the areas of right triangles with rational sides. The easiest example of a congruent number is 6, the area of the well known (3,4,5) Pythagorean Triangle. This is an old topic of study, starting with Diophantus in Ancient Greece. Famous mathematicians have investigated the problem of finding all congruent numbers, such as Fibonacci (13th century), who proved that 5 and 7 are congruent numbers, and Fermat (17th century), who proved that 1, 2, 3, 4 are not congruent numbers. This problem is still unresolved today. Congruent numbers are difficult to find, but the advent of elliptic curves and Tunnell's theorem in the 1980's led to a breakthrough. The problem of finding all congruent numbers will be solved once and for all if the Birch and Swinnerton-Dyer conjecture can be proven, a highly technical conjecture which most mathematicians believe to be true. Included is a discussion of ancient and modern methods of discovering congruent and non-congruent numbers, how congruent numbers relate to elliptic curves, Tunnell's theorem, and a list of all congruent numbers less than 50.

Kaitlin Speer
Faculty Mentor: Dr. Johnny Henderson
Fractional Nabla-Difference Calculus
(Mathematics)

We study some foundational properties of difference calculus with respect to the reverse, or nabla, difference operator. We can relate some of our findings to analogous properties which use the forward difference operator, but we found that using the nabla operator highlights several features of difference calculus, such as the importance of domain choice. Beginning by establishing a Fundamental Theorem of Discrete Calculus for the nabla operator, we use this and several other properties of the nabla operator to proceed to establish a generalized Leibniz's Rule, Power Rule, Composition Rules, and Binomial Theorems. Building on these properties, we derive a solution to a general initial value problem, establish a Laplace transformation for nabla difference equations and use it to verify several of the preceding properties.

Department of Modern Foreign Languages

Lizzie Clements
Faculty Mentor: Dr. Paul Larson
El Romero Engañado: A Cautionary Tale
(Modern Foreign Languages)

Gonzalo de Berceo wrote many miracle stories about monks, priests, and other clergy members of significance. In addition to writing about the lives of such people, Berceo wrote about the mortal sins of such people. In each miracle that Berceo wrote, he used the clergy member and their sins as a didactic tool and a lesson aimed at a larger public. Miracle VIII, “El romero engañado por el Diablo” from Los Milagros de Nuestra Señora, is an example of the use of the clergy members to show real examples of harm, danger, and of the reality of sin and its effects. Furthermore, through this miracle, Berceo communicates the importance of obeying “ecclesiastical directives” and the role of the Virgin as the intercessor. Above all, Berceo utilizes the grotesque in this miracle in order to capture the attention of the public so that listen and obey the law. I will show that Berceo’s didactic practices are a function of his role teacher and entertainer, and that the lesson will only be remembered and learned by his audience if it is both entertaining and thought-provoking.

Serena Walker
Faculty Mentor: Dr. Paul Larson
Co-opting Male Discourses of Power: Dos Palabras
(Modern Foreign Languages)

This paper discusses how the events of Isabel Allende's "Dos Palabras" show how powerful language can be. The main character, Belisa, begins life with a very low status as an impoverished woman living in a very patriarchal world. She is able, however, to use her extraordinary mastery of language to break out of this repressive mold. She uses this ability to manipulate other people around her, influence the environment she lives in, and most importantly determine her own future. This allows her to live freely in the world on her own terms and ultimately create her own identity outside of the constraints of her society. This demonstrates how potent her use of language can be. By examining the Belisa in her role as scribe, I will show how she throws off the yoke of a male-dominated patriarchy, carves out an independent identity as a female scribe, and dominates the men around her by co-opting male discourse and male patterns of power through her use of language.

Vanessa Wyns
Faculty Mentor: Dr. Frieda Blackwell
Bécquer's Dreamlike Symbolism
(Modern Foreign Language)

Gustavo Adolfo Bécquer, a nineteenth century Romantic poet, wrote the majority of his *Rimas* and *Leyendas* while under the influence of insomnia. He claimed that this time between sleep and wakefulness was when the imagination was freest. In his own imagination, he found a limitless well of thoughts, desires, and moments all struggling to be released into poetry and prose. Exploring this realm was partly a blissful experience for Bécquer, as it afforded him a strange freedom: a chance for his soul to wander unbound by the body and human restrictions. This feeling of liberation and the disembodied soul is communicated in his prose pieces he called *Leyendas*, typified in " Rayo de luna" and "El gnomo" through the use of the symbols of water, birds/feathers, and light. He emphasizes their ability to go where they please. However, there is also a dark and bitter side to Bécquer's works, brought about by the realization that he can never fully communicate his dream-world to this world. For this reason we see a limitation on the freedom of these symbols in his work. The sad endings of the tales also show Bécquer's frustration. Manrique en *Rayo de luna* never finds the mysterious woman who taunts him and ends up going mad, while Marta in *El gnomo* follows the river as it whispers promises to her, but ends up a prisoner inside of it. There is a strange mix of pleasant and dark imagery- freedom and inhibition- in Bécquer's works which speak to his own mixed feelings of enjoyment and frustration which his art affords him, and to which he admits his readers.

Emily Brower
Faculty Mentor: Dr. Frieda Blackwell
The Necessity of Interior Life in the Poems of Rosalia de Castro
(Modern Foreign Language)

Rosalia de Castro is a 19th century Spanish writer recognized most importantly for the philosophical depth she brought to poetry through her continued emphasis on the human's interior life. For Marina Mayoral, Castro "se iba convirtiendo en algo más que una figura histórica y literaria" and is "un símbolo, una encarnación del alma de Galicia" (*Castro has become more than a historical and literary figure and is a symbol and encarnation of the Galician soul*) (Mayoral 14). This description is particularly apt for Castro as she devoted much of her time and poetry to consideration of the soul and its relation to physical life. Castro's poetry "express[es] eternal concerns about the meaning of life and death," as she encourages her readers to focus on the everlasting soul rather than the temporal body (Dever 7). In her poems "Moría el sol y las marchitas hojas…" and "Dicen que no hablan las plantas" Rosalía de Castro uses nature and its changing seasons to reveal the necessity of nourishing the soul even as the body fades; without an interior life, human beings will suffer spiritual death well before physical death occurs. Life is a struggle between the voice of physical reason and the interior voice of the imagination, as Castro demonstrates in her poetry, even though the interior voice of the soul is the most important for a good life, physical or eternal.

Bianca Guerrero
Faculty Mentor: Dr. Frieda Blackwell
Civilizing the Woman in Nineteenth Century Spain: *La Gaviota*
(Modern Foreign Language)

The novel *La Gaviota* by Fernan Caballero, first published in 1849, caused a literary scandal because it was one of the first realistic novels that revealed the psychology of a person and also focused on the daily activities of common people. Also, women in this novel are granted power, something that was out of the ordinary in the 1800s. The novel's protagonist, Marisalada, daughter of Pedro the fisherman, first appears in the novel as a "savage" being, with uncombed hair and disheveled clothes who refuses to follow social norms about female behavior. By the end of Part I, she decides to leave her small town and go to the city to become a singer. This act, as well as other actions Marisalada takes, reinforces her transformation from savage to a civilized lady, ignites the different points of view of her from Marisalada's surrounding society, and also highlights the many norms that women have to follow, which Marisalada initially rejects. In the end, Marisalada seems to conform to society's norms on many ways by becoming a civilized and married lady.

Anastasia Carter
Faculty Mentor: Dr. Adrienne Harris
Commercialism and Value in *Gogol's Dead Souls*
(Modern Foreign Language)

Throughout *Dead Souls*, Nikolai Gogol chronicles the advance of commercialism in nineteenth-century Russia through the successive acquaintances of Chichikov, his scheming central character. Chichikov has identified a loophole in the mortgage system, enabling him to "purchase" the names of deceased serfs and to claim them as dependents. The novel blurs the distinction between the living and the dead, a separation that becomes progressively less clear after Chichikov's negotiations with Manilov, a pleasant, though unwitting landowner, Korobochka, a suspicious crone intent upon selling household wares, Nozdryev, a violent drunk who threatens him, Sobakevich, a capitalistic gourmand, and finally, Plyushkin, a slovenly miser who has caused the deaths of all but two of his serfs. For all of their idiosyncrasies, this progression of landowners represents an increasing desire for trade, and ultimately, for profit. The irony of dead serfs as a commodity provides a driving force for Chichikov's travels, and his intense greed ultimately foreshadows his downfall. By establishing a world of false value, Gogol condemns such greed and suggests that morality and commercialism are inversely related. Ultimately, *Dead Souls* is Gogol's expression of dissatisfaction with an expanding mercantile system in a changing Russia, and the rising desire for wealth in each of these characters contributes to the deadly greed that defines his central character.

Melissa Lorena Olshack
Faculty Mentor: Dr. Cristian Bratu
Tahar Ben Jelloun's "L'enfant de sable": A Francophone novel's theme of ambiguity in character identities, literary style, and cultural criticism of postcolonial Morocco
(Modern Foreign Language)

Maghreb Francophone literature has seen a recurring theme of ambiguity demonstrated through a cultural blending that has resulted from French colonization in Arab countries. With this mixing of cultures comes an uncertainty in identity as French and Arab languages, customs, and lifestyles often times clash and yet manage to now define a postcolonial Maghreb people who struggle to incorporate both influences into a "new" identity. Jelloun's protagonist, Ahmed, is in fact, the eighth daughter born into a Muslim family in Morocco that must struggle with her sexual ambiguity as her parents do the impossible to make everyone including Ahmed believe she is a man for fear of having no male heir or source of pride in a Moroccan culture. Through the characters and different elements in this novel, ambiguity takes on several different forms as we see Ahmed struggle with his sexuality and identity but also in the narrating and literary style used in the work as well. With certain elements of magical realism, a rather non-Western literary movement, the reader also falls victim to this theme of ambiguity as the story becomes increasingly difficult to believe when the narrator himself admits his possible fictitious storytelling. Finally, ambiguity can be seen in the form of the author's criticism of a postcolonial Moroccan society, which Jelloun struggles with as his Moroccan background and heritage, in fact, influence and shape his writing. Yet, in his work, he criticizes certain patriarchal customs in his culture and instead embraces a more Western lifestyle and expression.

Haley Dermody
Faculty Mentor: Dr. Michael Boerm; Dr. Richard Duran
Belgium: The Sociolinguistic Effects of a Historically Bilingual Country
(Modern Foreign Language)

Throughout history, the country of Belgium has undergone several changes in power and status. These important events have shaped the geographical regions, linguistic areas, and cultural communities in Belgium today. As the capitol of the European Union, Brussels, Belgium is a bilingual city that serves as a connection between Flanders and Wallonia, the northern and southern regions of Belgium, respectively. Yet, even with Brussels as a midway point of the country, Belgium has been divided from its beginning, geographically and linguistically. This research project will examine the historical events from two thousand years ago up to the political events of the twenty-first century, from the time when Latin and Germanic were the two prominent languages in the Belgian region up to the current linguistic scandal between the French and Flemish languages, in order to better understand the sociolinguistics of Belgium. An effort to analyze the change of regions, rulers, and the languages during specific time periods and their influences on each other will bring into light the role of the present sociolinguistic situation of Belgium in the European Union. By studying a prime example of sociolinguistic change such as Belgium, one can furthermore apply its status to the ever-growing lingual and cultural diversity in the world.

Clint Phillips
Faculty Mentor: Dr. Cristian Bratu
Agnès Varda: La Glaneuse de la Vie
(Modern Foreign Language)

My paper, which will be written and presented in French, is going to concentrate on the life of Agnès Varda. She lived a difficult life but overcame her struggles by being innovative and original in her work as a film director before and after la nouvelle vague movement in France. The paper will focus on certain aspects of Varda's creativity and how she found inspiration in real, everyday life. She was able to take uninteresting images and characters to which no one would normally pay attention and present them in such a fashion that delivers a powerful message to her viewers. This part of her life can be paralleled in one of her films, *Les Glaneurs et la glaneuse*. The paper will also analyze how the life of Varda can be seen in the film. The theme the paper is how one is able to succeed with what one is given regardless of the extenuating circumstances, as exemplified by Agnès Varda.

Valerie J. O'Brien
Faculty Mentor: Dr. Karol Hardin
The Influence of Fang on the Phonological System of Spanish in Bata, Equatorial Guinea
(Modern Foreign Language)

Equatorial Guinea is the only African country with Spanish as its official language. It was discovered by the Portuguese in 1472, but the territory was ceded to Spain in 1778 and remained a Spanish territory (called Spanish Guinea) until 1968. Due to their long history as a Spanish possession, Equatoguineans speak a form of Castilian Spanish which is easily distinguishable primarily by the use of the voiceless interdental fricative /θ/ as a phoneme. Although Equatoguinean Spanish is very similar to peninsular Spanish, there is an abundance of phonological characteristics that can be attributed to the influence of indigenous languages such as Fang, a Bantu language spoken by the majority of the population. In this paper, I will present an analysis of the influence of Fang on the phonological system of the Spanish of Bata, Equatorial Guinea. I will discuss the phonological inventory as well as morphological and syntactic details as they pertain to the Spanish of Bata and substrate influence. Linguistic literature on Equatoguinean Spanish is extremely underrepresented. I have visited the country twice and will be returning in March to do more recordings for linguistic analysis. Some of the key features to be outlined are historical explanations for language contact and influence, the phonological system of Fang, and how Fang speakers compensate for differences in the phonological systems of Fang and Spanish. This paper will exhibit preliminary research and findings which I plan to expand on as I begin a graduate degree in Hispanic Linguistics.

Department of Philosophy

Samuel Pomeroy
Faculty Mentor: Dr. David Lyle Jeffrey
Passed into the Heavens: The Role of Melchizedek in the Biblical Narrative
(Honors Program/Humanities)

Throughout the Biblical narrative, the character Melchizedek appears in three distinct yet profoundly connected locations: Genesis 14, Psalms 110, and Hebrews 5-8. Throughout this paper, I shall demonstrate how Melchizedek functions in the Old Testament as a type of Christ, which is later expounded upon and illuminated by the writer of Hebrews. Melchizedek's function as the High Priest of God in the story of Abram is the foundation for the meaning of Psalm 110, whereby a Davidic king ordained in the priesthood of Melchizedek is granted the authority of a ruler and judge. I will first examine how the Genesis narrative and prophetic Psalm together lay the groundwork of Melchizedek's dual identity as high priest and king. In conclusion, I will show how the writer of Hebrews transposes the body of meaning ascribed to Melchizedek from these two passages to illustrate that Jesus is both King to rule the hearts of His people and High Priest to intercede for His people. Yet, and most significantly, He does so in such a way that surpasses the merely physical realm: He rules from the "right hand of the throne of the Majesty in the heavens; a minister in the true tabernacle, which the Lord pitched, and not man" (Heb. 8:1-2).

This paper will study closely the etiological narrative associated with the character Melchizedek, how the Bible – in a way – converses with itself to illuminate the work of the salvation of mankind through the graceful narrative of its True protagonist.

Shayan Amin Makani
Faculty Mentor: Dr. Michael Beaty
Of Mice and Men: Applying Metaphoric Condensation to Dostoevsky's Notes from the Underground
(Philosophy)
Since its publication in 1864, Fyodor Michailovitch Dostoevsky's short novel, Notes from the Underground, has been the focus of much scholarly discussion and analysis. With its sesquicentennial anniversary only a few years away, the time is ripe for a fresh engagement with this foundational text in Russian literature. Proper philosophical analysis requires an acquaintance with the themes, motifs, and symbols, of an author's text, particularly when evaluating the underlying messages that are illustrated in fictional literature.

Thus, my project is a determinate and focused one: I hope to clearly analyze a particular instance of symbolism in Dostoevsky's Notes from the Underground through an existentialist lens. After carefully scanning the relevant literature, it has become apparent that little time and investigation has been devoted to examining the symbolism of mice in Dostoevsky's Notes from the Underground. Dostoevsky metaphorically utilizes mice in the third chapter of the first part of his novel. Accordingly, my analysis will focus on this portion of the novel, but my goal will be to situate this chapter in a holistic understanding of Dostoevsky's text and its implications for existentialism as a philosophical school of thought. A systematic and sustained critical evaluation of the symbolism of mice reveals existentialist themes such as the paradoxes of societal intelligence and acceptance, the collapse of modern humanism, and the inevitability of feelings of ressentiment.

Department of Physics

Erwin Gostomski
Faculty Mentor: Dr. Lorin Matthews
The Influence of Monomer Shape on Aggregate Morphologies in First Stage Protoplanetary Development
(Physics)

Dust is a prevalent component of our universe. Dust particles have been shown to coagulate to create fluffy aggregates which are the first step in planetary formation. Numerical models have been created to investigate the dynamics and properties of these aggregates from ellipsoidal monomers we can compare the morphology and porosity to aggregates built using spherical monomers. Analyzing the differences in the two populations helps determine whether spherical monomers are an acceptable approximation in all coagulation cases, or whether new models need to be implemented to accurately model dust aggregation.

Kimberly Orr
Faculty Mentor: Dr. Dwight Russell
Testing the Visual Magnitude Limits of the PJMO
(Physics)

The Paul and Jane Meyer Observatory (PJMO) operated by the Central Texas Astronomical Society is a 24-inch (0.6 meter) Richey-Chretien research grade telescope. The capabilities of PJMO telescope are stated as having a limiting visual magnitude (ML) of 16.6. With one of the CCD cameras attached ML increases to approximately 18. This ML is only an approximate number having never been rigorously tested. In the upcoming months we will test the upper limits of the observatory's ML while attempting to image high visual magnitude ($18<ML<20$) Kuiper Belt Objects (KBOs) Going beyond 20th magnitude will depend on the success of the first set of observations. Image manipulation techniques, including image stacking, will be used to stretch the boundaries of the system. And finally, these images will also be used to determine the orbital elements of these objects. Any other incidental information that can be determined from the images, including physical characteristics of the KBOs, will be factored into our results as well. PJMO's location, approximately 50 miles west of Waco, Texas outside of the town of Clifton, makes it an ideal location for Baylor University students to carry out their research opportunities.

Cameron Buescher
Faculty Mentor: Dr. Kenichi Hatakeyama
Missing Transverse Energy and Sum Transverse Energy Reconstruction with the CMS Detector at the Large Hadron Collider
(Physics)

Over the course of last summer, I studied reconstruction of Missing Transverse Energy and Sum Transverse Energy in the 7 TeV proton-proton collision data produced by the Large Hadron Collider (LHC). The reconstruction of these observables is critical in searches for the dark matter candidate particles which are being carried out at the Compact Muon Solenoid (CMS) experiment. The primary goal of my study was to ascertain consistency between old and new data collected by CMS. Prompted by an increase in the instantaneous luminosity of the collected data, I examined the effects of increased luminosity on missing transverse energy and sum transverse energy distributions. Overlaid distributions suggested that the effect of luminosity on these distributions was insignificant; however, further investigation revealed the changes, and the observation also suggested that the vertex tracking software of the experiment may be inefficient for selecting 1-interaction events. I also examined MHT, missing transverse energy reconstructed from high energy jets only. This observable was found to be less sensitive to the effects of increased luminosity and may be a powerful observable for future CMS data analysis.

Ian Eaves
Faculty Mentor: Dr. Linda Olafsen
Spatio-temporal beam profiling of pulsed infrared laser sources
(Physics)

Development of viable infrared lasers relies not only on the power and wavelength generated by the source, but also on the spatial and temporal profile of the output beam. Thermal imaging is of particular interest to researchers working in the field of optically pumped semiconductor analysis as the output from many of these devices falls in the mid-infrared range. While knife edge and other beam profile analysis techniques typically are unable to capture the temporal evolution of beam profiles, real time imaging is employed in this work, using a thermal camera synchronized with a Nd:YAG pump laser via LabVIEW-controlled triggering. Coupling the synchronization with detailed image analysis using IDL, this new methodology is applied to the near-infrared output of an optical parametric oscillator and ultimately will be extended to mid-infrared semiconductor lasers.

Alex Sabey
Faculty Mentor: Dr. Jeffrey Olafsen
Investigating Low Dimensional Chaos with Nearly Elastic Spheres
(Physics)

An experimental and numerical study of the dynamics in a system which is prone to chaotic motion is implemented via a shaking plate and two nearly elastic particles. Confined to move in the vertical direction, one spherical particle is driven by the shaking plate while the other sphere is driven by collisions with the first. The motion of the two particles and the plate were captured with a relatively high speed (~340 fps) CCD camera via image analysis algorithms written in IDL. Measurements of position, velocity, acceleration, and energy are used to formulate a thorough description of the system. The experimental results are compared to those of a numerical simulation to explore phase space for chaotic orbits of the two trajectories as well as phase synchronization between the particles and the plate. A thorough investigation of the phase space to describe the low dimensional system as well as to examine the dynamics for phase synchronization between the two particles is being pursued.

David George
Faculty Mentor: Dr. Wickramasinghe Ariyasinghe
Electrostatic Energy Analyzer Characteristics
(Physics)

The Electrostatic Energy Analyzer (ESA) is used to separate or find a specific energy of charged particles from a beam of muti-energy particles. The ESA's applications are versatile. In particular, auger electron spectroscopy is a common analytical technique used to identify chemical composition in material science and the ESA is the backbone of this analytical technique. The ESA consists of a voltage applied across concentric semicircular plates which allow only a narrow range of electron energies through. Electrons with specified energies are detected by a type of photomultiplier, which in turn plots a signal. By ranging the applied voltages, a spectrometry of electron energies for a given electron source can be found. Variations to the applied voltage across the concentric plates, end plate, and focusing plates produce specific characteristics for the ESA used. The specific characteristics denoting the relationship between energy resolution and particle energy, the relationship between signal output and particle energy, and verification of the linear relationship between applied transmission voltage and electron energy, for an Electrostatic Energy Analyzer Model: AC-903B are found and given in this poster.

Andrew Yost
Faculty Mentor: Dr. Jeffrey Olafsen
Trajectory Analysis of Inelastic Gravitational Billiards
(Physics)

We present an analysis of an experiment involving the motion of a gravitational billiard experiencing inelastic collisions with a sloped boundary. The inelastic particle is set into ballistic motion within three types of metallic boundary shapes: parabolic, hyperbolic, and wedge. The two-dimensional cell is oriented vertically with respect to gravity and motion is maintained by horizontal shaking. The trajectory data for various boundary shapes, shaking frequencies and amplitudes is analyzed to determine regions of periodic and chaotic behavior. The shaking is provided by a DC-motor and armature that allows for control of both the shaking amplitude and frequency. Comparison of the experimental results to numerical methods provides a sensitive test of the velocity dependence of the coefficient of restitution. An additional experimental trial is planned for a wedge boundary with an angle of 1200. One goal of the analysis is an examination of the Lyapunov exponent for the trajectories in the cell.

Lindsay Buckingham
Faculty Mentor: Dr. Lorin Matthews
Tholin Aggregation in Titan's atmosphere: Developing a probabilistic model
(Physics)

Titan's climate is dominated by a reddish haze in its atmosphere made of the organic aerosol tholin. This haze is known to influence the climate through temperature control, hydrocarbon production and atmospheric circulation. Because of continuing interest in Titan's tropospheric activity, it is important to understand the production and growth of tholin through the atmospheric layers. The coagulation of tholin is influenced by the cross-sectional area, relative velocity and charge on the aggregates. The aggregates become charged through plasma produced primarily by galactic cosmic rays (GCR) and UV radiation during the nighttime and daytime, respectively. The purpose of this study is to model the formation of tholin molecules in the lower atmosphere of Titan, approximately 100 to 300 km above the surface, using different charging schemes for daytime and nighttime ion production. This is simulated by numerically modeling the growth of three generations of aggregates using different conditions and charging based on the altitude of production for each generation. The preliminary results for the first and second generations charged by both charging schemes are given and compared with measured characteristics of tholin in Titan's atmosphere.

Department of Political Science

Haley Allee
Faculty Mentor: Dr. Ivy Hamerly
The Successes of the Finnish Education Model and Possible Implementation within the Declining American Education System
(Political Science)

The paper's purpose is to identify what makes the Finnish system of education thrive, and if these elements could be implemented into the struggling American education system. Finland ranks 1st in math and science compared to the U.S. who ranks 26th and 29th respectively. Finland currently spends less than the U.S. on their model and get better results. Finland continues to lead the world in education due to the Finnish government's high standards regarding its education system, such as government expenditure for education (i.e. subsidization for higher education) and stricter requirements for teachers, as well as societal emphasis of getting an education, particularly pertaining to the benefits of education. In regards to this model, it can be applied to the U.S. education system thus helping America regain its competitive edge in education. However, the subsidization for higher education from the national government seems to be the most critical aspect that cannot be implemented, due to difference in government and economic systems.

Jennifer Cook
Faculty Mentor: Dr. Dave Bridge
Courting Disaster: Why Dred Scott Was Different from Its Predecessor
(Political Science)

This paper compares two Supreme Court cases, Groves v. Slaughter (1841) and the infamous Dred Scott v. Sanford (1857). The two cases have remarkable similarities. The set of facts in both demonstrated owners transporting slaves from free territories to slave states. Both came off the heels of a presidential election. Even the Justices who presided over the two cases were extraordinary similar in their ideological makeup. In fact, three Justices were on the bench long enough to hear both cases. If these variables can be held constant, then what accounts for the difference between the two? How did the Court skirt the issue in 1841, but later come to the conclusion that blacks were "so far inferior that they had no rights which the white man was bound to respect"? This paper applies and expands upon the non-majoritarian theory of Supreme Court politics. In sum, the Court could avoid the controversial issue of slavery expansion in Groves because legislative compromise was still possible in 1841. By 1857, though, the actual legislative compromise was an acceptance to let the Court try its hand at the divisive issue. The comparative case study research design allows us to apply the theory to both cases, where we can gain even more traction on the conditions under which we can expect the Court to come to such divisive conclusions. Finally, the conclusion questions the wisdom of a dominant majority coalition choosing to employ the non-majoritarian strategy.

Maria Fernanda Aguirre
Faculty Mentor: Dr. Ivy Hamerly
Humanitarian organizations and NGOs in Latin America: The cases of Mexico and Colombia
(Political Science)

This paper argues that non-governmental organizations in Latin America, specifically those dealing with human rights, have not lived up to their potential due to the weakness of the states; caused partly by their colonial history and late transition into democracy. Through the study of Colombian and Mexican past political experiences, as well as current national problems, we are able to conclude that the history-state strength-NGO model can offer a successful explanation for existing 'third sector' trends. Using evidence from both countries, we can observe a pattern develop; an increase in state stability and strength leads to a rise in civil society, which fosters the development of NGOs. The result of the investigation is that Mexico's humanitarian sector is more extensive than Colombia's, because of its stronger state. In order to test this method and apply it with more certainty to Latin America, it is suggested that the same study is performed with countries such as Brazil and Argentina. These reports will further prove the theory, or bring forth new explanations for the current trends.

Samantha Jones
Faculty Mentor: Dr. Ivy Hamerly
Changing Norms: How International Humanitarian Organizations Can Do Their Part
(Political Science)

This paper argues that international humanitarian organizations (IHOs) change international norms by participating as powerful international actors in domestic politics, thereby affecting the cooperation of states to international humanitarian norms. I used three main comparisons to reach my conclusion. The NGOs I compared were International Justice Mission (IJM), Invisible Children, and the International Committee of the Red Cross (ICRC). By making comparisons of these NGOs, I showed different methods of how each is involved in domestic politics in order to change international norms. As legitimate international actors, IHOs change international norms by exposing human rights violations by states, by helping states to implement international humanitarian law, and by continually advocating for and practicing international humanitarian laws, such as the United Nations Universal Declaration of Human Rights. By challenging counterarguments against the international legitimacy of IHOs, I sought to establish more credibility for these groups. Using cited evidence, my paper proves that states accept norms created and advocated for by IHOs. The involvement of IHOs in domestic politics then becomes an international norm.

Department of Religion

Tyler Davis
Faculty Mentor: Dr. Joe Coker
Christian Theology and Racial Description
(Religion)

In this paper I will explore issues in answering the normative question of "how do Christians talk about race in the twenty-first century". Contemporary race theory offers sharply contrasting perspectives on addressing the normative language of how (or how not) to speak about race. Views differ from racial skeptics, to racial constructionists, to racial population naturalists, but all three broad views share a common metaphysical conviction about what race fundamentally is and then proceed to answer the normative question in three unique ways. I argue that the language used to answer the normative question about race ought to give priority not to metaphysical considerations, but rather theological-ethical ones.

Against this preliminary background the paper will move on to explore some Christian theological considerations; namely, how ideas of race fit within a larger Christian theological anthropology, how racial identities and stories can fit within the larger Christian story, and if it is possible to move beyond the 'realism' of speaking in racial categories while including the stories of those races who have found solidarity through historical racial injustices. Because of the abstract nature of the issues considered, I aim to embody the exploration and argument of the paper through working with Tony Morrison's novel, *the Bluest Eye*. It is hoped that this embodiment will show how the Christian theological considerations in approaching the issue of racial descriptions have relevancy beyond academic speculation and discussion, and can be fruitful in helping Christians better talk about race in the twenty first century.

Michael Gienger
Faculty Mentor: Dr. Joe Coker
Globalization and the Eucharist
(Religion)

This paper will address the post-modern phenomenon known as globalization and its subsequent theology. Globalization is a narrative that preaches a false "catholicity" as it removes human relations from the local and the particular. This creates numerous theological and ethical problems for Christians. As a counter-narrative, I will suggest that participation in the Eucharist solves the problem of the one vs. the many, the global vs. the local, and offer practical alternatives to globalization through the Church.

Billy Mcmahon
Faculty Mentor: Dr. Joe Coker
Missions and the Postmodern Critique of Metanarrative
(Religion)

Postmodern thought can be an intimidating and controversial philosophy to Christian evangelism. In this paper, I will (1) briefly explore the nature of evangelistic and social improvement models of missions, (2) provide and examine Jean-Francois Lyotard's definition of postmodernism, (3) apply this postmodern criticism to the aforesaid mission models, and (4) explore Brian McLaren's postmodern approach to evangelism in *More Ready Than You Realize: The Power of Everyday Conversation*. After close analysis, I will argue that a Lyotardian postmodern critique of knowledge can be constructive in increasing the effectiveness of Christian Missions.

Claire Aufhammer, Matt Berry, Daniel Camp, and Amy Rozzi
Faculty Mentor: Dr. Dennis Horton
The Effects of Short-term Missions on Mission Team Members
(Religion)

By conservative estimates, more than 1.5 million U.S. Christians annually participate in short-term mission work (that is, trips of a year or less) at an average cost of about $1,400 per person. Because two-thirds of these trips last two weeks or less and the volunteers are not always adequately trained, a number of missiologists have begun to question the wisdom of investing so much money—an estimated $2 billion per year—to fund short-term travel expenses if the positive effects on trip participants are also short-term. To help ascertain the effects of short-term missions (STM) on mission team members, an undergraduate research project was conducted by surveying approximately 550 students and interviewing 50 mission team leaders and 32 STM participants. In this session, the panelists will present findings from this study about the effects of short-term missions on the participants' level of ethnocentrism, materialism, and long-term involvement in mission work.

Department of Sociology

Natasha Rodriguez
Faculty Mentor: Dr. Carson Mencken
Called By God
(Sociology)

Religious experiences are very subjective, varying from individual to individual. Each person reacts differently to the onslaught of religious wealth out there. Does a person have to necessarily attend church every day in order to have a strong religious experience? Does this factor even help predict a person's propensity to have a strong religious experience? Surprisingly, not so much. According to the Baylor Religion Survey, when asked the question, "Have you ever felt called by God to do something?" the 39.6% of individuals that marked "yes" to the question, did not vary so much by church attendance, but rather other factors such as education, gender, race, and the region of the country in which they live. These factors had the greatest variation, providing a significant amount of insight into the general characteristics that differentiate this part of the population from the majority whom have never felt called by God to do something. There is one particular theory, the "compensator's theory", that helps explain why certain individuals are more inclined to experience stronger than normal reactions to religion. According to the compensator's theory, people on the margin of society, the poor, women, minorities, and people who have historically lacked power, are more likely to feel especially attracted and attached to religion in general because of the idea that they will be compensated in the future. It provides an appealing sense of fairness and justice and, overall, reason for the often times unpredictable and unjust ways of the world. With these ideas in mind, we proceed to explain the data found.

School of Engineering and Computer Science
Department of Electrical and Computer Engineering

Matthew Moldovan
Faculty Mentor: Dr. Charles Baylis
Graduate Student Researcher
(Electrical and Computer Engineering)

With the increase of communication and radar systems usage comes a greater demand for better electronic circuit design. All communication and radar systems require the design of power amplifiers (PA) to successfully transmit electrical signals to appropriate allocated spectra at desired output powers. Radio frequency (RF) PA design can get very complex since high frequency signals are prone to spectral leakage and distortion, which are unwanted nonlinearities in the signal and the amplifier. This presentation will explore and characterize different PA nonlinearities so that they can be accounted for when designing a PA. Nonlinearities manifest themselves in intermodulation distortions such as AM/AM and AM/PM conversion, which will be discussed. In addition, nonlinear measurements such as Adjacent Channel Power Ratio (ACPR) will be measured and illustrated to give us a better understanding of nonlinearities and their results. Load-pull will also be performed on an active device, varying its load impedance in order to observe nonlinear effects of the PA as well as achieve optimum performance out of the device—maximizing linearity and efficiency.

Josh Martin
Faculty Mentor: Dr. Charles Baylis
Using Wirtinger Calculus to Predict the Behavior of Time-Invariant Periodicity-Preservation Systems
(Electrical and Computer Engineering)

The nonlinear behaviors associated with RF systems can produce unwanted effects such as spectral leakage. Wirtinger calculus provides a method for approximating nonlinear system behavior. A broad range of RF systems can be classified as time-invariant periodicity preservation (TIPP) systems. This presentation examines the accuracy of the Wirtinger calculus parameters for approximating TIPP systems. As a first step, these parameters are calculated for simple TIPP systems. Once the limitations of this method have been explored, they can be applied to more complex RF systems such as power amplifiers.

Department of Mechanical Engineering

Joshua D. Kinnaird
Faculty Mentor: Dr. Kenneth Van Treuren
Wind Turbine Site Survey of Region 12
(Mechanical Engineering)

With economic uncertainty facing the global community, understanding energy has become increasingly important and will continue to be so in the future. This need led to the development of an energy literacy class Engaged Learning Group (ELG) for incoming freshmen that revolves around the topic of energy and its associated societal, political, environmental and economic effects. During the four semesters of this ELG, the students were given the necessary background information they needed to analyze energy issues and make proposals for research in this field. One of the student projects, the wind turbine site survey, was begun at Region 12 Service Center off Highway 6 near the Texas Central Market place. This site is one of the highest elevations in Waco, giving it the greatest probability of successfully placing a wind turbine. Erecting a tower and measuring wind velocity at several heights would accomplish this survey. Dr. David Carr from West Texas A&M University was willing to work with Baylor to accomplish the survey. A 100 foot tower was rented from West Texas A&M and erected in June of 2010. It has anemometers at 100 ft, 75 ft and 50 ft as well as a weather vane to measure wind direction. As almost a year of data has been accumulated, an analysis of this data will be accomplished. The hope is to learn from the proper wind survey the wind quality for Waco and purposely design wind turbine blades to be optimized for this wind speed.

Kaitlin Barney
Faculty Mentor: Dr. Kenneth Van Treuren
Energy Efficiency of Various Rooftop Designs
(Mechanical Engineering)

The objective of this experiment is to investigate energy efficiency by examining prototype rooftop designs as a means to effectively insulate buildings. These designs include a shingled roof, a white roof, and several rooftop gardens. Rooftop gardens are man-made green spaces located on rooftops. They can potentially reduce the need for air conditioning, lower outside ambient air temperatures, reduce smog in the summer, insulate during the winter, reduce rooftop maintenance, and benefit the larger environment by reducing runoff and pollution.
The study proposes that certain plants, based on color of leaves, will be more efficient at insulating a structure from temperature fluctuations than plants of another color. This will be determined by comparing the difference between daily temperatures and internal temperatures between the rooftop designs.
Plant color variation could prove to be very useful because plants absorb different types of light which correlate to specific energy amounts. Green plants will absorb mostly red light within the visible spectrum and violet plants absorb mainly yellow light. A rooftop garden full of violet plants should reduce the heating load of a building more efficiently than that of the green-plant rooftop garden because yellow light has a higher energy than the red visible radiation needed for green plants. Absorption of this radiated energy will interfere with and disable the energy's ability to enter the building because it will be absorbed in the photosynthetic processes of the plants rather than absorbed by the building.

School of Education
Department of Curriculum and Instruction

Beleida Romero, Alma Torres, and Gaspar Terrazas
Faculty Mentor: Dr. Randy M. Wood
Immigrant Student Hardships
(Curriculum and Instruction)

Students who chose to get an education in the United States but are immigrants go through a lot of hardships. These hardships develop because of their status, poverty or language barriers. This presentation will look at these aspects of immigrant student hardships.

Leslie Montiel, Ala Duke and Francisco Solorzano III
Faculty Mentor: Dr. Randy M. Wood
Poverty in an age of Affluence
(Curriculum and Instruction)

Immigrants are flooding into the United States. Even though many feel like that they are coming to the "land of plenty", the find out that the cost of living in this "rich land" is ever increasing. This presentation will look at the effect of poverty on these families and what it means for the future with so many families falling into this poverty category.

Maddie Stiers, Angel Rodriguez and Andrea Casasola
Faculty Mentor: Dr. Randy M. Wood
Immigration Issues facing Higher Education
(Curriculum and Instruction)

Getting college educated immigrants might not be as easy as some think. This presentation will review what is at stake as we look to the future of Texas and the United States with the large influx of immigrants who want to be educated but cannot find the avenues (of language, math skills, etc.) and financial backing in which to accomplish this goal.

Daniella Gonzalez, Lyzette Garza, and Jacqueline Lara
Faculty Mentor: Dr. Randy M. Wood
Education issues in a Borderless Society
(Curriculum and Instruction)

How are we going to educate Americans in the future? What are we going to do to make sure that all persons in the United States have a good education or can get a good education? This presentation will review what is happening and suggest what should happen to educate the next generation of Americans.

Ledy Scott and Sierra Buske
Faculty Mentor: Dr. Randy M. Wood
Hispanic Immigration Issues in 2011
(Curriculum and Instruction)

With the US Congress passing sweeping new laws and enforcing new immigration policies, it is time to review the problems facing immigrants as they try to come into the United States. This presentation will review this current, front page issue.

Department of Educational Psychology

Kara Blenden
Faculty Mentor: Dr. Tonya Davis
Analysis and Treatment of Challenging Behavior among Individuals with Developmental Disabilities
(Department of Educational Psychology)

Children with developmental disabilities demonstrate deficits in communication abilities. Deficits in communication often result in increased challenging behavior such as aggression or self-injury. However, challenging behaviors serve a particular function, such as to gain attention or escape an undesired task, as children with communication deficits may not be able to communicate such needs verbally. Traditionally, interventions to reduce challenging behaviors have focused on altering the consequence the child receives as a result of the challenging behavior. For example, a child seeking attention by hitting would be ignored, which reduces hitting as it no longer receives the desired consequence. In this study, we analyzed the effects of an antecedent-intervention to reduce challenging behavior. Haley, a young girl with a cognitive disability, frequently engaged in aggression and throwing objects in order to gain attention. During the intervention, Haley was asked to play quietly while the teacher worked, a common trigger for aggression and throwing objects; however, prior to this withdrawn of teacher attention, two conditions were presented: pre- and post-satiation. During the pre-satiation conditions, Haley was not provided with any teacher attention before the teacher withdrew attention to begin work. During post-satiation condition, Haley was given non-contingent attention until she engaged in a previously-validated indicator of satiation, and then the teacher withdrew attention to began work. Results indicate that Haley's challenging behavior was reduced when she was given noncontingent attention prior to the teacher withdrawing attention. Results suggest that antecedent-based interventions are viable options for reducing problem behavior.

Information Systems
Department of Information Systems

Isaiah Cisneroz
Faculty Mentor: Dr. Hope Koch
How I Became IT
(Information Systems)

For decades, there has been a crisis in IS: not enough students choose to major in IS despite strong job growth in IS-related fields. This crisis is compounding: increasing numbers of women/minorities are entering the workforce and the IS field has historically attracted men. This study assesses the effectiveness of the many enrollment interventions recommended in the IS literature by reporting on how and why students, who have been exposed to a plethora of enrollment interventions during their college career, become IS majors. Furthermore, the study addresses the differences between how females/minorities respond to these intervention compared to white males. Using social cognitive career theory as a theoretical lens, this study adds rich and contextual insight to the IS enrollment research and serves to guide IS programs on the most effective IS enrollment interventions.

Keywords:
social cognitive career theory, major choice, intervention, enrollment, minority

Student Index

A
Aguirre, Maria F. 48
Aguirre, Rafael Deliz 14
Ahmed, Tarin 6
Allee, Haley 47
Alvarez, Frank. 5, 6
Aufhammer, Claire 50
Azeesz, Carol 1
B
Baqui, Alexeis 18
Barnes, Pate 27
Barney, Kaitlin 52
Barrington, Tia 35
Barta, Caroline 21
Beard, Laura 12
Belz, Ben 26
Berry, Matt 50
Blenden, Kara 53
Bovio, Rebecca 22
Bransford, Tim 26
Brower, Emily 40
Brown, Jon 31
Buckingham, Lindsay 46
Buescher, Cameron 45
Buske, Sierra 53
Buttecali, Jillian 36
Byrd, Abby 1
C
Camp, Daniel 50
Carter, Anastasia 41
Casasola, Andrea 52
Casiano, Alexis 1
Castrillon, Jessica 7
Clements, Lizzie 38
Cook, Jennifer 47
Cook-Lindsay, Austin 27
Cornejo, Chelsea M 5, 6
D
Dadhania, Frany 8
Dale, Alex 28
Damoiseaux, Jolene S 5, 6
Danielson, Ryan 34
Daugherty, Dan 8
Davis, Tyler 49
Dermody, Haley 42
Dipeitro, Lyndsay 32
Dossey, Josh 5, 6
Drake, Jaclyn 24
Drum, Bayless E 5, 6
Duke, Ala 52
Durham, Ashley 2
E
Eaves, Ian 45
Eisele, Ashley 8
F
Fashina, Funmibi 5, 6
Fernelius, Josh 8
Fisher, John 31
Fiyan, Abraham 6
Flynn, Amanda 9
Fricke, Kayla 10
G
Gannon, Maria 26
Garcia, David 9
Garcia, Juliet 9
Garrett, Chelsea 2, 3
Gary, Bradley Scott 9
Garza, Lyzette 53
George, David 46
Gibson, Catherine 37
Gibson, Kimberly 23
Gienger, Michael 49
Goines, Tiffany 7, 16
Gonzalez, Daniella 53
Gostomski, Erwin 44
Grassbaugh, Emily 2
Greenstein, S. 6
Guerrero, Bianca 17, 40
H
Hahn, Melissa 11
Hall, Erin 9
Hanks, Cory 7
Hannon, Michael 26
Heflin, Brett 26
Helms, Joshua 31
Hermesch, Kevin 26
Hernandez, Bekah 9
Howard, Catherine M 5, 6

Student Index

Hudson, Amelia 24, 26
Hughes, Steven 12

J

Jacob, Suzie 9
James, Alexandria 5
Jawad, Dalia 9
Johnson, Audrey 23
Johnson, Katherine 26
Johnson, Rachel 5, 6
Jones, Samantha 48
Joyce, Elizabeth 3

K

Kang, Ki Eun 5, 6
Kaur, Aman (Amy) 11
Keck, Marcus 25
Keiser, Kelley 12
Kinnaird, Joshua D. 51
Kohn, Taylor 16
Krishnappa, Rashmi 14
Kuhn, Jimmy 5, 6

L

Lambert, Jason 12
Landers, Tyler 28
Lara, Jacqueline 53
Leavell, Alyssa 22
LeBlanc, Stephanie 33
Liu, Amy 13
Locke, Ashleigh 18

M

Makani, Shayan Amin 44
Manzana, Carlo 17
Margheim, Stephen 21
Martin, Josh 51
Martinez, Amanda 3
Mcmahon, Billy 49
McVey, T. Keith 32
Meese, Anna 5, 6
Moldovan, Matthew 51
Montiel, Leslie 52
Moore, David 37
Moran, Adam 38

N

Namkung, Suk 15
Nava, Andra 25
Neilson, Catherine 35
Nelson, Victoria A 5, 6
Nguyen, Kristie K 5, 6
Nichols, Erica 8
Nichols, Tabatha 3, 4
Northedge, Caroline 22

O

O'Brien, Valerie J. 43
O'Dwyer, Keith 8
Olshack, Melissa L. 41
Orr, Andrew 5, 6
Orr, Kimberly 44

P

Palza, Katia 14
Pamma, Balpreet 7
Patel, Roshan 6
Phillips, Clint 42
Phrampus, Benjamin 34
Pomeroy, Samuel 43
Powell, Ellie 8

R

Raad, Sammy 8
Raley, Morgan A 5, 6
Ram, Sindhuja 9
Rangel, Nikki 3
Reyna, Jose 23
Robins, Nathan 26, 27
Rodriguez, Angel 52
Rodriguez, Natasha 50
Romero, Beleida 52
Rosenthal, Ellie 5, 6
Rosenthal, Meredith K 5, 6
Ross, Katie 26
Rozzi, Amy 50

S

Sabey, Alex 45
Schuele, Corinne 26
Scott, Ledy 53
Sepela, Hope 30
Smith, Luke D 5, 6
Snyder, Lindsey 19

Student Index

Soeung, Melinda 19
Soeung, Victoria 19
Soileau, Savannah 33
Solorzano III, Francisco 52
Sotelo, J. 6
Speer, Kaitlin 38
Sprengal, Gregory 30
Stiers, Maddie 52
Stone, Hadleigh 1

T

Taylor, Shanna 23
Terrazas, Gaspar 52
Toney, Sky 26
Torres, Alma 52
Truitt, Ashley 3
Tuttle, Grace 4

V

Vednor, Peter 20

W

Walker, Melanie 13
Walker, Serena 39
Washington, Danielle 20
Wasson, Chelsey 4
Webb, Jade 11
Weinrich, Elizabeth 23
Welch, Cody 29
White Laura L 5, 6
Wilson, Alix 5, 6
Windham, Melissa 4
Wiswall, Hanna 7
Witt, Laurel 3
Wittman, Brett 29
Wyns, Vanessa 39
Wysocki, Lynette 26

X

Xu, Lucy 13

Y

Yancey, Preston 36
Yanney, Rayce D 5, 6
Yost, Andrew 46

Faculty Index

A
Adair, Dr. Tamarah 5, 6, 7, 10, 15, 17
Alexander, Dr. Sara 1, 3
Ariyasinghe, Dr. Wickramasinghe 47
Arnold, Dr. David..... 39
Atchley, Dr. Stacy C. 30
B
Baker, Dr. Lori..... 2
Baker, Dr. Lynne 26
Baylis, Dr. Charles 52, 53
Beaty, Dr. Michael..... 45
Blackwell, Dr. Frieda 40, 41
Boerm, Michael 43
Bratton, Dr. Susan 25, 26, 27, 28
Bratu, Dr. Cristian 42, 43
Bridge, Dr. Dave 48
Brooks, Dr. Bryan..... 28
Byars, Bruce 29
C
Coker, Dr. Joe..... 50
D
Danley, Dr. Patrick 15
Davis, Dr. Brennan..... 52
Davis, Dr. Tonya 55
Denton, Dr. Jeanette M. 24
Driese, Dr. Steven..... 29, 30, 31, 32, 34
Dunbar, Dr. John..... 32, 33
Duran, Dr. Richard 43
Dworkin, Dr. Steve 34
F
Fish, Dr. Jeffrey..... 21
Froberg, Dr. Brent 21
G
Garner, Dr. Charles..... 20
Gibbon, Dr. Bryan 5, 6
Grebenyova, Dr. Lydia 24
Gutzwiller, Dr. Kevin 13
H
Hamerly, Dr. Ivy 48, 49
Hardin, Dr. Karol 44
Harris, Dr. Adrienne 42
Hartman, Dr. Diane..... 13, 16, 18
Harvill, Dr. Marty..... 5, 6, 7, 8, 9, 10, 11, 12, 14, 17
Hatakeyama, Dr. Kenichi..... 46
Henderson, Dr. Johnny..... 39
Hillis, Dr. William..... 16
Horton, Dr. Dennis..... 51
J
Jeffrey, Dr. David L. 44
K
Kebaara, Dr. Bessie..... 14
King, Julie 27
L
Larson, Dr. Paul..... 39, 40
Lind, Dr. Owen..... 14
M
Macaulay, Carol..... 1, 2, 3, 4
Matthews, Dr. Lorin..... 45, 47
Mencken, Dr. Carson..... 51
Moehnke, Dr. Marcie 9
O
Olafsen, Dr. Linda..... 46
Olafsen, Dr. Jeffrey..... 46, 47
Owen, Dr. Lind..... 14
P
Peppe, Dr. Daniel 33
Pinney, Dr. Kevin G. 19
Pulliam, Dr. Jay R. 35, 36
R
Russell, Dr. Dwight 45
Russell, Dr. Richard..... 25
S
Sloan, Dr. Stephen 37
Smith, Dr. Alden 22
Supplee, Dr. Joan..... 38
Sutherland, Dr. Gabrielle 36, 37, 38
T
Trawick, Dr. Mary Lynn..... 19, 20
V
Van Treuren, Dr. Kenneth..... 53, 54
Vitanza, Dr. Dianna..... 22, 23

Faculty Index

W
Wilkins, Dr. Ken 7, 12
Wood, Dr. Randy 54, 55
Y
Yelderman, Dr. Joe 35