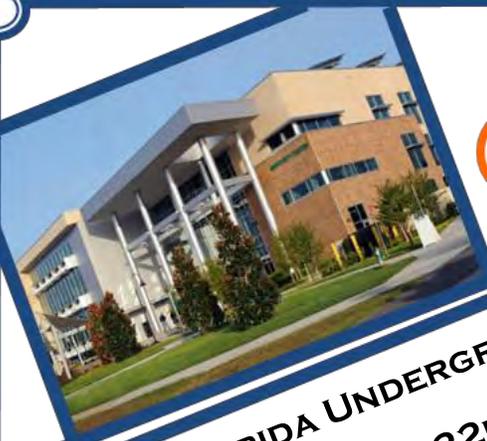


FLORIDA UNDERGRADUATE RESEARCH CONFERENCE
FEBRUARY 22ND-23RD 2013-GAINESVILLE FL.



Welcome

The University of Florida Center for Undergraduate Research is pleased to host the 3rd Annual Florida Undergraduate Research Conference. This conference is organized to showcase undergraduate research efforts from across the state. This year over 290 students are sharing their research conducted in a wide range of disciplines. Students representing 23 institutions, large and small, public and private, are gathered to highlight the research they have worked on this past year. In addition, we are pleased to offer a variety of professional developments workshops for participants. Graduate recruiters are important sponsors of the event and are here to discuss options for post graduate education.



We would like to thank our long list of co-sponsors of the event, listed in the program.

Each of these students has benefitted from mentoring provided by exceptional faculty researchers. We thank them for their efforts on behalf of the undergraduate students.

We encourage you to share in this project as you visit the presentations and read the collection of abstracts.

Enjoy,



Director, Center for Undergraduate Research

Research is formalized curiosity. It is poking and prying with a purpose. Zora Neale Hurston (1891-1960). American folklorist, anthropologist, and author.



Presenter: Ago, Adela

Authors: Adela Ago, Romina Buna, and Shannon McQuaig

Research Mentor: Shannon McQuaig

Natural Sciences Department, St. Petersburg College

Examining the Prevalence of ESBL-Positive Bacteria in the Hospital and Community

The Center for Disease Control has documented increasing prevalence of antibiotic resistant bacteria over the past decade. Antibiotic resistance in Enterobacteriaceae is of particular concern in hospital settings because this family of bacteria is the leading cause of hospital-acquired infections. Extended spectrum beta lactamase (ESBL)-positive Enterobacteriaceae produce enzymes which enable these bacteria to breakdown beta-lactam rings and therefore confer resistance to beta-lactam antibiotics. The focus of our research is to examine the prevalence of ESBL-positive bacteria in hospital setting as well as the general population. Bacterial communities isolated from hospital fomites and local population sewage were assayed for the presence of ESBL genes, including SHV and TEM, using polymerase chain reaction (PCR) analysis. Ten percent of the hospital-associated samples were positive for the TEM gene and none were positive for SHV. We have purified DNA from several sewage samples, and have yet to perform PCR analysis targeting TEM and SHV genes. Previous studies indicate a high prevalence of ESBL-positive bacteria in the population and we predict a large percentage of sewage samples will be positive for EBSL genes.

Presenter: Alexis, Stephanie

Authors: Alexis, Stephanie, Henrietta L. Logan

Research Mentor: Edna Coefield

Florida A & M University

The Use of Technology Among Minorities

Minority is defined as the smaller in power, number and representation in two social groups that forms a whole. The purpose of this experiment is to observe whether minorities respond better using the iPad survey over the paper and pencil survey. To observe this we begin by visiting the trial location and recruiting participants for the survey. Then we held a pilot project to expose any glitches that may surface during the experiment. Upon arrival participants filled out an informed consent form. Next they partake in either the paper or iPad survey. Afterwards they are debriefed and then compensated. Out of N= 60 participants 61.7% of the participants preferred the iPad, 21.7% preferred the paper and pen, 5% preferred neither, 10% were unknown, and 1.7% preferred both. We concluded that among minorities, technology is not something foreign but technology like the iPad is something that is preferred over the customary paper and pen.

Presenter: Allen, Brandon

Authors: Brandon Allen, Guenakh Mitselmakher, Didar Dobur, Lana Muniz, Pieter Everaerts, Nikoloz Skhirtladze Lesya Shshutska, Ronald Remington, Konstantin Matchev, Andre Korytov, and John Yelton

Research Mentor: Guenaki Mitselmakher

Department of Physics, University of Florida

Leptonic Searches For Supersymmetry with the CMS Detector at the LHC

The recent discovery of the Higgs boson at the Large Hadron Collider provides confirmation of the Standard Model of particle physics. However, there remain open questions with the Standard Model, such as the hierarchy problem and lack of a dark matter candidate, which motivate a search for new physics beyond the Standard Model. Supersymmetry, one theory that could potentially resolve these issues, is the notion that there could be a new kind of symmetry that would mirror the Standard Model, effectively doubling the number of particles, similar to the notion of antimatter. Additionally, Supersymmetry provides a useful framework in which to search for any type of new physics because these new particles provide a variety of experimental signatures that could be observed at the Large Hadron Collider. Because of this, the CMS and ATLAS collaborations are currently conducting experimental searches for supersymmetry. Most supersymmetric particles have a decay chain with multiple leptons in the final state, a rare, but clean, experimental signature, since leptons are easily identified in the CMS detector. We present here the latest results of searches for supersymmetry in proton-proton events with collision energy of 8 TeV where particles decay with multiple leptons in the final state.

Presenter: Amat, Samantha

Authors: *Samantha Amat, R. Garcia-Areas, S. Libreros, and V. Iragavarapu-Charyulu*

Research Mentor: *Vijaya Iragavarapu*

Department of Basic Science, Florida Atlantic University

Exploring The Role of Semaphorin 7A In Monocyte Chemoattraction in a Breast Cancer Model

Breast cancer is the most common diagnosed cancer among females. Poor clinical outcome in breast cancer patients has been correlated with increased inflammatory mediators which aggravate tumor progression and metastasis. The principal inflammatory cells in the tumor microenvironment are the tumor-associated macrophages (TAMs), which enhance tumor growth and metastasis. Thus, it is crucial to determine tumor proteins able to attract circulating monocytes because once sequestered in the tumor microenvironment monocytes develop into tumor-associated macrophages. Our laboratory has discovered that mammary tumor cells express high levels of the novel protein Semaphorin 7A. Semaphorin 7A (Sema7A) promotes monocyte chemoattraction during the immune inflammatory response, but its role in tumorigenesis is still largely unknown. We hypothesize that tumor-derived Semaphorin7A may play a role in attracting monocytes into the tumor and enhance tumor progression. The proposed studies may give insight into the role of Semaphorin 7A in breast cancer as a novel target for breast cancer therapy.

Presenter: Anton, Michael

Authors: *M. Anton, C. Johnson, C. Williams, and Peter Magyari*

Research Mentor: *Peter Magyari*

Brooks College of Health Florida, University of North Florida

Variability in Resistance Training Repetitions Achieved at Specific Workloads by Gender

Exercise loads in resistance training (RT) are typically based on a percent (%) of each subject's one repetition maximum (1RM) and include an expected number of repetitions (reps) performed at each given load. The purpose is to determine if gender plays a role in the number of reps achieved at specific loads on eight pieces of cam mediated variable resistance exercise equipment (CMVREE). Forty college subjects completed 1RM testing on eight pieces of CMVREE and a maximal number of reps at 60% and 80% of 1 RM with a minimum of 72 hours rest between protocols. Reps achieved averaged 22 and 12 at 60% and 80% 1RM. The rep variability ranged from 11 on the shoulder press to 41 on the leg press at 60% 1RM and a low of 7 on the shoulder press to 20 on the leg press at 80% 1 RM. Gender related differences in reps achieved at specified workloads were only found in the shoulder press (60%), leg extension (60%) and leg curl (60% and 80%). Exercise professionals should recognize that published repetition tables may not accurately predict the number of reps achieved on various pieces of RT equipment in male or female subjects.

Presenter: Arias, Natalia

Authors: *Authors: Natalia L. Arias, Lynne M. Mercier, Paul J. Reier, David D. Fuller, and Michael A. Lane*

Research Mentor: *Michael Lane*

Department of Neuroscience, University of Florida

High Cervical Spinal Cord Injury Results in a Reorganization of Respiratory Activity

The majority of traumatic spinal cord injuries (SCIs) occur at cervical levels (the neck), resulting in a wide range of motor and sensory deficits. Of these, impaired breathing is one of the most life-threatening. While experimental and clinical studies have revealed spontaneous improvement in function over time—or “neuroplasticity”, the extent of recovery is limited and the mechanisms of plasticity are poorly understood. We propose that the most effective treatments for SCI will need to work synergistically with neuroplasticity. Accordingly, a detailed understanding of spontaneous functional and anatomical plasticity is essential. The objective of this study was to investigate supraspinal plasticity associated with respiratory function following an experimental cervical SCI. Adult female Sprague-Dawley were surgically anesthetized and received a lateral cervical (C2) hemisection. Two (n=6) or twelve (n=6) weeks later, animals were re-anesthetized and electrodes were stereotaxically placed into the caudal medulla to map the distribution of inspiratory and expiratory phase activity. Preliminary data reveals that regions of inspiratory and expiratory-phase activity are altered post-SCI. Brainstem neurons normally active during inspiration are instead active during expiration in injured animals. Ongoing experiments seek to elucidate this functional reorganization, which may represent a therapeutic target.

Presenter: Atick, Jessica

Authors: *Jessica Atick, Christine Ghilain, Anibal Gutierrez, and Michael Alessandri*

Research Mentor: *Michael Alessandri*

Psychology Department, University of Miami

Language Development in Preschoolers with Autism Spectrum Disorders: A Comparison of Outcomes Across Educational Settings

This study seeks to determine the differences in language gains between self-contained and inclusive classrooms across a school year in preschool children with autism spectrum disorders (ASD). Self-contained classrooms consist of children with ASD and related disabilities; whereas, inclusive classrooms consist of children with ASD and their typically-developing peers. This study is an extension of a larger, multi-site study comparing the efficacy of preschool educational programs for children with ASD. Children were administered the Preschool Language Scale, Fourth Edition (PLS-4) in order to measure their language functioning at both the beginning (PRE) and end (POST) of the school year. Language gains were measured as the change in PLS-4 scores across a school year. When mean differences in Auditory Comprehension (AC), Expressive Communication (EC) and Total Language (TL) were compared, results indicated a significant difference between groups in EC and TL but not in AC scores, with children with ASD in inclusive classrooms demonstrating greater average language gains. Although language gains were made in all classrooms, it is important to identify specific classroom characteristics (e.g., student: teacher ratios; ratio of typically-developing students to students with ASD; etc.) that promote increased gains in child language development.

Presenter: Azaizeh, Wesam

Authors: *Wesam Azaizeh, Sue -Ann Flores, Lauren Sanchez, Jovans Lorquet, Maxime Jean, Christoph J. Hengartner, and Leticia R. Vega*

Research Mentor: *Leticia Vega*

Department of Biology, Barry University

Protecting the End: Genetic Interactions of Telomere Binding Proteins in Yeast

Telomeres are the physical ends of eukaryotic chromosomes that protect DNA ends from degradation and from end-to-end fusion. Telomeres consist of stretches of repeated C/G-rich DNA ending with 3' single stranded G-rich overhangs. The enzyme telomerase and accessory proteins such as Ku and Cdc13p maintain and facilitate telomere functions. In *S. cerevisiae*, *cdc13-1* is a temperature sensitive allele of Cdc13p, an essential telomere protein that binds to single-stranded G-tails to prevent telomere degradation. The Ku heterodimer, composed of Ku70 and Ku80, functions in DNA non-homologous end joining, recombination and telomere end protection. Yeast cells lacking Cdc13p or the Ku complex have uncapped telomeres and long single-stranded G-tails. This study examines the effects of mutations in *yku80* on *cdc13-1* strains. We introduced a library of 125 mutant *yku80* alleles into the *cdc13-1* background by plasmid shuffle and determined the effects on viability and telomere end protection of the various *yku80* mutant alleles. 22 out of 125 *yku80* alleles tested increased the temperature sensitive phenotype of *cdc13-1* strains, suggesting a telomeric end protection role for these mutant *yku80* alleles. We are currently characterizing the telomere phenotypes of the double mutant strains.

Presenter: Babinchak, William

Authors: *W. Michael Babinchak, James N. Wilson*

Research Mentor: *James Wilson*

Department of Chemistry, University of Miami

Fluorescent Neurotransmitters: An Investigation of Charge Separation and Probe Affinity

The norepinephrine transporter (NET), a cell membrane protein responsible for the reuptake of norepinephrine, has been shown to have high substrate binding elasticity and is the target of many antidepressants and other pharmacotherapies. Experimental evidence indicates that monovalent fluorescent stilbazolium dyes are capable of binding to NET and may serve as reporters of drug binding potential. We investigate the binding capabilities and rates of bivalent dimers of varying carbon tether length using one of these dyes, labeled ASP+, as a potential reporter compound. Each dye is synthesized using substitution of diamines of varying hydrocarbon chain length, followed by a condensation reaction. Each is quantified using NMR, infrared spectroscopy, UV-Vis, and fluorescent spectroscopy. The binding rate and capability is tested by adding each compound to a plate of NET-expressing cells, followed by the addition of desipramine, a common antidepressant, to inhibit the dye's binding

and to examine the release rate. The effect of steric hindrance suggests that compounds of too short (2-4 carbon) or too long (10-12 carbon) chain length may have slower binding rates than those of middle length (6-8 carbon) and thus may be less suitable as fluorescent reporters in pharmacotherapy research.

Presenter: Balaez, Alexander

Authors: Alexander Balaez, Darren T. Beck, Joshua F. Yarrow, Sean C. McCoy, Luke A. Beggs, Sarah M. Combs, Julie R. Miller, Christine F. Conover, and Stephen E. Borst

Research Mentor: Stephen Borst

Department of Applied Physiology and Kinesiology, University of Florida

The Combined Effects of Anastrozole and Testosterone or Trenbolone on Prostate and Levator Ani-Bulbo Cavernosus Mass

Our purpose was to determine the role of aromatase enzymes in mediating the myotrophic and prostate enlarging effects of androgens and provide a rationale for testing strategies to combat osteoporosis. 10 month old Fischer 344 rats received Sham surgery or orchiectomy (ORX). One week following surgery, animals were implanted with motorized micro-infusion pumps to disperse anastrozole (ANA; aromatase inhibitor) or vehicle at a rate of 2.0 µl/hour. Animals received weekly intra muscular injections of testosterone enanthate (TE; 7.0mg/week), trenbolone enanthate (TREN; 1.0mg/week), or vehicle. 28 days following pump implantation, animals were sacrificed and the prostate and levator ani-bulbocavernosus (LABC) muscle were excised. Retro fat, left and right tibias, and left and right femurs were preserved for further investigation. Our findings suggest that estradiol is not required for androgen mediated prostate enlargement. Further, inhibiting the aromatase enzyme did not blunt the myotrophic effects of androgens. Supported by VA Merit Award to SEB and VA Geriatrics Fellowship to DTB.

Presenter: Baraoidan, Samantha

Authors: Samantha A. Baraoidan

Research Mentor: Taylor Stein

Department of Wildlife Ecology and Conservation, University of Florida

Visitor Perceptions and Motivations for Wildlife Tourism in Crystal River National Wildlife Refuge

Each year, thousands of people flock to Three Sisters Spring (TSS) at Crystal River National Wildlife Refuge to experience a close-up encounter with a West Indian manatee (*Trichechus manatus*). The recreation experience may also be defined by a variety of other factors, including the presence of other visitors.

The primary goal of this project was to measure visitors' perceptions of crowding and how crowding affected their recreation experience in TSS. Specifically, research will identify the size of crowds acceptable to visitors who are swimming with manatees, and how managers might ensure that visitors are able to attain quality experiences. Past research shows that people recreating in nature often find that feeling crowded detracts from their experience. In order to ensure that visitors to TSS continue to receive a satisfying experience, we have examined visitors' tolerance for crowds. Surveyors used an on-site questionnaire to collect data in order for participants to give immediate feedback on their experience. Results show that the unique experience of interaction with manatees was the most important factor in determining quality experiences. However, when visitation numbers increased, visitors were more likely to acknowledge that crowding was a problem, but the encounter with the animal mitigated crowding issues.

Presenter: Bardwell-Owens, Angela

Authors: Angela M. Bardwell-Owens, Dr. Diana Ciesko, Department of Psychology, Jacob M. Whitney, Dr. Diana Ciesko,

Research Mentor: Diana Ciesko

Department of Psychology, Kristin E. Schaefer, Modeling and Simulation, Valencia College

The History of Robotics: Identifying Changes in Development and Utilization

The evolution of human-robot interaction has accelerated into the human-social domain within the last twenty years; however, robotics development has actually had a much longer history. The history of robotics reveals some of the same development issues affecting robotics today, and provides an understanding of how the utilization of robotics has changed over time. This work explores the history of robotics extending as far back as 3rd Century B.C.E. to identify common design needs such as movement, realism, capabilities, and functionality. Some

outstanding points in robotics history include Leonardo Davinci's "Knight" that focused on the ability of movement and Nikola Tesla's remote-controlled boat that may have provided inspiration for robotic control systems. Yet, there is a noted transition in the utility of the robot from historical entertainment then, into more practical uses now. The longest running and primary use of current robotics is in military and industry domains. The more recent transition into social environments has led to the expansion of robotics into the medical, entertainment, social, and educational fields. Viewing past capabilities with robotics, and more importantly the struggles, incorporates a new perspective into current and future design.

Presenter: Bari, Arafat

Authors: Arafat Bari, Jessica L. McGuire, and Evelyn Frazier

Research Mentor: Evelyn Frazier

Department of Biological Sciences, College of Veterinary Medicine, Florida Atlantic University

Analysis of the Gopher Tortoise Tick (*Amblyomma tuberculatum*) and its Distribution in Southeastern Florida

Gopher tortoise habitat quality has been declining due to intense development in South Florida. As a result of this stress, it is possible that tortoises have developed increased susceptibility to disease and are more prone to parasites such as the gopher tortoise tick, *Amblyomma tuberculatum*. To expand our limited knowledge on the distribution of this tick species, we conducted transect surveys and employed point capture techniques at the Conservation Area at Florida Atlantic University in Boca Raton, FL. Ticks were collected from adult gopher tortoises and classified into different life stages based on physical characteristics. To date, more than 80% of captured ticks were from tortoises inhabiting areas with shrub cover and very few ticks were captured in grasslands and oak canopy area. Additionally, we have found that only the adult and nymph stages of this tick feed on the reptile. We have not captured any tick larvae, which could suggest that the tick species may also parasitize other hosts. Hence we hypothesize that the distribution of the tick might be different than that of the gopher tortoise. In the future, we plan to further assess the distribution of *A. tuberculatum* in southeastern Florida and screen them for potential pathogens.

Presenter: Barrios, Richard

Authors: Richard Barrios, Jeremy W. Chambers

Research Mentor: Jeremy Chambers

Department of Cellular Biology and Pharmacology, Biological Sciences, Florida International University

Mitochondrial Signaling on the Scaffold Sab Influences Lactate Transport Facilitated by Monocarboxylase Transporter 1 (MCT-1).

One hallmark of cancer is a specialized type of metabolism featuring aerobic glycolysis and increased production of lactate. To transport lactate, cancer cells over-express specific monocarboxylate transporters (MCT). Lactate is pivotal for maintaining a pH conducive for cancer cell metabolism and proliferation. The over expression of the two transporters, MCT1 and MCT4, can be associated with poor prognosis in a variety of cancers. We have identified a unique phosphorylation site near the C-terminus of MCT1 that is modulated by signaling on the mitochondrial scaffold Sab, and is increased five-fold following the inhibition of Sab mediated signaling. Additionally, we found that blocking Sab-mediated signaling also increased lactate transport and decreased intracellular pH in human neuroblastoma cells. These results may indicate a unique pathway regulating lactate transport may exist between the mitochondria and plasma membrane. A bioinformatics search for kinases capable of phosphorylating MCT1 at this motif revealed twenty candidate enzymes. Current studies in our lab are concerned with verifying the contributions of these proposed components to the regulation of MCT1. Based on our current data, we propose the existence of a novel signaling mechanism between the mitochondria and MCT1 for the purpose of regulating intracellular pH and metabolism in cancer cells.

Presenter: Barton, Jennifer

Authors: Jennifer M. Barton, Emily L. Robertson, and Ashley Batts Allen

Research Mentor: Ashley Allen

Psychology, University of North Florida

Perceptions of Safety and Empowerment: A Self-Compassion Intervention

Domestic violence is a dangerous epidemic that endangers 1 out of 4 women (Davhana-Maselesele, Myburgh, & Poggenpoel, 2009). Women in abusive relationships tend to have maladaptive coping strategies which can lead to psychological stress; such as, humiliation, self-blame, and submissiveness (Davhana-Maselesele, Myburgh, & Poggenpoel, 2009). However, self-compassion has been shown to reverse these negative effects. Benefits of self-compassion include buffering against anxiety to help cope with stressful life events which may have the potential to greatly assist women in abusive relationships (Allen, Goldwasser, & Leary, 2012). A pilot study aimed to increase self-compassionate thoughts and behaviors by implementing a six-week intervention at a local domestic violence shelter. However, participants responded negatively to the long questionnaires and physiological measures. In the current study, domestic violence survivors at a local shelter will complete measures of empowerment and safety perceptions at intake and exit interviews. We anticipate that participants who attend self-compassion training will increase perceptions of safety and feelings of empowerment more so than participants who do not attend. If our hypothesis is supported, self-compassion support groups could be implemented in more domestic violence shelters as a valuable aid in their recovery.

Presenter: Bean, Lorenzo

Authors: Lorenzo Bean, Zenith Maddipatla MS, and Gary Wang MD, PhD.

Research Mentor: Gary Wang

Department of Medicine, University of Florida

Comparison of High-throughput Metagenomic Analysis with Traditional Culture Approaches for Examination of Drainage Sites from Suspected Bacterial Infections

The existing conventional method for clinical diagnosis of questionable abscess and pleural effusions relies on the use of cell culture on selective media and microscopy. This method is limited by the inability to culture specific fastidious microorganisms. Previous studies suggest inconclusive yields in up to 63% of cases. It is our hypothesis that the sequencing of the hypervariable region of the 16S rRNA gene of bacteria by deep sequencing will allow for better detection of bacterial infection agents since this method can detect both cultivatable and uncultivated species. Drained abscesses and exudative effusions were cultured and examined using light microscopy in the Shands Clinical Microbiology laboratory. For the specimens to which culture data was available, total DNA was extracted. Amplification of the 16s rRNA hypervariable region was performed with barcoded PCR primers and followed by 454 pyrosequencing. Microbial infections were detected in 11 out of 24 patient specimens through culture and microscopy. Currently analysis of the 454 sequencing data is being performed. We believe the clinical gold standard of diagnosis can be improved to provide a more inclusive understanding of the polymicrobial makeup of infection through sequencing the amplified 16s rRNA gene.

Presenter: Beasley, Christina

Authors: Christina L. Beasley, Lauren E. James, Kristina L. Keene, and Dr. Jody S. Nicholson

Research Mentor: Jody Nicholson

Psychology, University of North Florida

The Impact of "Social" Father Contact for Children of Adolescent Mothers

Investigating the influence of social fathers, or influential male role models, for children of adolescent mothers is warranted because the relationship with the biological father is often not sustained (Howard, Lefever, Borkowski, & Whitman, 2006). Our study investigates children's outcomes at 18 years based on four scenarios: presence of either a biological or social father, presence of both types of fathers, or absence of both. It is hypothesized that better cognitive, academic, and behavioral functioning at 18 years will be evident for children who have greater father involvement. Methodology: 134 adolescent mothers were interviewed during their last trimester of pregnancy and the dyad was followed through the children's 18th year. Children were interviewed at age 18 regarding father involvement (n=109). Outcomes were assessed using standardized measures. Data analysis: Using a two-factor ANOVA for continuous variables and chi-square test of independence for categorical variables, comparisons will be made on the contribution of biological and social father presence on children's behavioral, academic, and cognitive functioning. Discussion: This study provides an opportunity to contribute to the literature

on the influence of social fathers for children born to teen mothers as they enter adulthood, a population who has been largely neglected in fathering literature.

Presenter: Berry, Steven
Authors: *Steven Berry, Ashley Allen*
Research Mentor: *Ashley Allen*
Social Sciences, University of North Florida

Donkeys and Elephants and Moderates, Oh my!: How Self-compassion and Self-criticism Impact Moderates' Views of a Presidential Candidate

Throughout every election cycle the positions of moderate voters have been subject to analysis by those interested in the political process. According to CNN and Fox News exit polls during the 2012 presidential election (N=24,910) 41% of voters identified as moderate, with 56% voting democrat and 41% voting republican. With so many voters identifying as moderate, factors that influence their final voting choices are of particular interest. For our study, we examined if the way in which political candidates coped in the face of adversity impacted voters judgments about them. We hypothesized that participants would respond more favorably to a presidential candidate if they coped self-critically opposed to self-compassionately. Participants (N=176) were randomly assigned to read a summary of a study that claimed that 85% of either Obama or Romney's political ad's were found to have false or misleading information that negatively portrayed the other candidate. In line with previous research, we found that moderate voters tended to sway slightly politically left, however, when the conservative candidate coped in a self-critical manner moderate voters had more positive judgments about that candidate.

Presenter: Betancourt, Francisco
Authors: *Francisco Betancourt, Jeanne-Marie R. Stacciarini*
Research Mentor: *Jeanne-Marie Stacciarini*
College of Nursing, University of Florida

Social Isolation in Rural Areas: The Case of Latino Women

The Latino community is constantly faced with painful feelings associated with missing family/friends, having limited or no English proficiency, and dealing with discrimination. Above all other challenges they also encounter social isolation, which has a detrimental effect on their lives. The purpose of this research project is to explore and further analyze the causes and extent to which Latina women face social isolation as a result of living in rural areas. The specific aims are to: 1) describe the evidence on social isolation among Latinos, and 2) describe Latina women perceptions of their rural environment and social isolation. To accomplish this, a literature review of (N=13) publications on social isolation among Latinos were identified and analyzed. Then, interviews with Latina women (n =15) in Levy County were reviewed, and content analyzed for common themes. Results show that several factors have influence on Latina women social isolation, which include: deportation, environment, family separation, discrimination, language barriers, transportation, and social network. To decrease social isolation, subjects such as immigration policies, financial support programs, and interactive programs that increase interactions in the community need to be addressed. Interventions should be geared towards and facilitate the assimilation of Latina women into the greater community.

Presenter: Bis, Dana
Authors: *Dana Bis, Amy Lane*
Research Mentor: *Amy Lane*
Biology Department, University of North Florida

Genetic Basis for Production of Novel Anti-Inflammatory and Anti-Cancer Molecules from a Marine Bacterium

Pharmacognosy focuses on discovering new medicines derived from natural sources, and bacteria are a promising source of new molecules that may be useful as human drugs. The marine bacterium *Nocardioopsis* sp. was previously found to produce two unique suites of compounds, named the nocardioazines and nocardioopsins. The nocardioazines are promising anti-cancer therapies, while the nocardioopsins exhibited immunosuppressant properties. Both the nocardioazines and nocardioopsins are also highly structurally novel. Given the unusual molecular structures and biomedical promise of these compounds, we initiated a study to identify the genes and

corresponding enzymes employed by the bacterium in producing these compounds. We have identified genes with proposed involvement in nocardioazine and nocardiopeptide production, and we are pursuing genetic engineering to alter these genes in an effort yield additional members of these classes of compounds. This will provide additional compounds for biomedical testing, which is critical in the pursuit of these compounds as drug candidates.

Presenter: Blair, Taylor

Authors: Taylor Blair, Sara Haynes, and Christopher Leone

Research Mentor: Christopher Leone

Department of Psychology, University of North Florida

Some Effects Of Self-Esteem And Social Exclusion On Psychological Distress

Individuals with contingent self-esteem have fragile and unstable self-worth (Kernis, 2003). Ostracism thwarts basic needs such as self-worth (Williams, 2007). We hypothesized that compared to included individuals, ostracized individuals will feel more distress – especially if they have contingent self-esteem. Participants wrote about a time they were excluded for lacking social status, excluded due to personal compatibility, or included by others (Bernstein et al., 2008). They then rated their personal distress and pain (Kunzendorf et al., 1995; Riva et al., 2011). Last, they completed the Contingent Self-Esteem Scale (Kernis, 2003). Using an analysis of variance (ANOVA), we found no self-esteem differences when participants were included by others. When excluded, however, individuals with contingent self-esteem reported more distress and pain than did individuals with non-contingent self-esteem – especially when excluded for not being cool! In sum, we discovered that some forms of ostracism were more unpleasant (not being cool) than others (not sharing personal dispositions). Unlike other researchers, however, we also found that the effects of ostracism depended on differences in contingent self-esteem. Our findings have implications for theories of ostracism and of self-esteem as well as implications for clinical applications (e.g., for tailoring therapies and coping techniques to different individuals).

Presenter: Blanchard, Brian

Authors: Lester Castillo, Jennifer Cueller, Lacy Flake, Kristi Layne, Brian Blanchard, Juan Cortes, Jennifer Bess and John Whitlock

Research Mentor: John Whitlock

Biology Department, Hillsborough Community College

Detection and Analysis of Wolbachia Species in the Tampa Bay Mosquito Population

Wolbachia is a Gram-negative bacterium and common endosymbiont of insects. Its role in mosquito evolution and mosquito control has yet to be fully explored. To assess the presence of Wolbachia in the local insect population, mosquitoes were collected from various regions in the Tampa Bay area. Adult mosquitoes were visually identified at 400x magnification using wing structure, thorax, abdomen, and length of the palpi as means of identification. DNA was extracted from pools of adult mosquitoes and specific target DNA was amplified using Wolbachia-specific primers. Amplification products were electrophoresed on 1% agarose gels, stained with ethidium bromide, and then visually analyzed by UV-light. We believe that PCR products from whole mosquito tissue will show that Wolbachia can be found in a variety of mosquito species from our local area. The use of the naturally existing strains of Wolbachia in mosquito control has been a recent research interest of many scientists and may offer a form of biological control.

Presenter: Blanco, Erica

Authors: Erica Blanco, Crystal Blair, Emily Loe, Rebekah Smith, BSN, DNP, and Jeanne Marie R. Stacciarini, RN, PhD

Research Mentor: Jeanne-Marie Stacciarini

College of Nursing, University of Florida

Development of Faith-Based Social Justice Intervention

Latino immigrants living in rural areas of the United States face an increased number of social stressors including isolation, language barriers, discrimination, transportation issues and disconnection from the community. These stressors have the potential to lead to health disparities. Enhancing Faith Based Organizations (FBOs) awareness of Latinos' lives may serve to promote social changes in their communities. The purpose of this study is to describe the development of a social justice intervention for FBOs, from diverse denominations in a rural area of

North Florida. The specific aims of this study are to: 1) describe the evidence on social justice, spirituality and best practice of intervention implementation, and 2) describe the development of an intervention integrating social justice, spirituality and intervention best practices. A social justice intervention was developed to enhance community awareness of Latinos' social/health disparities. The intervention is directed to churches whose majority population is not Hispanic. This intervention is currently being disseminated to key churches with the potential to care for the Hispanic communities.

Presenter: Bleiberg, Melissa

Authors: *Melissa Bleiberg, Brady Patzer, and Shirley Sonesh*

Research Mentor: *Shirley Sonesh*

Psychology Department, University of Central Florida

Minimizing Cognitive Errors in Emergency Medical Services

Cognitive biases in healthcare (i.e., a caregiver's cognitive disposition to respond to a particular situation) impact physician decisions in both positive and negative ways. Positive biases (e.g., successful heuristics) facilitate a physician's ability make quick decisions in emergency situations. Negative biases (e.g., overconfidence, etc.) can cause patient harm by way of misdiagnosis and medication error. Strategies to reduce negative biases provoked by time sensitive and high stress situations have been explored extensively in the hospital setting. Emergency Medical Services (EMSs) operate in similarly stressful and time limited environments. However, the roles of bias within EMS settings remain unclear, particularly among immediate response pre-hospital EMS decision makers. Thus, the purpose of this research is to review literature concerning the role of cognitive bias in EMS decision-making, in order to develop interventions that can eliminate or reduce the errors due to bias. The aim of this literature review is two-fold; (1) develop guidelines for measuring cognitive bias in EMS workers (which the literature is currently lacking), and (2) facilitate the development of empirically informed training by modifying and expanding upon the current de-biasing strategies designed for hospital personnel. If these tactics are successful, the safety of EMS patient care may be dramatically improved.

Presenter: Boose, Amber

Authors: *Amber Boose, Eva R. Kimonis PhD*

Research Mentor: *Eva Kimonis*

Department of Mental Health Law and Policy, University of South Florida

Patterns Of Emotional Responding Among Maltreated Children With Callous-Unemotional Traits

Individuals with psychopathic traits show abnormal emotional processing and stress hormone levels. Similarly, maltreated children show deficits in recognizing fear and sadness in facial expressions. Childhood maltreatment can cause an acquired affective disturbance or disturbed conscience, which is characteristic of secondary psychopathy. No prior research has examined callous-unemotional traits, which are believed to be a childhood precursor to adult psychopathy, as well as emotional processing deficits in a maltreated population. The present pilot study examines patterns of cognitive and neuroendocrine emotional responding among school-aged maltreated children (mean age = 8.18). Results indicate that callous-unemotional traits are associated with deficits in recognizing surprise and disgust, in addition to being negatively correlated with disengagement from empathy pictures. These findings shed light on the detrimental effects that various types of maltreatment may have on emotional and personality development, particularly with respect to a severe type of conduct problems with callous-unemotional traits.

Presenter: Borgman, Douglas

Authors: *Doug Borgman, Aaron Burnham, and Madhu Pandey*

Research Mentor: *Madhu Pandey*

Environmental Science, University of South Florida Saint Petersburg

Removing Metal Contamination Form Biodiesel Using Orange Peels

Metal contamination in biodiesel causes a shortened shelf-life, toxic emissions, and injector failure. One method of removing metals from biodiesel involves filtration with a synthetic ion-exchange material, which is costly and non-biodegradable. Orange peels, which are biodegradable and less costly, are known to be effective in removing heavy metals from wastewater (i.e. aqueous solution). Additionally, orange peels contain antioxidants, which are known to extend the shelf-life of biodiesel. This study tested whether or not orange peels remove metals from biodiesel (i.e. lipid-based solution) using methods compatible with commercial biodiesel production processes.

One variable tested was the addition of extra methanol, which solvates the biodiesel and creates a more favorable pH for metal binding. Biodiesel samples with and without orange peel treatment were dry-ashed and analyzed for copper and sodium levels using ICP-MS. Preliminary results indicate that orange peels are not effective in removing metals from biodiesel.

Presenter: Brady, Steven

Authors: *Author: Steven Brady, Dr. Sean Forbes*

Research Mentor: *Sean Forbes*

Department of Physical Therapy, University of Florida

Effects of Sildenafil Citrate on Dystrophic Muscle Evaluated Using Magnetic Resonance Spectroscopy

Duchenne muscular dystrophy (DMD) is an X-linked recessive disorder that affects approximately 1 in every 3,500 live male births. It is caused by a genetic mutation of the dystrophin gene, which leads to an absence or deficit of the protein dystrophin. Absence or deficiency of dystrophin results in progressive muscle weakness and degeneration, deterioration of functional ability, and premature death. Sildenafil citrate (Viagra), a phosphodiesterase 5 (PDE5) inhibitor, has been previously demonstrated to contribute to improvements in cardiac dysfunction present in the mdx mouse model of DMD. In this study, we used phosphorus-31 magnetic resonance spectroscopy (31P-MRS) to test the hypothesis that mdx mice treated with sildenafil citrate would experience an improvement in phosphocreatine (PCr) recovery, an index of mitochondrial function. 31P-MRS data were acquired during (2 min) and following (15 min) high-intensity stimulation in male mdx mice (n=4) before and after 12 weeks of treatment with sildenafil using an 11.1 T MR system. The time of phosphocreatine (PCr) recovery was similar following high-intensity stimulation before and after treatment. Overall, the data suggest that sildenafil citrate does not improve PCr recovery following high-intensity exercise in mdx mice.

Presenter: Brant, Kristopher

Authors: *Kristopher Brant, Matt Gilg*

Research Mentor: *Matt Gilg*

Biology, University of North Florida

Testing the Effectiveness of Various Substrates and their Resistance to Biofoulants

Little is known of exactly how and what leads to the attachment of foulants such as barnacles and macro algae. This paper describes an experiment done to test the effectiveness of various materials in their ability to resist biofouling. Two substrates were selected to simulate materials from a boat hull, fiberglass and aluminum. Various coatings were then applied to test the foulants affinity or aversion to the materials. Fiberglass, fiberglass coated with wax, aluminum, aluminum coated with antifouling paint, aluminum coated with vaseline, and aluminum coated with vaseline and cayenne pepper were the six substrates tested. Substrates were placed at two test sites in the intracoastal waterway near Jacksonville, FL, in the months of June and July and remained in the field for either one or two months. Both sites showed similar patterns with increased settlement in each subsequent month. It was determined that barnacles as well as macro algae show significantly less settlement on hydrophobic materials, the greatest settlement was found on fiberglass, followed by wax coated fiberglass, aluminum, painted aluminum, vaseline coated aluminum, and aluminum coated with a pepper-vaseline mixture. Extremely hydrophobic materials have the potential to make a viable antifoulant coating for barnacles and macro algae.

Presenter: Britto, Manuel

Authors: *Manuel Britto, Xi Huang, and Gail Fanucci*

Research Mentor: *Gail Fanucci*

Chemistry, University of Florida

Study of Single-Site Natural Occurring Mutation Affect on HIV-1 Protease Flap Conformational Sampling

Human immunodeficiency type 1 protease (HIV-1 PR) is a 99 amino acid homodimer that plays a critical role in the maturation of the HIV-1 retrovirus; hence it is target of many antiviral AIDS therapies. In order for the HIV-1 virus to undergo maturation, the protease cleaves the gag and gag-pol viral polyproteins. HIV-1 protease is categorized into different subtypes and exists in different conformations. Previous studies have shown that subtypes AE and F prefer tucked/curled flap conformation more than subtype B. Understanding how different

amino acid points in subtypes AE or F compared to subtype B effects flap conformation may provide insights for optimizing drug candidates against highly variable targets. Molecular dynamics have shown that salt-bridge interactions made in flap regions are different in each subtype. Thus, the researcher will induce R41K, E35D, and R57K mutations on subtype B individually and in combination in order to study the effect on flap conformation. The researcher will induce mutations using site directed mutagenesis, and measure the distance between flaps using pulsed EPR which harnesses different frequencies to control different spins on electrons in order to find out the strength of their coupling, and consequently measuring the distance between two spin labels.

Presenter: Brunner, Nicole

Authors: Nicole Brunner, Department of Pediatrics, Lindsay A Thompson, MD MS, Department of Pediatrics, Heidi Saliba, BA, Department of Pediatrics, Erik Black, PhD, Department of Pediatrics and College of Education, Mary Peoples-Sheps, DrPH

Research Mentor: Lindsay Thompson

College of Public Health and Health Professions, University of Florida

Parents' Opinions about Breastfeeding in Public and in the Work Setting

Previous research has cited mixed reception about breastfeeding in public or work settings. Despite the HealthyPeople 2020 goal to reach 81.9% of mothers successfully breastfeeding and laws that support public breastfeeding, parents still feel uncomfortable nursing in public. This study sought to understand parents' opinions about breastfeeding in public and work settings, stratifying by those who never breastfed, those who successfully breastfed but not in public, and those who breastfed in myriad locations. A brief survey was distributed to a convenience sample of parents who presented at two academic pediatric clinics in Gainesville, FL, in a single month during 2012. The survey addressed opinions about breastfeeding in public settings and policies of work, school, and public spaces. The data were analyzed in STATA using non-parametric methods. Breastfeeding in public remains controversial. A mother breastfeeding in public is still not recognized by all populations as promoting a healthy image. Even parents who reported breastfeeding in public felt it was a distraction to others. To reach national breastfeeding goals, future studies must discern if discomfort of public breastfeeding causes shorter breastfeeding durations, as well as articulate what aspects of public breastfeeding remain as barriers to successful breastfeeding.

Presenter: Bruno, Launie

Authors: Launie Bruno, Shanghai Li, and Roger Leblanc

Research Mentor: Roger LeBlanc

Physical Sciences Department, Barry University

Using Dynamic Light Scattering, Zeta Potential Measurements, and Fluorescence Spectroscopy to Study the Properties of Graphene Oxide

Graphene oxide (GO) is the oxidized form of graphene, a two-dimensional, one atom thick honeycomb shaped lattice of sp², bonded carbon atoms. GO has reactive functionalities such as hydroxyl, epoxy and carboxylic acid groups, with potential applications in biomedical fields including cancer treatment, drug delivery, and biological imaging. A study of the size distribution and surface charge of GO in aqueous solution was carried out, using Dynamic Light Scattering (DLS), and zeta potential measurements to understand factors that influence its stability and ability to disperse in water. DLS determined the hydrodynamic size distribution of GO's radius to be approximately 100nm, close to the actual size. The surface charge was less negatively charged with solutions of higher concentrations. Fluorescence spectrum revealed a linear relationship. These results will provide greater insights into the physical and chemical characteristics of GO and the conditions under which it may be most effectively used in therapeutic applications. (Supported by the NIH-NIGMS MARC U*STAR Grant, T34 GM08021-29, Barry University and University of Miami.)

Presenter: Bryant, Jamal
Authors: *Jamal Bryant, Amy Palmer*
Research Mentor: *Amy Palmer*
Department of Chemistry and Biochemistry, Florida State University

Measuring Cytosolic Zinc Ion Concentrations in Pancreatic Cancer Cells Using Genetically Encoded Fluorescent Sensors

Zinc is the second most abundant metal in the human body, and is necessary for protein structure, immune and enzymatic function, and transcriptional activity. The total Zn(2+) concentration in mammalian cells is estimated to be between 0.1-0.5mM. Most of this Zn(2+) is bound by proteins, enzymes, and cellular ligands. Also present in cells are smaller concentrations of the unbound ion. Zn(2+) misregulation has been linked to human diseases, such as breast, prostate, and pancreatic cancers. In this current study, I seek to visualize and quantify resting free cytosolic Zn(2+) concentrations within three pancreatic cancer cell lines: AsPc-1, Hs766T, and Panc-1. To do this, I will use a high-affinity, genetically encoded Zn(2+) sensor, containing CFP and circularly permuted Venus (cpVenus). The sensor undergoes a conformational change upon binding to Zn(2+), and fluorescence resonance energy transfer is observed and used to calculate cytosolic ion concentrations

Presenter: Buchanan, Elizabeth
Authors: *Elizabeth Buchanan*
Research Mentor: *Anuradha Godavarty*
Biology, Florida Gulf Coast University

Advancements in Neuroimaging for Cerebral Palsy: A Systematic Review from 2007 to 2012

Cerebral palsy is the most common motor disability stemming from early childhood. Worldwide prevalence ranges between 1 and 5 per 1,000 live births. The disorder can originate during prenatal development through about the age of 2 years. Neuroimaging is not an absolute requirement for diagnosis, but is widely utilized to confirm the diagnosis and to illuminate the areas of the brain most affected. The method of this systematic review included a three-tiered detailed analysis of all peer-reviewed journal articles from 2007 to 2012 that included neuroimaging data and at least 1 patient with confirmed cerebral palsy. The results present all recent findings for cerebral palsy from many varieties of imaging modalities, including conventional (MRI) and functional magnetic resonance imaging (fMRI), diffusion tensor imaging (DTI), computed (axial) tomography (CT or CAT), ultrasound/ultrasonography (US), electroencephalography (EEG), magnetoencephalography (MEG), positron emission tomography (PET), single photon emission computed tomography (SPECT), (proton/hydrogen) magnetic resonance spectroscopy (P/H MRS or MRS) and (functional) near infrared spectroscopy (fNIRS or NIRS).

Presenter: Buchwald, Zsuzsa
Authors: *Z. Buchwald, A.M. Muehlmann, H. O'Hearn, and M.H. Lewis*
Research Mentor: *Mark Lewis*
Department of Psychiatry, University of Florida

Indirect Basal Ganglia Pathway Mediation of Repetitive Behavior in an Inbred Mouse Strain

Restricted, repetitive behaviors are typically characterized as inflexible, persistent, and apparently functionless. Little is known about their causes; if the neurological basis could be established, then better treatments could be developed and prevention strategies pursued. Using animal models, our lab has found that repetitive behavior in deer mice is linked to imbalanced activity in the pathways of the basal ganglia. Previous research has shown in deer mice that the lower the activation of the indirect pathway the greater the level of stereotypy demonstrated. It would be compelling to demonstrate that the same mechanism of reduced indirect basal ganglia pathway activity applies to the inbred mouse strain C58/J's as well as to deer mice. Using 15 C58s and 15 C57 (control), I will statistically analyze jump frequency counts and cytochrome oxidase staining in the sub-thalamic nucleus of the basal ganglia, to determine if there is in fact a reduced amount of activity in the indirect pathway. Results of this experiment will allow us to generalize about the mechanisms behind repetitive behaviors that are similar in two very different models. This generalized understanding of neurobiological mechanisms will hopefully lead to better treatments for these common symptoms of many developmental, psychiatric, and neurological disorders and diseases.

Presenter: Burgett, Drew
Authors: *Drew Burgett, Sanjukta Bhanja*
Research Mentor: *Bhanja Sanjukta*
Electrical Engineering, University of South Florida

Majority Logic Synthesis and Applications to Spintronics

The scaling limits of CMOS are the drive behind the search for alternative computing techniques. One promising candidate is spintronic logic, which uses nanomagnet structures (single layer and multilayer) to perform computation and store information. Attractive features of spintronics include: non-volatility, room temperature operation, thermal robustness, radiation hardness, endurance to multiple reads/writes and easy CMOS integration. The nanomagnets are patterned with shape anisotropy to provide them with two stable states for binary representation. Information propagation and logic computation take place through dipolar coupling between these nanomagnets. The core logical constructs in spintronics are the majority and inverter, which together form the universal minority function. My research focuses on majority synthesis for low cost solutions in area, delay and computational complexity. Here, I have compiled my study of algorithmic cost for various majority synthesis algorithms: Cohn and Lindaman'61, Akers'62, Miyata'63, Zhang et al.'07. Zhang'07 synthesizes a 2-bit adder with the least gate count while Miyata'63 generates the least delay. The circuit performance of a 2:1MUX is best using Zhang'07. Zhang'07 also requires less time to compute than any of the others except Miyata'63. The next phase of my research is applying majority synthesis for spintronics-based reconfigurable computing in communication systems.

Presenter: Carter, Austin
Authors: *Austin Carter, Rebecca Black, and Christopher Leone*
Research Mentor: *Christopher Leone*
University of North Florida

Some Effects of Self-Monitoring and Negative Illusions on Coping with Relationship Dissolution.

Using positive illusions (i.e., exaggerated optimism about a relationship) increases relationship longevity and satisfaction (Murray et al., 2011). We investigated the use of negative illusions (i.e., exaggerated sense of relationship helplessness) to cope with failed romantic relationships. Additionally, we examined situational (i.e., focusing on partner's versus one's own role in relationship dissolution) and dispositional (i.e., high versus low self-monitoring) moderators of the use of these negative illusions. Participants recalled times in their past relationships when either (a) they created conflict or b) their ex-partners created conflict. Participants then completed measures of their relationship pessimism, dissatisfaction, and helplessness (Murray & Holmes, 1997). Last, participants completed the Revised Self-Monitoring Scale (Lennox & Wolfe, 1984). Based on a series of statistical analyses, we found that low self-monitors who focused on their own relationship mistakes (rather than their partner's mistakes) lessened their feelings of dissatisfaction and helplessness in that failed relationship. The opposite pattern was found for high self-monitors. It appears that for low self-monitors, focusing on their own relationship mistakes constrained their tendencies to blame their partner. For high self-monitors, however, focusing on their own relationship mistakes threatened their self-image as relationship experts which, in turn, enhanced their motivation to blame their partner.

Presenter: Carter, Sharon
Authors: *Sharon Carter, Jason L. Strickland, Gregory P. Territo, Fred Kraus, and Christopher Parkinson*
Research Mentor: *Christopher Parkinson*
Biology Department, University of Central Florida

Towards a Robust Phylogeny of Toxicocalamus (Elapidae)

New Guinea and the surrounding islands have a geological history that has generated a rich array of biodiversity as well as a high number of endemic species. One group of undersampled New Guinean snakes are in the genus *Toxicocalamus*, which has 11 described species based solely on morphology. These snakes are small, specialized burrowers and members of the cobra family (Elapidae). Recent studies, using limited species representation, have had difficulty placing the genus in context with other genera in the cobra family. Furthermore, it is also unknown if the described species are most closely related to each other or to species in other related genera. Our objective is to provide a robust phylogenetic analysis of the species within *Toxicocalamus* using genetic data. We extracted DNA from 23 samples, representing 9 species, which encompass all available tissues. Full mitochondrial cytochrome-b (cyt-b) and 16S sequences were generated for all individuals and the results of this analysis suggest

that Toxicocalamus is monophyletic and possibly an early-diverging lineage within the subfamily Hydrophiinae. Additional support from a nuclear gene, recombination activation gene 1 (RAG1), was also evaluated for 8 species. Understanding genetic variation is an important step toward documenting the biodiversity on these islands.

Presenter: Carter, Maya
Authors: *Maya Carter, Kevin Riggs*
Research Mentor: Kevin Riggs
Physics, Stetson University

Creating a Public Data Access Website for Double Chooz

Double Chooz is a high-energy physics experiment that deals with neutrino oscillation. Neutrinos are tiny particles that important to physicists because they could help further our understanding of the universe. There are three types of neutrinos and a single neutrino can change from type to type. This change is referred to as neutrino oscillation. Two of the three types of neutrino oscillation have been heavily documented; Double Chooz focuses on the third type. The presentation will go into the physics of neutrinos and what Double Chooz is looking for, followed by what goes into the setup of a public data access webpage for the experiment. The idea behind having a webpage open to the public is to allow people not affiliated with the Double Chooz experiment to see the data and results. It is currently being reviewed by an international committee made up of the physicists working on the Double Chooz experiment.

Presenter: Carucci, Daniella
Authors: *Daniella Carucci, Rebecca Shearer*
Research Mentor: *Rebecca Shearer*
Psychology Department, University of Miami

The Relationship Between Teacher Ratings and Observer Reports of Peer Play

The use of multiple measurement approaches gathered from different perspectives provides a more comprehensive view of children's interactions (with peers and teachers). Determining how to define constructs, and appropriately measure them has been an ongoing challenge for researchers in the study of social and emotional development of early childhood. The purpose of this study was to determine the relationship between teacher ratings (PIPPS) and observer reports (InCLASS) of children's interactions and engagement with teachers, peers and tasks for a representative sample of Head Start children (N=206). The relationships were examined with correlations. Results suggested that teacher reports of children's behaviors are significantly correlated with observation ratings of children's engagement with peers and tasks. Findings suggest that future research should develop interventions targeting play-based learning for culturally diverse children who are at risk for poor academic outcomes.

Presenter: Casad, Alexander
Authors: *Alexander Casad, Brenda Schumpert*
Research Mentor: *Brenda Schumpert*
Biology Department, Valencia College

Comparative Influence Of Environmental Factors On Species Abundance Within The Phytoplankton Order Gonyaulacales

Phytoplankton are important both because of their fundamental role in the marine food chain and because of the significant human health impacts associated with harmful algal blooms and the bioaccumulation of toxic species. Order Gonyaulacales includes *Gambierdiscus toxicus* and the genus *Alexandrium*, two of the most potent contributors to phytoplankton-associated human poisonings, as well as several bioluminescent species. In order to better understand and predict the growth patterns of these phytoplankton populations, we set out to determine whether species abundances within this order are affected similarly by physical factors such as water temperature, air temperature, and salinity. We accessed data from the National Oceanic and Atmospheric Administration's Phytoplankton Monitoring Network (PMN) database and determined correlations between species abundance, salinity and temperature. We then compared these correlation coefficients between species.

We discovered some similarities in response to some environmental changes, with varying degrees of response across the Order.

Presenter: Cassell, Clara

Authors: Clara N. Cassell, Padmanabhan Mahadevan

Research Mentor: Padmanabhan Mahadevan

Department of Biology, University of Tampa

Horizontal Transfer of Viral dUTPases

The dUTPases are enzymes found in eukaryotes, prokaryotes, and viruses. These enzymes control the level of dUTP (deoxyuridine triphosphate) by hydrolyzing it to dUMP (deoxyuridine monophosphate) and pyrophosphate. The horizontal transfer of dUTPases between viruses and eukaryotes and prokaryotes was shown more than a decade ago using phylogenetic analysis of the sequences available in databases at that time. Since then, the growth of sequence databases has been exponential due to advances in sequencing technology. In particular, next generation sequencing has enabled the low cost determination of a myriad of genomes, including virus genomes. Therefore, we searched GenBank for viral dUTPases and performed phylogenetic analysis in order to determine cases of previously undiscovered horizontal transfer of dUTPases. A semi-automated phylogenetic pipeline was used to perform multiple sequence alignment, alignment curation, and phylogenetic tree construction. The results of the phylogenetic analysis showed potentially novel cases of the horizontal transfer of dUTPases between viruses and other organisms.

Presenter: Castillo, Jonathan

Authors: Jonathan Castillo, Florin Curta

Research Mentor: Florin Curta

College of Liberal Arts and Sciences, University of Florida

How Warfare, Disease, and Religion Impacted Social Mobility in the Late Medieval Period

By the year 1000, European society was perceived as divided into three groups: those who fought, prayed, or worked. By 1500, however, the distinction was no longer cut and dry. Rather than three rivers flowing parallel, European society had become an ocean in a storm. No longer were the nobles the only deciding factor in battle, were priests and monks sequestered away from secular affairs, or peasants doomed to the obscurity of working the land. Three factors fueled this transformation: warfare, disease, and religion. It is my goal to show how these forces transformed Western European society in the late medieval period. To do so, I will employ primary sources, such as the chronicles of Jean Froissart, Jean de Venette, and Henry Knighton. As social mobility is such an important feature in Western society, it is both worthwhile and necessary to see how this transformation came about, especially due to the overall lack of scholarly research done in this regard.

Presenter: Castillo, Lawrence

Authors: Lawrence Castillo, Bobbi Langkamp-Henken

Research Mentor: Bobbi Langkamp-Henken

Department: Food Science and Human Nutrition, University of Florida

Impact of Probiotics (*Lactobacillus gasseri*, *Bifidobacterium bifidum*, *Bifidobacterium longum*) on Fecal Secretory IgA levels in Healthy Older Adults

Secretory IgA (sIgA) is an immunoglobulin produced by activated B-cells and plasma cells in the mucosa and serves as one of the initial responses against microbial activity at the mucosal level. SIgA protects epithelial linings and mucosal tissue by inhibiting invasion of antigens by binding to them and working to neutralize the toxins from pathogens. SIgA is one of the most abundant immunoglobulins and the major immunoglobulin of saliva, nasal mucous and gastrointestinal secretions. Over time, the production of IgA decreases due to age, lifestyle factors or nutrient deficiencies, which lead to a decrease in overall immune function. Fecal sIgA levels will serve as a biological marker of sIgA levels and immunity by comparing baseline and final levels after introduction of a probiotic supplement into the diets of aged adults. Probiotics can stimulate a change in the intestinal microflora, which provide a role in immune function by increasing the number of both bifidobacteria and lactobacilli within the gastrointestinal tract. Through probiotics, promotion of microbiota can potentially lead to the increased development and secretion of sIgA. It is expected that the subjects who are randomized to the probiotic treatment

will have higher levels of fecal sIgA. Concentrations of fecal sIgA will be quantitated using an Enzyme-linked immunosorbent assay (ELISA) technique.

Presenter: Cat, Linh Anh
Authors: *Linh Anh Cat, Patrick Bohlen*
Research Mentor: *Patrick Bohlen*
Department of Biology, University of Central Florida

An Apple Snail a Day Keeps the Plants Away: Effects of an Invasive Snail on Aquatic Plants and Ecosystems

The channeled apple snail, *Pomacea canaliculata*, ravaged the rice paddies of southeast Asia and is one of the top 100 most devastating invasive species. *P. canaliculata* was introduced to Florida in the 1970s and poses a threat due to its high reproductive capacity and feeding preferences for native aquatic plants. This experiment investigates effects of various population densities of *P. canaliculata* on different physical characteristics of aquatic ecosystems and the potential of invasive snails aiding in increasing the dominance of invasive plants. Results are being obtained by testing low, medium and high densities of snails to determine the snails' effect on pH, nutrient concentration, dissolved oxygen, and turbidity. Changes in composition of the plant community are monitored by recording percent cover of each species throughout time. It is expected that higher densities of snails will cause a change to an alternative stable state characterized by high algae concentration and the consumption of all aquatic plants. *H. verticillata* should have an increased rate of take over due to the feeding habits of *P. canaliculata*. This outcome would pose a threat to the future of aquatic ecosystem health due to the loss of ecosystem services such as purified water.

Presenter: Cave, Emily
Authors: *Emily C. Cave, Charlene Krueger*
Research Mentor: *Charlene Krueger*
University of Florida College of Nursing, University of Florida

Quantification of Speech in the Neonatal Intensive Care Unit

There is continuing debate regarding the potential benefits and risks of exposing preterm infants to sound. Prior studies suggest short-term improvements for preterm infants exposed to maternal voice including physiological stability, fewer episodes of feeding intolerance, frontal brain activation, and a significant increase in weight gain. However, previous human studies have not addressed a potential confound-- how much speech, maternal or stranger, that the infant hears during study participation. This feasibility study seeks to validate a method of quantifying the amount of human speech (from the infants' mother, family, and health care providers) that the preterm infant is exposed to while cared for in the Neonatal Intensive Care Unit. To test this we will use a sound level meter and an individual observer's report of speech within the vicinity of the infant's crib and determine if there is a positive correlation between methods of measurement. The study is underway; results will be presented upon completion. Findings will be used to improve upon future studies evaluating the effect of speech on the developing preterm infant to optimize the benefits of maternal stimulation.

Presenter: Cawthron, John
Authors: *John Cawthron, Eli Enders, Joshua Peterson, Gabriel Echeverry, and Claude Villier*
Research Mentor: *Claude Villier*
Civil Engineering, Florida Gulf Coast University

The Characteristics of Recycled Concrete Aggregates in Portland Cement Concrete

The purpose of this research is to determine the validity and feasibility of using Recycled Concrete Aggregate (RCA) in Portland Cement Concrete (PCC). An analysis was conducted to determine the effect of RCA variability on the compressive strength of concrete. In order to achieve these objectives, a concrete mix design (with only virgin aggregate) that was approved and placed on roadways in the State of Florida was utilized as a reference. The mix was then redesigned with various RCA proportions by weight along with additives such as water reducing agent and superplasticizer. Based on the analysis conducted, it was found that RCA can be used to produce quality PCC mixes, especially when the RCA quantity is minimized. Also, it appears that the variation of RCA vastly affects the performance of the mix. The observed compressive strength decreased by 35% to 50% from

the reference mix. All the mixes produced met the 28-day target compressive strength except when the RCA content was increased by 25%. Finally, water reducer appears to be a more effective additive as compared to superplasticizer. Additional research is recommended to understanding the effect of additives in PCC mixes containing RCA.

Presenter: Charapko, Aleksey
Authors: *Aleksey Charapko, Stephen Repper*
Research Mentor: *Ching-Hua Chuan*
School of Computing, University of North Florida

Optimal Shuttle Routes on Campus

In this project, we used artificial intelligence to create a computer program that examines the efficiency of a campus shuttle system. In the fall of 2012, University of North Florida (UNF) has changed the shuttle routes on campus in order to better utilize the shuttle system. During the first few weeks after the change, many students have complained that the new route requires more time to reach campus from the parking lot than the previous route. Such claim contradicts the key purpose of changing the shuttle system. In order to assess the claim, we created a computer program which calculates and produces a list of optimal routes between intersections and shuttle stops on the roads inside the UNF's campus. The software relies on distances and posted speed limits between the points on the road in order to rank the proposed routes. In addition, our program can be expanded to take into account other factors such as delays at the traffic lights or stops signs. The project results can provide valuable information for improving the campus shuttle in the future.

Presenter: Christman, Kevin
Authors: *Kevin Christman, Kelli Stickrath*
Research Mentor: *Kelli Stickrath*
Biology Department, St. Petersburg College

Relative Abundance of the Florida Gopher Tortoise (*Gopherus polyphemus*) Population in Different Natural Communities on Honeymoon Island State Park

Gopher tortoises (*Gopherus polyphemus*) dig and live in extensive burrows that help protect the resident tortoise and play an important ecological role. Their burrows provide refuge for over 360 species, making them a keystone species throughout their range (Jackson and Miltrey 1989; Epperson and Heise 2003). Gaining a better understanding of their ecology will help scientists preserve this species and better manage their habitat at Honeymoon Island State Park. This study was designed to (1) conduct a 100% census of gopher tortoise burrows within three different natural and ruderal communities on the island to estimate the total population. Beach dune/coastal strand, mesic flatwoods, and ruderal sites were the focal natural communities. (2) To determine if the estimated population differs between those three communities, and (3) determine which community held the greatest amount of juveniles. Results indicate that the estimated population size was approximately 804 tortoises, the populations did not statistically differ between communities, and the beach dune/coastal stand community held the largest amount of active and inactive juvenile burrows. These numbers may now be used in the future for observing population dynamics over time.

Presenter: Clarke, Christy
Authors: *Christy Clarke, Luciano Berardi*
Research Mentor: *Berardi Luciano*
Department of Psychology, University of Central Florida

The Role of Attachment to Parents on Cultural Mistrust During the First Year Transition to College

Cultural mistrust is defined as a pervasive attitude that minority individuals may have towards European Americans as a result of historical discrimination and oppression in the U.S (Berardi, Colon, Fever, Roundfield & Sanchez, 2005). As a fairly new phenomenon, cultural mistrust is a newly tested theory, particularly in an academic setting with emergent adults. Attachment theory (Bowlby, 1969) is defined as patterns of relationships across the lifespan which is known to be a good predictor of academic outcomes, particularly first-year college students leaving their parents for the first time. This study examines the role of attachment to parents on student's cultural mistrust during the first year of college transition. Participants of this study included first-year students at

a large, urban, private university (N=590). Also, the present study demonstrated if race mediates the relationship between students' attachment and the role cultural mistrust has on college adjustment. Knowing this information is important because it can help to develop resources to assist students who are struggling with their ethnic identity to effectively fit in their new environment and ultimately improve their level of academic achievement.

Presenter: Claypoole, Victoria
Authors: *Victoria Claypoole, Christine Stopka*
Research Mentor: *Christine Stopka*
Psychology, University of Florida

Physical Activity and Cognitive Functioning In Adolescents with Intellectual Disabilities

Cognitive functioning and ability is a large concern for those who have and help treat adolescents with intellectual disorders. Physical activity has been shown to increase quality of life and brain stimulation in in populations as whole. This rationale has been conveyed to the idea that physical activity can increase cognitive functioning and ability in adolescents who have intellectual disorders such as Down's Syndrome and Autism. High school students between the ages of 15 and 22 with intellectual disorders (N=14) were instructed in moderate physical activity twice a week for ten weeks, resulting in a total of forty hours over the entire program. Participants were issued a pre and post cognitive test using the Woodcock-Johnson 3 Test of Cognitive Abilities. It was shown that participants averaged an increase of eight points between the pre and post cognitive tests, indicating that physical activity can be a tool to improve cognitive functioning and ability in adolescents with intellectual disabilities.

Presenter: Cokley, Raven
Authors: *Raven K. Cokley, Erin Murdoch*
Research Mentor: *Erin Murdoch*
Department of Psychology, University of Central Florida

The Role of Mentoring on the Development of Ethnic Identity as it Relates to Body Image Concerns in Ethnic Minority Women

Emerging literature has emphasized the importance of mentoring in the development of minority youth. In particular, mentoring is stated to have an effect on the development of youths' sense of self and self-concept. By examining the conceptual frameworks of both mentoring and racial socialization, this article summarizes the theoretical processes associated with youth development, in particular how such development relates to one's ethnic/racial identity. Additionally, this relationship will further be examined in order to determine if it has a positive effect on the current body image perceptions of ethnic minority college-aged women. At the conclusion of this research, gaps in the literature as well as suggestions for future studies will be identified, including highlighting the importance of incorporating cultural factors related to body image into the design of mentoring programs geared toward minority females. This article will conclude by highlighting the importance of mentoring and ethnic identity in the overall positive development in minority adolescents as it relates to forming positive self-ideals and body image perceptions in young adulthood.

Presenter: Collier, Jessica
Authors: *Jessica Collier, Jenene CasePease*
Research Mentor: *Jenene CasePease*
Marriage and Family Research Institute, University of Central Florida

Examining the Difference in Pre and Post Family Adjustment II Scores for Male and Female Partners Following Participation in a 30-hr Becoming Parents Program Intervention

It is understood that distress comes with parenting a child. This distress puts relational strain on the parents as a couple and on the parent-child relationship.. Our research examines the effects of participation in The Becoming Parents Program (BPP), which focuses on educating parents with children ages 0-5 on relationship satisfaction as well as ways to increase and maintain relationship satisfaction. The Family Adjustment Measure II (FAM II), a 30-question assessment examining the parent's coping skills, social support, family based support, and parental distress through parenting their child. was given at the beginning of each workshop and again at the last session. The participants of BPP completed the assessment separately allowing us to examine female and male scores

individually. We will examine the pre and post Family Adjustment Measure II scores to determine whether or not differences exist between male and female partners following participation in the BPP intervention program.

Presenter: Colon Gomez, Maria

Authors: *Maria Yezabel Colón Gomez, Sheng Yao, and Kevin Belfield*

Research Mentor: *Kevin Belfield*

Department of Chemistry & CREOL, The College of Optics & Photonics, University of Central Florida

Squaraine Dyes for Two-Photon Fluorescence Bioimaging Applications

The central question and purpose of this research is to synthesize organic materials that can be utilized for fluorescence imaging in tissue for early cancer detection. Near infrared squaraine dyes are promising candidates for bioimaging applications. Two-photon fluorescence microscopy (2PFM) imaging is a powerful tool being used for the study of biological functions since it produces 3D images with minimal damage to cells and lower fluorophore photobleaching. Squaraine dyes normally exhibit fluorescence maximums in the near infrared region, providing deeper penetration through biological samples such as thick tissue sections. Dyes that show adequate utility for 2PFM imaging of cells and tissue were synthesized and underwent comprehensive photophysical characterization using spectroscopic techniques, such as UV-vis absorption, fluorescence quantum yields, and fluorescence anisotropy. The squaraine dyes were tested for cell toxicity to determine the dye concentration for the cells to be incubated at for 2PFM imaging and for evaluation of the dyes within the cells; followed by an analysis of the dyes to ascertain its use as a probe to improve photodynamic therapy (PDT) for early cancer detection.

Presenter: Cook, Justin

Authors: *Justin Cook, Steven Berry, and Christopher Leone*

Research Mentor: *Christopher Leone*

Department of Psychology, University of North Florida

A Re-Examination Of Measures Of Religious Orientation: “Something Old, Something New...”

In their seminal work, Allport and Ross (1967) identified two religious orientations (intrinsic, extrinsic) and created an accompanying self-report measure. Despite its widespread use, this measure has been criticized (Kirkpatrick & Hood, 1990). Because the utility of any measure is an empirical matter (Shadish, Cook, & Campbell, 2002), we assessed the convergent and discriminant validity of scores on the Allport and Ross measure. Three separate samples completed both the Allport and Ross Religious Orientation Scale and the Gorsuch and McPherson I-E Revised Scale (1989). In addition to assessing an overall extrinsic religious orientation, the Gorsuch and McPherson scale differentiates two sub-types of extrinsic religious orientation: socially-based and personally-based extrinsic orientation. With respect to convergent validity, scores on the intrinsic orientation scales of both measures were strongly correlated; scores on the extrinsic orientation scales of both measures were also highly correlated. There were no correlations between the intrinsic and extrinsic orientation scales of both measures. Unexpectedly, scores on the intrinsic orientation scale of the Religious Orientation Scale were modestly correlated with scores on the extrinsic-personal but not the extrinsic-social orientation subscales of the I-E Revised Scale. This suggests that an intrinsic religious orientation and extrinsic-personal orientation may share heretofore unanticipated communality.

Presenter: Creamer, Richard

Authors: *Richard Creamer, Iver Iversen*

Research Mentor: *Iver Iversen*

Psychology Department, University of North Florida

Contingencies of Delayed Reinforcement

Acquisition of operant behavior with delayed reinforcement has been established with delays up to 30 s for several species and types of reinforcement. However, past research has not investigated how subjects respond to changes in contingencies of reinforcement after acquisition with delayed reinforcement. Rats were used as subjects, and a nose-poking response produced a single food pellet after an 8-s resetting delay. After acquisition, three rats were exposed to a Fixed-Duration (FD) schedule with a gradually increasing response duration requirement up to 1 s. Then, the delay was removed while the FD 1 s was retained. Next, the 8-s delay was

reinserted and the FD 1-s schedule was repeated. After acquisition with delayed reinforcement, behavior was maintained with increasing response durations but in an inefficient manner with considerable response variability. When the delay was removed behavior improved in efficiency and variability was reduced but not as much as for comparison rats who acquired the same response under FD 1-s without delay during acquisition. Contingencies of delayed reinforcement are complex and induce considerable response variability that does not easily recover when delays are removed. Various methodological issues related to studying the effects of changing contingencies of delayed reinforcement will be presented.

Presenter: Crooks, Rachel

Authors: Rachel L. Crooks, Neil Jumonville

Research Mentor: Neil Jumonville

History Department, Florida State University

Enlightened Racism and The Cosby Show

Audiences remembered The Cosby Show, one of the most beloved situation comedies in United States history, as a progressive force in racial relations. For the first time in the representation of African Americans, Cosby and others created a television show that departed from previous minstrel traditions developed in the antebellum period. Both blacks and whites appreciated the humorous tales of the everyday life of the Huxtable family, but scholars Sut Jhally and Justin Lewis pioneered the argument of enlightened racism as a consequence to the show's viewership. Through viewing episodes of the show's eight seasons and reading secondary sources, I investigated why particular scholars viewed negative consequences of a positive portrayal of a historically oppressed group. In a world of discomfort talking about race, I seek to understand how quality programming, the role of the black middle class, and black situation comedies intersect. Society prevents history from being forgotten, making it so that even the successful and virtually colorblind portrayal of the Huxtables suggests that Americans are not divorced from a deeply racist history. My analysis of The Cosby Show illustrates the problems within the community in determining what constitutes as quality programming for black situation comedies.

Presenter: Crowley, Kapri

Authors: Kapri Crowley, John Richard Stepp

Research Mentor: John Richard Stepp

Anthropology Department, University of Florida

Demystifying Tropes in Ethnographic Films for Undergraduate Students

The intention of this research is to create a short informational program that will teach students the implication of ethnographic films and the filmmaking process. Many scholars have emphasized the need for a program to equip students with the necessary tools to analyze critique ethnographic film and reduce students' negative preconceptions about other cultures. Yet, this important tool to improve student analysis has not been invented nor investigated. This research attempts to answer the following question: what changes (if any) does a short informational program about the implications of ethnographic film have on students' understanding about the filmmaking process? The participants will include students between ages 18 and 24 enrolled in an introduction to the dynamic discipline of anthropology course. The goal of the program is to increase students' understanding of film techniques and their role as spectators, in order to promote the anthropological approach that all cultures are equally valuable; cultural relativism.

Presenter: Curry, Lisa

Authors: Lisa Curry, Venus Dookwah-Roberts

Research Mentor: Venus Dookwah Roberts

Division of Natural Sciences, New College of Florida

Optimization of Solid Phase Extraction for HPLC-UV Analysis of Methomyl, S-methyl-N((methylcarbamoil)oxy)thioacetimidate

Methomyl, N((methylcabamoil)oxy)thioacetimidate, is a broad-spectrum systemic and contact insecticide introduced in 1966. Used for foliar treatment on vegetable, fruit and field crops, the insecticide is capable of being absorbed by the plants without being phytotoxic to the plant itself. According to the Pesticides in Ground Water Database (USEPA, 1992) the crops' runoff leads to ground water contamination of Methomyl with

concentrations up to 20µg/L being detected. Methomyl is classified as a Class 1 Restricted Use Pesticide (RUP) by the Environmental Protection Agency (EPA), and has a high acute toxicity to mammals, birds, fish and other animals. The risk associated with pesticide exposure from crops impelled our study comparing efficiency of recovery of methomyl by sorbents used in solid phase extraction (SPE) followed by high-performance liquid chromatography (HPLC) coupled with ultra-violet detection (UV). By determining the sorbent with the highest recovery of the insecticide, the results of this study will establish our selection of sorbent for future work with field analysis of methomyl.

Presenter: Davari, Paran

Authors: *Paran Davari, Kaustuv Saha, Etienne Cartier, and Habibeh Khoshbouei*

Research Mentor: *Habibeh Khoshbouei*

Department of Neuroscience, University of Florida

Amphetamine Decreases the Lateral Mobility of Dopamine Transporter at the Plasma Membrane

Amphetamine, a psychostimulant, is a FDA approved drug for treatment of Attention Deficit Hyperactivity Disorder. Amphetamine increases synaptic levels of dopamine by competing with dopamine uptake and stimulating the reverse transport via dopamine transporter (DAT). It has been shown that DAT association with plasma-membrane lipid-microdomains regulates DAT's lateral mobility and activity. We used confocal microscopy and Fluorescence Recovery After Photobleaching to investigate whether amphetamine exposure influences DAT's membrane-microdomain association and activity. We examined the lateral diffusion ($t_{1/2}$) and mobile fraction (Mf) of Yellow Fluorescent Protein (YFP)-tagged DAT, in Chinese Hamster Ovarian cells before and after amphetamine exposure. We found amphetamine (10µM; 10&15 min) significantly decreased $t_{1/2}$ of YFP-DAT at the plasma-membrane and resulted in altered Mf compared to vehicle control ($p < 0.05$, $n=15-23$ cells). We and others have shown that amphetamine increases DAT phosphorylation level and mutation of phosphorylation targets at the N-terminus of DAT decreases amphetamine-induced alteration in DAT activity. Currently, we are investigating the hypothesis that amphetamine regulation of DAT mobility is dependent upon amphetamine induced phosphorylation of DAT. The results of our studies can potentially reveal molecular mechanisms of amphetamine regulated DAT activity and novel drug-target sites on DAT. Funding provided by DA026947/DA/NIDA and NS071122/NS/NINDS.

Presenter: Davidson, Megan

Authors: *Benjamin Davids, Megan Davidson, Monika Oli, and Saundra TenBroeck*

Research Mentor: *Saundra TenBroeck*

Animal Sciences, University of Florida

A Comparison of Sterile Scrub Techniques

Adequate antiseptis of skin is an essential step prior to any invasive procedure. The method commonly utilized is a 5-minute scrub with chlorhexidine or iodine; however no studies currently validate this as the best skin preparation technique. The purpose of this study was to determine whether a 5-minute mechanical scrub with chlorhexidine was more effective to a non-mechanical or "static" preparation where chlorhexidine was applied and left to stand for the same amount of time. Each horse, supplied for this project by the University of Florida Equine Performance Laboratory, was prepped using both methods. Bacterial cultures were obtained at three different points in the preparation. These cultures were then incubated and analyzed for the number of colony forming units. Preliminary analysis appears to show that the "static" method provides a more consistent result with only a slight sacrifice in sterility thereby proving to be a preferable method for achieving preoperative skin antiseptis.

Presenter: Di Bonaventura, Maria

Authors: *Maria C. Di Bonaventura, Ida E. Svensson, and Michele V. Manuel*

Research Mentor: *Michele Manuel*

Materials Science & Engineering, University of Florida

Biodegradable Magnesium Alloys as Medical Implants

Magnesium-based alloys are gaining popularity in biomedical applications because they replace current implants designed for long-term used in cases where a temporary implant will do just fine due to its ability to degrade in

physiological conditions. However, low strength and a high degradation rate are major obstacles for Mg-based alloys. The objective of this experiment is to create a magnesium alloy with alloy additions that will retard the degradation rate of Mg, while not losing its mechanical integrity that can lead to tissue damage. In this case, Mg-2Y-1Sc will be tested. Yttrium and Scandium were chosen since their oxides have a high thermodynamic stability that can reduce the degradation rate of the Mg-based alloy. To evaluate the behavior of the selected alloy, micrographs of Mg-2Y-1Sc based alloys cast and solution treated will be taken in order to study the microstructure and see grain formation, as well as performing Vickers micro-hardness testing to investigate the hardness of the alloy. Additionally, dissolution tests will be performed in Hank's solution to determine how quickly this specific Magnesium alloy degrades in physiological environments.

Presenter: Dias, Marielena

Authors: *Marielena Dias, Katharine Baldwin*

Research Mentor: *Katherine Baldwin*

Political Science, University of Florida

Colonial Missionary Education in Mozambique

This study aims to examine the inequalities that resulted from colonial missionary education in Mozambique. The study covers the time period of Portuguese colonial rule, from the year 1500 to the beginning of Mozambican independence in 1975. It looks at four key parts of missionary education in Mozambique: the local receptivity to missions and mission education, factors that determined how much education was provided by different missions, relationships between mission schools and government and the effects of missionary education. However, unlike similar projects that have been conducted on the subject, it takes an in depth look at the colonizing country- Portugal. It examines significant moments in Portuguese internal politics and in Portugal's relationship with the Catholic Church as factors that meaningfully impacted the effect of missionary education in Mozambique. This study allows for a better understanding of colonial missionary education practices and effects in Mozambique by reviewing the role of the colonizing country- Portugal- and how events within Portugal reverberated back to its colonies. It concludes that ethnic group statuses were largely affected while the location of ethnic groups didn't change significantly. Furthermore, the study finds that southern Mozambican ethnic groups had access to better education and increased political consciousness.

Presenter: Diaz, Lauren

Authors: *Lauren Diaz, Brenda Schumpert*

Research Mentor: *Brenda Schumpert*

Biology Department, Valencia College

Storms and Plankton in our Coastal Waters: An Analysis of Phytoplankton Abundance in Relation to Hurricane Landfalls on the Atlantic and Gulf Coasts

Harmful algal blooms can have severe economic impacts on coastal communities. Some algae produce toxins that can cause sickness or death in humans and marine life. Monitoring plankton abundance can lead to a better understanding of how to predict toxic blooms. Currently, the influence of environmental factors on phytoplankton populations is not well understood. Major environmental events, such as hurricanes, may lead to changes in regional phytoplankton populations. To address the effects of hurricane landfalls on the abundance of toxic phytoplankton in Atlantic and Gulf coastal regions, we used the National Oceanic and Atmospheric Administration's Plankton Monitoring Network Database to assess the abundance of toxic plankton species during the six months prior to hurricane landfall, and compared that data to the abundance in the six months following the storm. In some species, the toxic plankton in affected areas will have a general increase in abundance after the storm has made landfall. Other species data is reported as well.

Presenter: Diaz, Ashley

Authors: Ashley Diaz, Jeremy Chambers

Research Mentor: Jeremy Chambers

Department of Biological Science, Department of Cellular Biology and Pharmacology, Florida International University

Sab-Mediated Signaling Initiates Mitochondrial Dysfunction in an in-vitro Model of Adipocyte Aging

During aging there is a loss of adipocytes, this process is referred to as adipolysis. Adipose tissue is an endocrine organ necessary to maintain longevity. Despite the relationship between adipolysis and aging, little is known regarding the regulation of this process. One hypothesis is oxidative stress and mitochondrial dysfunction may be two important factors contributing to aging. Research demonstrates that signaling localized on the mitochondrial scaffold, Sab, influences these two factors. One of the Sab constituents is the c-Jun N Terminal Kinase (JNK). It has been demonstrated that inhibition of the JNK- Sab interaction prevents JNK-induced oxidative stress, mitochondrial dysfunction, and cell death. These data indicate that mitochondrial JNK signaling maybe a critical component of cell death initiation. Analysis of Sab expression during aging in mice revealed that Sab levels increase with age. Given this information, we hypothesize that as mammals age Sab concentration increase on mitochondria leading to increased mitochondrial dysfunction and cell death in adipose tissue. We propose to examine this signaling nexus using biochemical, cellular and organismal approaches in order to define the mechanism of adipolysis during aging. Elucidation of this mechanism will help identify new therapeutic targets for adipose loss in the elderly.

Presenter: Dimmitt, Heather

Authors: Heather Dimmitt, Heidi Harley

Research Mentor: Heidi Harley

Psychology Department, New College of Florida

Doodling as Therapy: Does Creative Drawing Expression Induce Central Executive Release, Increased Heart Rate Variability and Stress Reduction Mediated by Boredom Proneness, Daily Mindfulness, and Trait Anxiety

The current study aims to test the effects of increasing cognitive load through a sustained attention task, and to record changes in state anxiety levels using the State Trait Anxiety Inventory (STAI-S) and heart rate variability (HRV) using a finger pulse transducer heart rate monitor after completion of a Creative Drawing Expression (CDE) doodling task versus a control task of waiting for 5 minutes. Additionally, the Boredom Proneness Scale (BPS), the Mindfulness Attention Awareness Scale (MAAS), the trait version of the State Trait Anxiety Inventory (STAI-T), demographic questions, and a few questions about doodling and realistic drawing experience were also given at the end of the experiment to determine if trait levels of anxiety, boredom, and mindfulness would affect the level of cognitive load induced in participants and if these states of mind would have an interaction with the different tasks on change in anxiety levels after sustained attention. Previous research indicates that the sustained attention task would increase levels of anxiety but that these effects would be ameliorated by CDE and remain high for the waiting control group. This research could have implications for developing a method of reducing stress and anxiety, and improving the ability to sustain attention.

Presenter: Dorden, Shane

Authors: Shane T. Dorden, Donald Seto, Padmanabhan Mahadevan

Research Mentor: Padmanabhan Mahadevan

Department of Biology, University of Tampa

In Silico Restriction Enzyme Analysis Of Human Adenovirus Genomes

Human adenoviruses are divided into seven different species, A through G. Each species is further divided into types which are numbered numerically in order of their discovery. Methods such as serum neutralization assays and hemagglutination inhibition assays have been used to distinguish between human adenovirus species. Restriction enzyme analysis has long been used to distinguish between human adenovirus types. However, with the decreasing cost of genome sequencing, many whole human adenovirus genome sequences are available in sequence databases. Therefore, whole genome bioinformatics methods can be used to distinguish between human adenovirus types instead of wet lab methods. In silico restriction enzyme analysis using several enzymes was performed on human adenovirus genomes and the results were compared to whole genome bioinformatics methods such as phylogenetic analysis. We predict that restriction enzyme analysis is not as accurate as other

whole genome methods such as phylogenetic analysis in distinguishing between closely related human adenovirus types.

Presenter: Dorismond, Samora

Authors: *Samora S. Dorismond, Mary Lou Pfeiffer*

Research Mentor: *Mary Lou Pfeiffer*

Advanced Research and Creativity in Honors (ARCH), Honors, Florida International University

Ethical Factors that Influence the Selection of Potential Organ Transplant Candidates.

Due to organ shortage, dilemmas faced by the U.S. organ transplantation system involve the selection of recipients where standard procedures include the maximum benefit approach coupled with the time spent on the national waiting list. This approach also highlights medical needs, transplantation efficacy, and the recipient's age. Because the best suited candidates are chosen, it is critical to question the moral strengths and weaknesses of the allocation principles. To achieve this goal, a survey of 100 adults regarding those factors is designed to generate an experimental profile for a potential organ recipient, comparing this to the theoretical one used by the Host Organ Procurement Organization. Common and novel ethical techniques – like the four basic principles of bioethics and Dr. Bernard Lo's clinical model – offer comprehensive analysis that may show diverging terms of importance given to the selection criteria. Although the ethical examination proposed could reassure the credibility of the selection method, it might also reveal flaws that urge an improved system for recipients through more equitable criteria.

Presenter: Dorociak, Katherine

Authors: *Katherine E Dorociak and Jennifer M Taylor, and Dr. Greg Neimeyer*

Research Mentor: *Greg Neimeyer*

Department of Psychology, University of Florida

Development and Validation of the Professional Self-Care Scale

This study reports on the development and provisional validation of a new instrument, the Professional Self-Care Scale (PSCS). Stress and a lack of self-care in psychology graduate education and clinical practice have negative impacts on the development and maintenance of professional competency. Psychologists have an ethical responsibility to provide competent care for each client and must find a balance between caring for clients and caring for themselves. To create the PSCS, 458 psychology undergraduate students completed an anonymous survey comprised of 8 empirically validated scales measuring 12 hypothesized facets of the self-care construct through 119 items. Structural equation modeling was performed to create a brief 19-item self-care scale with 5 subscales: orientation towards meaning making/purpose, commitment to discussing health concerns with a health professional, commitment to exercise, commitment to making necessary life adjustments, and orientation towards changing attitudes/emotions/thoughts. The PSCS is the first comprehensive self-care scale for mental health professionals with strong psychometric properties and potential application across a variety of contexts. The creation of the Professional Self-Care Scale will allow graduate programs and professionals to assess self-care and use this information to promote psychological and physical well-being in education and practice settings.

Presenter: Droney, Andrew

Authors: *Andrew Droney, Rhonda Cooper-DeHoff*

Research Mentor: *Rhonda Cooper-Dehoff*

Department of Pharmacotherapy & Translational Research, University of Florida

Mechanisms Associated with Statin Induced Diabetes

Statins are currently the most effective treatment used to reduce cholesterol and reduce cardiovascular events. Recent studies have shown increased risk for diabetes in patients treated with statins. Obesity, a risk factor for diabetes, may play a role. The goal of this study was to identify underlying mechanisms of statin induced glucose dysregulation by evaluating the effect of statins on specific glucose regulating genes in a human adipocyte cell model of differentiating adipose tissue. Simpson-Golabi-Behmel Syndrome (SGBS) pre adipocytes were induced to differentiate, and then treated with simvastatin and atorvastatin at 100ng/dL and 1000ng/dL for six days. Cells were harvested and m-RNA gene expression was measured by real-time PCR with the following gene probes: adiponectin (ADIPQ), glucose transporter 4 (GLUT4), insulin receptor (INSR), and peroxisome proliferator-

activated receptor gamma 1 and 2 (PPAR γ 1 and PPAR γ 2). Significant dose-dependent down regulation of all genes was observed following exposure to both statins. These data suggest that statin associated glucose effects may be mediated through important glucose-insulin regulated genes, which are highly expressed in adipose.

Presenter: Drozdowski, Ryan

Authors: Ryan Drozdowski, Michael Hannaford, James Royal, and Janusz Zalewski

Research Mentor: Janusz Zalewski

Computer Science, Florida Gulf Coast University

Security Analysis in Computer Networks with Penetration Tools and Anomaly Detection

The objective of the project is to create a hostile environment for the target computer to attack it with penetration tools and see to what extent a tool for anomaly detection can detect and counteract the attacks. The following penetration tools used are: NMap to collect information about the network Metasploit to expedite the attacks via exploiting the discovered vulnerabilities and penetrating the target computer with exploits. Then, the packet analysis tool name Wireshark is used on the target computer to detect any anomalies in the network behavior to detect potential threats and attacks. The results of the project show that the methodology is successful and the data analysis on the target computer can lead to detection of malicious behavior, however the amount of data generated by the tool is so significant that another tool has to be created to do complete analysis.

Presenter: Dumeny, Leanne

Authors: Leanne Dumeny, Kerri A. O'Malley, Yao Hu, Zhihua Jiang, Angela L. Cuenca, and Scott A. Berceli

Research Mentor: Scott Berceli

Department of Surgery, University of Florida

Evaluation of Cell Proliferation in Vein Grafts Using Bromodeoxyuridine (BRDU)

Vein grafts are a form of treatment for vascular diseases but can only provide short-term improvement due to the possibility of the grafts failing from intimal hyperplasia and remodeling of the graft. Physiological adaptations, like blood flow rate, can regulate the remodeling of the graft by causing a shearing force across the endothelium. This leads to proliferation of cells within the vessel and causes biochemical and morphological changes to the graft. Bromodeoxyuridine (BrdU) is integrated into new cellular DNA and can be used to assess proliferation. In order to find a correlation between the rate and timing of cellular proliferation and intimal hyperplasia development, vein graft samples were stained for BrdU. Vein grafts were performed and harvested 2 hours, 1, 3, 7, 14, and 28 day(s) after implantation in BrdU-injected rabbits. The vein grafts were embedded and slides were generated for each time point. Positive cells are visibly stained and counted to determine the proliferation rate. Data from each sample are qualitatively compared and the high flow and low flow graft for each rabbit are also compared. I anticipate that proliferation will be higher in low flow grafts for rabbits at the 3, 7, and 14 day time points.

Presenter: Dunn, Jonathan

Authors: Jonathan Dunn, Nicholas Forster, Oscar Simon-Jorge, and Mustafa Mujtaba

Research Mentor: Mustafa Mujtaba

Department of Biological Sciences, Florida Gulf Coast University

Identification and Optimal Growth Requirements of Southwest Florida's Polycyclic Aromatic Hydrocarbon Degrading Microbes

Oil spills, whether on land or sea, can have devastating effects on the environment, the food chain, and ultimately on the social and economic conditions of localities afflicted by a spill. Therefore, it is imperative to clean any oil spill and other oil-based contaminants, such as polycyclic aromatic hydrocarbons (PAH), readily and completely to minimize their environmental and economic effects. Although crude oil from spills can be toxic to many living organisms there are microbes that naturally use oil as an energy source. The goal of this study was to identify the PAH-digesting microbes found in Southwest Florida. We found microbes from a number of different soils collected from Southwest Florida that are capable of degrading naphthalene, which is a common PAH. These microbes were able to grow on agar plates with naphthalene as its sole source of carbon. Furthermore, biochemical and morphological identification tests suggested that these microbes were gram negative and oxidase positive bacilli, suggesting a similarity to the Pseudomonas bacterium, a common microbe found in the soil. Thus,

we found bacteria in Southwest Florida soils that are capable of degrading PAHs, and further characterization will fully elucidate the microbe's identity and its optimal growth requirements.

Presenter: Elliott, Jessica
Authors: *Jessica Elliott, Hui Zou*
Research Mentor: *Hui Zou*
School of Architecture, University of Florida

A Comparative Study of the Urban Community Spaces of China, Italy and Southern Florida

Through comparative research, this project seeks to analyze and compare the community spaces in both China and Italy while taking into account the social, cultural, and environmental backgrounds of both countries and the resulting effects on the people and their cultural values in community spaces. Whereas Italy has maintained a sense of continuity throughout the history of its historical cities, China's fast changing urbanization has created a loss of memory for its people and has reduced the quality of community spaces within its cities. After researching and developing a response to these differences and cultural variations in community spaces within the Italian and Chinese urban cores, this analysis will assist in the design proposal of a small community plaza for public gathering within my hometown of Sarasota, Florida. Drawing a global view from both the Eastern and Western cases analyzing public communal spaces within an urban core, the proposed community project will reach out to promote a sense of unity and cultural growth of a low-income suburban community in Sarasota and will generate renewal of these public spaces in a city with such a large gap between the low-income communities and the wealthy upper class.

Presenter: Emmanuel, Mickey
Authors: *Emmanuel, Grey, Oppenheimer*
Research Mentor: *David Oppenheimer*
Department of Biology, University of Florida UF Genetics Institute, Plant Molecular & Cellular Biology Program, University of Florida

Using Bio-Layer Interferometry to Determine Affinities Between ADF and an a family of Putative ADF Regulators

The actin cytoskeleton is required by all eukaryotic cells to carry out key functions such as cellular motility and intracellular trafficking of cellular components. One of the most important actin-binding proteins responsible for actin remodeling is Actin Depolymerizing Factor/Cofilin (ADF). Current work in our lab on ADF regulation in Arabidopsis, led to the identification of a novel regulator of ADF1 called Irregular Trichome Branch 3 (ITB3). In addition to ITB3, Arabidopsis has 21 additional ITB3-Like genes (ITB3L1-ITB3L21). Based on our previous results, we suspect that the remaining ITB3 family members also function in regulating ADF1 and/or the other 10 ADF family members. The central hypothesis being tested is that the ITB3 family members will show binding specificity with respect to specific ADF family members. We will use a label free assay called Bio-Layer Interferometry to determine if different ITB3 family members bind to specific ADF family members. Bio-Layer Interferometry will allow us to characterize binding affinity (Kd), association rates (ka) and dissociation rates (kd) in real time. The results of our analyses will help define a function for a large conserved gene family in plants, and extend our knowledge about the regulation of ADF.

Presenter: Espino, Danielle
Authors: *Danielle G. Espino, Eugene Zaldivar*
Research Mentor: *Eugene Zaldivar*
Department of Humanities and Foreign Languages, Santa Fe College

Implementing Comprehensive Sexual Education

Much like most concerns that take place at the local and state level of our government, sexual education is an issue that tends to be overlooked. The most prevalent of the sexually active community in our nation is comprised of young adults aged 15-24. It's at this age that our youth develops the most, and it's imperative that they receive the proper guidance in order to form rational decisions that work in favor of a more successful future.

The shocking amount of sexual activity that takes place within our youth isn't necessarily the issue at hand, but rather with their lack of knowledge on such an "adult act." The abstinence-until-marriage program is currently

the prevailing method of sexual education and it continuously fails to produce the same results as it preaches. It is clear that comprehensive sexual education is a much more promising route in ensuring that our youth approaches the topic of sex in a safe and appropriate manner.

Presenter: Evens, Steven

Authors: Steven Evens, Caprice Knapp

Research Mentor: Caprice Knapp

Department of Economics, University of Florida

Charitable Giving to Florida Higher Education in Economic Recession

While all charitable organizations were affected by the 2007-2009 recession, the unique and changing structure of higher education endowments lends cause for analysis in their receipt of gifts. Notably, higher education revenue streams are changing with endowment support expected to increase while state and federal support to decrease. The objectives of this study are to determine the quantitative impact of recessions on education endowments and understand responses toward the impact of economic recessions on educational endowments. Quantitative data from 2007-2009 was collected from the Internal Revenue Service Form 990s for the 11 endowment foundations supporting public institutions of higher education in the State of Florida. Qualitative data was obtained through 5 interviews with endowment professionals employed by the University of Florida. Quantitative data shows that the recent recession was especially severe in comparison to those previous, most clearly affecting the value of net assets. Interviews demonstrated that the UF Foundation employed several strategies to counteract these losses. While endowments suffered loss of value as a result of the recession, the structuring of these endowments led to differences in their ability to support their respective Universities. Lessons learned from these trends and strategies used to counteract them are valuable for planning.

Presenter: Fabian, Mate

Authors: Mate Fabian, Brandon Klee, Richard Nichols, Michael Barzaga, Laura Cifuentes, and Shannon McQuaig

Faculty Mentor: Shannon McQuaig

Natural Sciences Department, St. Petersburg College

Methicillin-Resistant Staphylococcus aureus (MRSA) on Money

The purpose of our study was to assess the prevalence of methicillin-resistant Staphylococcus aureus (MRSA) on both paper and plastic currencies. We collected over 100 dollar bills and credit cards samples. Dollar bills were categorized into two principle groups: hospital-associated and non-hospital. Credit cards were categorized based on amount of usage. We hypothesized a high percentage of hospital-associated bills would harbor MRSA and credit cards with higher usage would more likely be contaminated. Bacteria were washed from the samples and cultured on mannitol salt agar which selectively grows salt-tolerant gram positive bacteria (e.g. Staphylococcus spp.). DNA was extracted from the resulting colonies and polymerase chain reaction (PCR) was used to detect the *mecA* antibiotic resistance gene. The *mecA* gene encodes penicillin-binding protein 2A (PBP2A) and the detection of this gene confirms the presence of MRSA. Approximately 80.0% of non-hospital dollar bills, 88.9% of hospital-associated dollar bills and 52.9% of credit cards tested were positive for the *mecA* gene indicating the presence of MRSA on these samples. Based on these results, individuals handling money should exercise diligent hand washing practicing.

Presenter: Faby, Eric

Authors: Eric Faby, Alan Katritzky

Faculty Mentor: Alan Katritzky

Department of Chemistry, University of Florida

Synthesis of Novel Bis-2,5-Diketopiperazines Utilizing Benzotriazole Auxiliary

2,5-Diketopiperazines (2,5-DKPs) occur in numerous natural products, and this subunit frequently occurs as such or embedded in larger, more complex architectures in a variety of natural products from fungi, bacteria, the plant kingdom, and mammals. 2,5-DPKs are a class of naturally occurring privileged structures that have the ability to bind to a wide range of receptors together with several characteristics attractive in scaffolds for drug discovery. In sharp contrast to numerous studies dedicated to the synthesis and biological properties of DKPs, relatively few bis-DKPs have been reported, although they have already demonstrated numerous promising biological activities. We now report novel and versatile strategies for the synthesis from readily available peptidoyl

benzotriazoles containing proline as a turn inducer of both symmetrical and unsymmetrical bis-diketopiperazines (DKPs) by triethylamine-catalyzed macrolactamization. Because it can accommodate both the cis and the trans conformers of a tertiary Xaa-Pro amide bond (where Xaa represents any 1- α -amino-acid), proline has high tendency induce reverse turns in polypeptides, therefore it has been utilized to introduce reverse turn to achieve short end-to-end distance in peptide chain.

Presenter: Fernandez, Lisbet

Authors: Gonzalez-Rothi EJ, Fernandez L, Rombola AM, Sandhu MS, Doperalski NJ, Lane MA, Reier PJ, and David D. Fuller

Research Mentor: David Fuller

University of Florida

Serotonergic Innervation of Pre-Phrenic Cervical Interneurons

Respiratory-related control of phrenic motoneurons (PhrMNs) is driven primarily by monosynaptic inputs from the medulla. However, accumulating evidence suggests that cervical interneurons (INs) are synaptically coupled to PhrMNs and that these cells may modulate phrenic output following cervical spinal cord injury. These observations have led to our working hypothesis that cervical INs are part of the anatomical substrate regulating plasticity in respiratory-related phrenic motor output. The influence of serotonin (5-HT) on cervical INs is of interest because spinal 5-HT receptor activation is both necessary and sufficient to trigger persistent increases in phrenic motor output. Our experiments confirm that pre-phrenic cervical INs receive serotonergic innervation and express serotonin (5-HT) receptors. Pseudorabies virus (PRV), a retrograde transsynaptic tracer, was applied to the diaphragm of adult female Sprague-Dawley rats to identify PhrMNs and pre-phrenic cervical INs. Using fluorescent, immunohistochemical dual-labeling techniques we confirmed the presence of extensive 5-HT innervation of PhrMNs. In addition, we found robust 5-HT immunoreactivity on or near pre-phrenic INs in laminae VII and X. Based on these findings, we conclude that pre-phrenic cervical INs are robustly innervated by serotonergic neurons, and that these cells could therefore play a role in initiating or maintaining 5-HT dependent phrenic motor plasticity.

Presenter: Fernandez, Rachel

Authors: Rachel E. Fernandez, Emily R. Mazza, Taylor A. Stevens, and Gabriel J. Ybarra

Research Mentor: Gabriel Ybarra

Department of Psychology, University of North Florida

Factors That Influence the Development of Attachments to Security Blankets

Within the first few years of life, many children develop attachments to soft, inanimate objects. For example, by age 3 years, approximately 30% of children in the United States are reported to have attachments to their “baby” blankets. The current project’s objectives included exploring the contextual and cultural influences of blanket attachment development in young children. In addition, the use of blankets and parents as soothers also was investigated. Participants were parents with children currently age five years and under. Following obtainment of consent, participants completed questionnaires that inquired about their child’s current level of attachment, their beliefs about such attachments, their child’s sleeping arrangements, and the use of blankets and parents as soothers during the day and at night. Parents also provided basic demographic information and their family’s annual income. Differences were found by Culture and by Socioeconomic Status for the reported blanket attachment level, parental beliefs about blanket attachments, and sleeping arrangements (alone versus in close proximity to others), with all p ’s < .05. Further research is necessary to explore the complexities and causality of these differing factors on object attachment, as well as their applicability to particularly stressful situations.

Presenter: Field, Zachary
Authors: *Zachary Field, Tim Crombie, and David Julian*
Research Mentor: *David Julian*
Department of Biology, University of Florida

Tolerance to Multiple Stressors: Combined Effects of Copper and Temperature Stress on *Caenorhabditis elegans*

Although the effects of individual stressors on *Caenorhabditis elegans* are well documented, the combined effects of multiple stressors remains much less studied. Organisms face an array of stressors in an environment that lead to morphological and physiological changes. When *C. elegans* are dead or extremely stressed, they become straight and rigid which we used as an assay to measure stress. In our study we crossed a range of temperatures with increasing concentrations of copper chloride dissolved in solution. As we observed, there is a synergistic effect between these two stressors. That is, temperature stress alone, even at 35° C, shows a minimal morphological effect. Copper, up to 2 mM, shows a minimal effect as well with survival rates of about 94% and 99% respectively. However, when these stressors are combined we observed a rapid decrease in survival, only about 67%. These results suggest that overall stress tolerance is quickly diminished when different types of stress are introduced. Furthermore, our results may indicate that introduction of one stressor may interfere with the pathway to produce another stress response protein.

Presenter: Flores, Sue
Authors: *Sue Ann Flores, Lorena Ramo, and Ernesto Abel-Santos*
Research Mentor: *Ernesto Abel-Santos*
Barry University

Purification of Crude Extract from Great Boiling Spring that Stimulates Growth of *Thermoflexus hugenholtzii* (phylum Chloroflexi)

Thermoflexus hugenholtzii is a novel, thermophilic bacterium that flourishes in the Great Boiling Spring (GBS) near Gerlach, Nevada. Phylogenies inferred from 16S rRNA genes and predicted amino acid sequences of various conserved proteins indicate that the bacterium is a new class in the phylum Chloroflexi, which is a diverse group of bacteria that includes both photo- and chemoorganotrophs. *T. hugenholtzii* grows in synthetic medium quite well. Yet the bacterium is greatly stimulated by water from GBS. Reverse-phase and thin layer chromatography were used to separate and visualize the extracts from the GBS. The crude extract consisted of three main components, which were separated and purified using silica column chromatography. One component stimulated the growth of *T. hugenholtzii* the best; however, its effect was lower than the crude extract. Therefore, we hypothesize that other stimulants may not have been recovered from the silica column. Further work may include identifying the components that stimulate *T. hugenholtzii* growth. (Supported by NIH-NIGMS RISE Grant R25 GM059244-12 Barry University; and NSF Grant DBI REU 1005223 University of Nevada-Las Vegas.)

Presenter: Flowers, Kacy
Authors: *Joseph Pugh, Kacy Flowers, Molly Neuberger, Folakemi Odedina, Scott Gilbert, and Philipp Dahm*
Research Mentor: *Philipp Dahm*
Department of Urology, Department of Radiation Oncology, Florida A&M University

Participation of Black Man In Randomized Controlled Trials in Prostate Cancer

Black men hold a disproportionately high prostate cancer burden. It is critical that black men participate in randomized controlled trials to assess new treatment modalities; however their participation in clinical trials is historically low. The objective of this study was to systematically evaluate their participation in randomized controlled trials of prostate cancer treatment. We conducted a systematic review of published randomized controlled trials and quasi randomized controlled trials of prostate cancer over a period of ten years (2002-2011) in PubMed. In our initial search 288 of the 605 studies identified met our inclusion criteria. Overall 21.9% (63) of the studies enrolled black men. Over the ten year time period, the studies that included black men ranged from a low of 10.3% (2005) to a high of 31.8% (2011), without any significant trend toward change over time ($p=0.645$). No studies enrolled black men exclusively or prospectively planned to stratify the analysis based on ethnic background. Participation of black men in randomized controlled trials of prostate cancer treatment appears low with no significant improvement over time. Considering their high disease burden, increased effort to improve their participation in randomized controlled trials is needed.

Presenter: Foley, Evan

Authors: *Evan Foley, Thomas Vogel*

Research Mentor: *Thomas Vogel*

Mathematics, Stetson University

Simulating Solitons of the Sine-Gordon Equation using Variational Approximations and Hamiltonian Principles

This project examines the underlying principle of soliton solutions in partial differential equations using Hamilton's Principal and Variational Approximations. William Hamilton formulated the idea that physical models can be described in terms of energies instead of the Newtonian posturing in terms of forces. Using the concept of functionals, we can describe these energies in the form of what is known as the Lagrangian to facilitate finding approximate solutions. Equations such as the Korteweg-de Vries (KdV), Modified KdV, and the Sine-Gordon will be examined to find localized structure (i.e. soliton) solutions. Interestingly enough, solitons behave differently than typical waves, due to their unique characteristics which will be addressed throughout this work. The solutions to these equations shall yield two results, justify the existence of solitons in the governing equation and provide an approximate geometric structure for the solutions to the PDEs that are under consideration. These solutions will be compared to the exact solutions, to determine how accurate the approximation works on those particular equations.

Presenter: Formisano, Tara

Authors: *Tara Formisano, Chelsea Embry*

Research Mentor: *Chelsea Embry*

Department of Integrative Health Science, Stetson University

Phytochemical Inhibition Of MRP8/14-Induced Pro-Atherosclerotic Inflammation In Human Monocytes

Atherosclerosis is characterized by vascular inflammation and lipid accumulation within the arterial wall. Expression of myeloid-related proteins 8 and 14 (MRP8/14) is increased in vascular lesions from patients with carotid atherosclerosis. MRP8/14 are recognized by Toll-like Receptor 4 (TLR4) as damage-associated molecular patterns (DAMPs), and induce an inflammatory response from monocytes. Recent studies suggest that MRP8/14 may contribute to the progression of cardiovascular disease by enhancing monocyte recruitment and foam cell formation. We investigated whether spice phytochemicals known to inhibit lipopolysaccharide activation of TLR4 would also inhibit an inflammatory response from human monocytes treated with MRP8/14. We find that the phytochemicals Curcumin and [6]-gingerol, from turmeric and ginger spice respectively, inhibit IL-6 and TNF-alpha expression in MRP8/14 stimulated THP-1 monocytes. These pro-inflammatory cytokines promote cellular recruitment and lesion instability, which can lead to plaque rupture and myocardial infarct. Thus, spice phytochemicals may represent a novel therapy to inhibit DAMP-induced inflammation that contributes to morbidity and mortality from cardiovascular disease.

Presenter: Freeland, Steven

Authors: *Sooyeon Lee, Stephanie Amici, Steven Freel, and Lucia Notterpek*

Research Mentor: *Lucia Notterpek*

Departments of Neuroscience and Neurology, University of Florida

The Absence Of Peripheral Myelin Protein 22 Alters The Proliferation, Migration, And Adhesion Of Schwann Cells

Peripheral Myelin Protein 22 (PMP22) is a trans-membrane protein that is necessary for the proper myelination of axons by Schwann Cells (SCs). The misexpression of PMP22 is associated with hereditary demyelinating neuropathies. To study the mechanism(s) by which alterations in PMP22 expression lead to neuropathies, we used primary SCs from PMP22-deficient mice. We characterized the effects of PMP22 on cell proliferation, migration, and adhesion and found SCs from PMP22-deficient mice have faster proliferation, altered migration, and adhere less readily, as compared to normal cells. . To further investigate the consequences of the absence of PMP22, we are currently studying embryonic fibroblasts from PMP22-deficient mice, and determining whether similar effects are found in an alternate cell type that is known to express the protein. Further studies will investigate specific signaling pathways that are involved in PMP22-mediated cellular functions. Identifying the role of PMP22 in Schwann cells will allow us to better understand the disease mechanisms in PMP22-linked hereditary neuropathies.

Presenter: Frelow, Jessica
Authors: *Jessica Frelow, Amy Reckdenwald*
Research Mentor: *Amy Reckdenwald*
Sociology Department, University of Central Florida

Public Education in the Reformation of High-Risk Behavior Phenomenon

High-risk behaviors such as sexual activity and substance abuse are on a rapid incline, causing a great effect on the adolescent community and society as a whole. In order to combat these issues, they must be addressed, particularly within the education system. Preventative sex and substance abuse programs have not been particularly effective in establishing a long lasting connection with high-risk youth. Expansive reformation at the within the education system can redevelop and redefine important lessons in prevention and rehabilitation for youth. Public education is a staple in a person's life and is an essential factor in reaching this demographic. Analyzing current statistics, programs already set in place, and new innovative and more effective methods can bring forth a proposal to confront this phenomenon head on. In addition, future projections are included to measure public expectations of education system in relation to the subject. In conclusion, this research provides a critical review of existing theories and the review of the current system to create a new structure of substantial support for high-risk adolescents.

Presenter: Gandy, Jacob
Authors: *Jacob C. Gandy, Holli Nichole Causey, Dylan G. Cummings, and Jody S. Nicholson*
Research Mentor: *Jody Nicholson*
Psychology Department, University of North Florida

MTV'S 16 and Pregnant: An Accurate Portrayal for Teen Pregnancy and Parenting, or a Perpetuation of Stereotypes

Negative stereotypes are often associated with adolescent mothers, which have been classified as being irresponsible, ignorant, lazy, and immoral (Eshbaugh, 2011). The media may perpetuate these stereotypes, as television shows often build the idea that adolescents who become pregnant have certain negative character types (Bales and O'Neil, 2008). The current study investigates one such show, 16 and Pregnant. It is hypothesized that the show conveys some realistic aspects of teen pregnancy, such as the challenges associated with academic achievement and relationships, but does not depict typical demographic variations (ethnicity and income) and may depict more risk-taking of the adolescent mothers than is evident in a nationally representative sample. The current study will investigate the media's portrayal of teen mothers through a reality show that has featured 48 teen mothers observed from their 2nd trimester to 3 months postpartum. Each episode was coded on information related to: demographics, financial and emotional support, education, and relationships. The coding system developed will allow a comparison between what the show conveys and statistics available from nationally representative samples of teen mothers. Comparisons will be made using t-tests for continuous variables and chi-square tests for dichotomous variables.

Presenter: Gao, Weijie
Authors: *Weijie Gao, Yiider Tseng*
Research Mentor: *Yiider Tseng*
Chemical Engineering, University of Florida

Motility of NIH 3T3 Fibroblast Cells Under Varying Shear

The movement of NIH 3T3 Fibroblasts in response to shear stress has previously been demonstrated, yet the role of CDC42 and Rac1 (key factors known to mediate movement in fibroblast cells) in this response is unclear. Manipulation of those two proteins during the controlled application of shear stress altered the cell response behavior, which was captured using fluorescence microscopy in real-time. By tracking the cells and their centroids, we are able to study the migration trends and their correlation to the magnitude of shear stress. Concurrently, cells are fixed for immunostaining after experimentation to understand the locations of CDC42 and Rac1 proteins. Qualitative data is gained through observations while quantitative data is accumulated through the use of statistical algorithms such as root mean square displacement and trajectory. Under minimal stimuli, cell mobility is increased as the stimuli is increased in direction of the shear. Empirical results show that knock-down of CDC42 will decrease cell motility while knock-down of Rac1 will increase cell motility.

Presenter: Gare, Aya

Authors: Aya Gare, Dr. Tsung-Chow Su

Research Mentor: Tsung-Chow Su

Department of Ocean and Mechanical Engineering, Florida Atlantic University

Reduction of Urinary Tract Infections Caused By Urethral Catheter through the Implementation of Hydrophobic Textile Coating

Intermittent catheterization has been in use as a medical device to drain the bladder by the insertion of a catheter tube through the urethra. However, catheter-associated urinary tract infections (UTI) are the most common infections in the U.S. healthcare system. This research focuses on improving the liquid flow to prevent reflux of bacteria-ridden urine into the body. The obstruction of urine caused by confined air bubbles result in the development of bacterial growth released during urination. Due to negative pressure, stagnant bacteria-ridden urine reverts backward through the tube, releasing the urine into the urinary tract and causing the UTI. Use of a hydrophobic textile coating has shown to improve the liquid flow in a closed-system tube. By the insertion of this material into the catheter tube, urine would cease to adhere to the inner surface. To develop a model between the backflow of urine and its associated bacterial growth within the intermittent catheter, a parametric study is performed. This study would relate the incoming flow of urine with the liquid flow rate and the catheter's geometry.

Presenter: Garner, Mary

Authors: Mary E. Garner, Amrita B. Mullick, and Adam S. Veige

Research Mentor: Adam Veige

Department of Chemistry, University of Florida

Development of Novel Gold(I)-N-Heterocyclic Carbene Complexes as Anti-Cancer Agents

Current metal-based anti-cancer agents display a high level of instability and lack the selectivity to be deemed therapeutically valuable. Patients often succumb to an array of toxicity issues brought on by heavy metal accumulation in the body, leaving the benefit of these potent drug candidates in question. We seek to solve this problem by developing a class of highly potent gold(I)-N-heterocyclic carbene (Au(I)-NHC) complexes whose unique structural features provide the complex with increased cytotoxicity and selectivity. To assess the efficacy of our metallo-drug complexes, we measured their IC50 value through a series of cell viability studies on both cancerous and healthy cell lines. Moving forward we aim to enhance the targeting ability of our Au(I)-NHC drug design by preparing cancer-specific aptamer (molecular probe with the binding affinity and selectivity comparable to that of antibodies) Au(I)-NHC conjugates. From these data we expect to find our novel Au(I)-NHC drug design superior to modern metallo-drugs.

Presenter: Gause, Elizabeth

Authors: Elizabeth Gause, Max Teplitski

Research Mentor: Max Teplitski

University of Florida

Impact of Flavonoids on Gene Expression in Salmonella

In the past few decades awareness has been increasing on the dangers of foodborne pathogens and the preventative measures to prevent foodborne disease. One area that has shown an increase in bacterial outbreaks is Salmonella in fresh produce, particularly tomatoes. By learning about the interactions of Salmonella with their plant hosts we can better understand how to prevent bacterial infection in produce. The objective of this experiment is to examine how three flavonoids that are found in tomatoes, Quercetin, Kaempferol and Rutin, affect Salmonella gene expression. This will be done by performing a disk overlay to examine how the genes respond to the flavonoids. I will also perform a beta galactosidase assay to view the impact of flavonoids on gene expression. By looking at specific genes using Salmonella mutants we can better understand how flavonoids inhibit Salmonella proliferation. This data will allow further insight into how tomatoes protect themselves against Salmonella and the specific genes affected by flavonoids. By also examining the flavonoid content of different cultivars of tomato, this data may help point the industry in the direction of cultivars of tomato that are more resistant to bacterial infection.

Presenter: Gerzina, Ashlee
Authors: *Ashlee Gerzina, Tracy Alloway*
Research Mentor: *Tracy Alloway*
Psychology, University of North Florida

Investigating the Contributing Roles of Trait Impulsiveness, Hedonic Desires, and Working Memory to Impulsive Buying Behaviors

In the United States, approximately 40% of consumers consider themselves to be impulsive buyers. Although consumers report feeling pleasure and excitement, impulsive buying can lead to serious negative implications, such as financial debt. Two separate mechanisms have been identified in impulsive spending: (1) hedonic desires and (2) the ability to regulate control over this urge. One way to conceptualize self-regulation is known as working memory. Working Memory is a cognitive skill that we use to keep a goal active in mind, inhibit distractors, and make decisions to achieve that goal. However, there is no research to date investigating the role of working memory in impulsive buying behaviors. This project will recruit young adults, because their financial independence is novel and they may not have established a self-regulatory system. Participants will take a standardized test of working memory, and complete questionnaires assessing their trait impulsiveness, hedonic desires, and impulsive buying behaviors. The results can help identify a structural model of the factors that contribute to impulsive buying behaviors. The findings can provide the basis for good financial planning, and avoid future debt for young people.

Presenter: Gibbons, Jacob
Authors: *Jacob Gibbons, David F. Johnson*
Research Mentor: *David Johnson*
Department of English, Florida State University

Bridging Manuscript and Print

The development of printing in the fifteenth century did not transform the medieval Book from the manuscript to the modern mass-market paperback overnight—instead, changes in the design of late medieval texts occurred gradually over the first decades of printing in Europe. This has significant repercussions for the way we should evaluate terms like “print culture” and how we understand features of book production traditionally assigned to manuscript or print. To illuminate this transition, I will demonstrate the complex use of ink and typography to structure books in the late 15th century, and the gradual shift from “rubrication” to the use of space and typography as means of structuring the page for the reader of the printed book. I will do so with a detailed case study of a text exemplary of this phenomenon: Gerard Leeu’s 1481 printing of “Die geesten of geschiedenis van Romen”, a Dutch translation of the Gesta Romanorum that includes a distinctive pattern of rubrication coexisting with some typographic features that foretell the future of the role of typography in structuring the printed book.

Presenter: Giddings, Ashley
Authors: *Ashley M. Giddings, Kimberly Robertson, and Neil E. Rowland*
Research Mentor: *Neil Rowland*
Department of Psychology, University of Florida

Effect of Reduced Energy Density on Cost-Demand Functions for Food in Laboratory Mice

Optimal foraging theory is a bioanthropological theory that predicts animals will behave in a way that allows them to maximize energy gain while minimizing effort or cost. This theory, closely linked with the idea of neuroeconomics, shaped scientific understanding of foraging behavior and has been linked to Prospect Theory, a behavioral economic theory suggesting that organisms make decisions based on which alternative produces the lowest risk. In this experiment, dietary fiber was introduced to dilute the diet of male mice (*Mus musculus*) under closed economy operant test conditions and food intake (demand) was measured at a series of increasing costs or effort. Contrary to our hypothesis, we found that mice worked equivalently hard for pellets of reduced or standard energy density. Our results indicate that the energy yield basis of optimal foraging theory does not provide an adequate prediction of foraging behavior under these conditions, and alternative explanations are advanced.

Presenter: Gomez, Daniel

Authors: *Daniel Gomez, Andrew Ray, Jerry Reed, and Brenda Schumpert*

Research Mentor: *Brenda Schumpert*

Valencia College

The Valencia Bat House: Using an Interdisciplinary Undergraduate Research Project to Turn Our Campus into a Living Laboratory

Undergraduate research is rapidly becoming a necessary educational component in many disciplines. To provide opportunities on Valencia's West Campus, a bat house being built and instrumented as an interdisciplinary endeavor. Our goal is for students from different fields to work collaboratively to help turn the campus into a living laboratory.

To this end, we have formed collaboration between Building Construction, Computer Technology, and Biology. Together we have researched, designed, and constructed a bat house that incorporates instrumentation, such as sensor boxes and cameras, which will allow Biology students to gather and analyze data on the diversity and behavioral patterns of the bats that inhabit the house.

Situated in our West Campus natural area, the Bat House will be accessible by students from each discipline, whose projects will include maintaining the structure and instrumentation, increasing sensor diversity and output, biological data collection and analysis, and modifying or enhancing the design according to the needs of specific research projects. We hope to expand collaborations to include our Electrical Engineering department to create an autonomous solar power supply for the bat house. This ongoing project will provide research opportunities for many Valencia students.

Presenter: Gruder, Olivia

Authors: *Olivia Gruder, Jonathan Dennis*

Research Mentor: *Johnathan Dennis*

Department of Biological Science, Florida State University

Zymosan Fungal Infection Induces Nucleosome Distributions During the Innate Immune Response on a Time Dependent Manner

Chromatin structure plays a critical role in the regulation of the human genome. An understanding of the role of chromatin structure and its relationship to gene regulation is critical to developing new strategies to prevent and treat diseases. We chose to investigate the anti-inflammatory response of human macrophage like cell line (THP1) to Zymosan, in order to elucidate the regulation of chromatin. Zymosan is a component the fungal cell wall that induces an innate immune response. After THP1 were treated with zymosan, we hypothesized that the fungal infection would initiate an inflammatory response by altering nucleosome redistribution and/or altering chromatin structure in a time dependent manner. Based on previous results that showed rapid, widespread, transient changes in nucleosome distribution in the innate immune response, we chose to look at multiple timepoints at high temporal resolution: 0 (control), 20', 40', 60', 80', 100', 2h, 3h, 4h and 12h. We measured nucleosome distribution at each of these timepoints at hundreds of genes transcription start sites involved in the immune response. Our goal is to identify nucleosome distribution changes in the innate immune response to fungal infection.

Presenter: Haave, Glenn

Authors: *Glenn Haave, Shimelis Behailu Dessu*

Research Mentor: *Shimelis Dessu*

Department of Earth and Environment, Florida International University

Do Airboats Create "Footprints" in the Florida Everglades?

When the Everglades are observed closely through satellite imagery, air boat trail networks become apparent. Because airboats travel randomly, they contribute to the discontinuation of land mass on both sides of a trail. Therefore, the objective of this study was to map two specific airboat trail network locations (Miccosukee and Tamiami) where the majority of airboat traffic is located and analyze the routes connecting to destination points in the Everglades. Results indicated that there is a considerable difference in length amongst the trails. At the Miccosukee trail network, a pilot can choose 204 different routes to get back to the same point. Similarly, at the Tamiami trail network, a pilot can choose more than 250 different routes to get to the starting point. The shortest trip a pilot can choose is 8.97 at Miccosukee and 7.25 km at Tamiami. The corresponding longest trips are 13.21 km (Miccosukee) and 10.05 km (Tamiami). The width covered by alternative trails connecting two points along

airboat routes were 3.44km (Miccosukee) and 1.48 kilometers (Tamiami), respectively. With all the pro-activity and advocacy in the Everglades in order to restore it, the findings of this study will contribute towards an informed conservation of the precious Everglades.

Presenter: Hagler, Shaye

Authors: *Shaye B. Hagler, Shannon D. Gower-Winter, Thomas J. Morgan Jr., Deborah Morris, Rikki Corniola, and Cathy W. Levenson*

Research Mentor: *Cathy Levenson*

Department of Biomedical Sciences, Florida State University

Zinc Regulation of Mesenchymal and Neuronal Stem Cell Proliferation and Survival

Bone marrow derived mesenchymal stem cells (MSC) have the potential to be used therapeutically for a variety of diseases and injuries. These cells are receiving an increasing amount of attention due in part to their accessibility, ease of isolation and culture, potential for autologous and allogenic use, and a wide variety of promising clinical applications. To fully exploit their potential, we need a better understanding of the cellular and molecular mechanisms that govern MSC. We have hypothesized that the essential trace element zinc regulates MSC growth and survival. Proliferation of rat MSC in culture resulted in an 80% increase in cell number after 6 days. This increase was reduced to 20% by zinc deficiency, suggesting that reductions in zinc availability impair the proliferation of MSC. In further support of this hypothesis, we show that proliferation, survival, and maturation of neuronal stem cells is impaired by zinc deficiency. Three weeks of a zinc deficient diet reduced the number of dividing stem cells in the hippocampus by approximately 50%. Together these data will enable us to develop a comprehensive model of the molecular roles of zinc in MSC and neuronal stem cells that will facilitate their use in a clinical setting.

Presenter: Hall, Eric

Authors: *Eric J. Hall, Danielle Morel*

Research Mentor: *Danielle Morel*

Physics Department, Stetson University

A Dynamic Computational Study of the Role of Ion Channels in a Neuron

Neurons are brain cells that exchange information across connections, called synapses, using electrical signals. These signals form as ion channels (specialized pores) allow charged particles to flow across the cell membrane. The neuron adds together all the individual signals received in a process called synaptic integration. It is expected that as synaptic input is added, the effect of each additional input on the integration process will be less than previous inputs. Instead, linear synaptic integration has been observed at times, whereby additional synaptic inputs have the same effect as previous inputs. Linear integration uses specialized ion channels to modify the strength of these synaptic signals. This research studies the properties of three types of ion channels in relation to linear integration. We constructed a computational model of a neuron using physiological data. We studied the channels individually and in combinations to identify the conditions required for linearization. Physiological studies show that different types of ion channels are expressed in different regions of the neuron. Our results indicate why this occurs: individual channels and their combinations act at different levels of synaptic input. Using multiple types of ion channels allows the neuron to function under a greater range of conditions.

Presenter: Hambazaza, Ibrahim

Authors: *Ibrahim Hambazaza, Omar A. Heredia Nieto, and Eric Freundt*

Research Mentor: *Eric Freundt*

Department of Biology, University of Tampa

Effects Of Thapsigargin On The Unfolded Protein Response During The Replication Of A Mammalian Model For Multiple Sclerosis

Theiler's Murine Encephalomyelitis Virus causes a chronic demyelinating disorder affecting several strains of mice. TMEV is an accepted mammalian model for multiple sclerosis, where demyelination of the central nervous system, and oligodendroglial apoptosis are shared characteristics. The unfolded protein response is a cellular stress pathway, triggered by several viruses, and reported to be active within oligodendrocytes in patients with MS. This study examined the effects of the UPR on TMEV replication. This experiment was performed by treating

BHK and L929 cells with thapsigargin, a known inducer of UPR; or DMSO, a control. These cells were inoculated with TMEV to measure the rate of viral replication at 6, 9 and 12 hours post-infection by performing plaque assays. The results indicated that thapsigargin inhibits the replication of both the chronic strain (DA) and lethal strain (GDVII) of TMEV. It was found that samples treated with DMSO had more plaques formed than samples treated with thapsigargin, with about a 10-fold difference, and was more pronounced in samples infected for longer periods of time. This study shows that TMEV is inhibited by induction of the UPR, and suggests that pharmacological induction of the UPR could be effective in limiting replication of certain sensitive viruses.

Presenter: Handel, John

Authors: *John M. Handel, Paul Fyfe*

Research Mentor: *Paul Fyfe*

English Department, Florida State University

Victorian Virality: The Oxford Movement and Victorian Information Networks

As an epoch in the history of the Church of England, the Oxford Movement has been written about exhaustively by both historians and theologians. Research has centered on the formation of Anglo-Catholicism and the people that lead the movement. However, this approach leaves the question of medium and method entirely unanswered. This research seeks to discover how the Oxford Movement achieved “viral” status and how the movement created and utilized new information networks to realize this virality. In order to answer this question, the forms and inherent textuality of the movement must be closely analyzed. The format, publishing cost, sale cost, advertising, and distribution networks of the different textual vehicles utilized (tracts, quarterly journals, collected sermons, etc.) by the Oxford Movement must be evaluated, as well as the decision making that went into the choice to use each particular textual medium. By using the Oxford Movement as a paradigm of networked thinking, better understanding can be achieved of how early Victorian information networks were taking shape.

Presenter: Haniff, Hafeez

Authors: *Hafeez S. Haniff, Yuanwei Zhang, Mykhailo V. Bondar, and Kevin D. Belfield*

Research Mentor: *Kevin Belfield*

Department of Chemistry, The College of Optics & Photonics, Institute of Physics, University of Central Florida

Aggregation and Photophysical Studies of New Squaraine Dyes

Squaraine dyes which are the subject of this research have a donor-acceptor-donor chromophore characterized by sharp and intense absorption bands in the near IR region. They can be synthesized by condensation of electron-rich aromatics, such as N,N-dialkylaniline, benzothiazole and pyrrole with squaric acid. 2,4-Bis[4-(N,N-dialkylamino)-2-hydroxyphenyl]squaraine dyes show interesting thermotropic liquid crystal behavior, they can form H- and/or J-aggregates upon thin film formation via spin coating before and after thermal annealing treatment. The main question of this research is to understand the different triggers in solution that affect the way the dye molecules coalesce to form H and/or J aggregates. Synthetically speaking long alkyl chains were employed to force the molecules to aggregate when placed into solutions of increasing polarity. Since aggregation phenomena depends greatly on the concentration of the species that will aggregate, UV-vis experiments were designed to measure monomer concentration as polarity was increased in water miscible organic solutions and study the polarity dependence of the aggregation while holding concentration constant. Then similar studies were conducted hold solvent polarity constant while altering monomer concentration. It was found that the hypsochromic shift observed in the absorption spectrum resulted from H aggregation of the squaraine dyes causing fluorescence quenching of the dye.

Presenter: Hargenrader, Catharine

Authors: *Catharine S. Hargenrader, Tessa Skilton, Madeleine Gagne, and Kevin S. Beach*

Research Mentors: *Kevin Beach*

Department of Biology, University of Tampa

Seasonal and Spatial Trends in an Epiphytic Macroalgal Community in a Mangrove Basin Forest.

Mangrove prop roots and pneumatophores provide hard substrates that host many types of macroalgae. These macroalgal communities contribute significant amounts of fixed carbon to these systems over time. Spatial and temporal trends in primary production, biomass, and stress tolerance have only received limited attention despite the prevalence of this community type on the hard substrate provided by mangrove roots and the long intervals of

emersion from seawater for these aquatic organisms. The importance of this substrate to macroalgae is underscored by the relative absence of other hard, attachment substrates (that most macroalgae require) in this largely soft bottom community. This full year study examines the variation in overall ecophysiology and biomass of mangrove pneumatophore epiphytes in a basin forest in Tampa Bay, FL over both seasonal as well as horizontal (cm) and vertical spatial scales (m). A synthesis of samples from four “seasons” of sampling will be presented in order to discern significant trends related to these three scales. These findings will also be discussed in the context of future research on primary production and stress tolerance in this macroalgal community in comparison to other mangrove forest types.

Presenter: Harpale, Rupali

Authors: L. Zhao, E. Li, M. Rivera, R. Harpale, S. Chuckkapalli, I. Velsko, C. Klondell, T. Martin, P. Hess, T. Beaver, and G. Wang, L. Kesavalu

Research Mentor: Lakshmyya Kesavalu

Oral Diagnostic Sciences, Department of Surgery, Division of Cardiovascular Surgery, Department of Medicine, Division of Infectious Diseases, Department of Periodontology, University of Florida

Bacterial Phylogenetic Diversity in Cardiovascular Diseased Tissues by 454 Pyrosequencing

Objectives: Periodontal disease (PD) is a polymicrobial-induced chronic immune-inflammatory disease caused by several bacterial species in the subgingival cavity. Observational studies to date support an association between periodontal disease and atherosclerotic vascular disease (ASVD) but not a causal relationship. This study was designed to investigate the bacterial diversity in the aortic plaque samples from cardiothoracic surgery patients via 454 pyrosequencing of bacterial 16S rRNA genes.

Methods: Thoracic aortic aneurysm tissue samples were collected from patients during cardiac surgery. Samples were suspended in RNA later buffer and stored at -80° C. The tissue was then homogenized by tissue rupture. Bacterial genomic DNA was extracted using the DNeasy Blood & Tissue Kit (Qiagen, Valencia, CA). Nested PCR was performed on the bacterial DNA and sequenced using Roche/454 pyrosequencing. An analysis of the bacterial diversity of the aortic plaque samples was conducted.

Results: Genomic DNA from several bacterial genus/species was detected in aortic aneurysm samples via 454 pyrosequencing including DNA from periodontal bacteria.

Conclusions: These results demonstrate that periodontal bacteria are able to enter, colonize the human aorta, and initiate inflammation. Thus, suggesting a possible correlation between Periodontal Disease and Cardiovascular Disease.

Presenter: Hedstrom, Leilani

Authors: Leilani Hedstrom, Bernadette Robinson, and C. Dominik Guess

Research Mentor: Dominik Guess

Department of Psychology, University of North Florida

Creative Achievement: How can it be Fostered?

Creativity is the engine of advancement in many areas of society such as arts, science, or economy. Where does creativity come from and what norms and values influence creativity? How can creativity be fostered? We administered the Creative Achievement Questionnaire (Carson, Peterson, & Higgins, 2005) assessing creative achievement in 10 life domains to a sample of 106 US undergraduate students. Participants also responded to surveys assessing dogmatism, desire for change, future orientation, motivation to reduce cognitive uncertainty, and age. Cronbach alpha reliabilities for the scales were between .85 and .92. The student sample overall showed low to modest overall creative achievement with the highest creative achievement in the domains visual arts, dance, and creative writing. Strongest correlations with creative achievement were found for desire for change and younger age. Regression analyses showed that the five variables together predicted 18.6 percent of the variance in creative achievement. Results have implications for education. Educators could encourage students to be less dogmatic, open to change, future oriented, and willing to tolerate uncertainty to foster creativity.

Presenter: Heitman, Cody

Authors: *Cody Heitman, Hunter Henderson, Zachary Bryan, Orlando Rios, Gail Mackiewicz Ludtka, Alexander Melin, and Michele Manuel*

Research Mentor: *Michele Manuel*

University of Florida

Reconstruction and Visualization of Three-Dimensional Particle Distribution and Morphology in Magnesium Metal Matrix Composites

Three-dimensional (3D) reconstruction and visualization of particle size morphology and distribution in Electromagnetic Acoustic Transmission (EMAT) processed magnesium metal-matrix composites (MMCs) is performed to clarify and model the relationship between processing, structure and properties of this system. With traditional two-dimensional metallographic techniques, assumptions about the shape, distribution and connectivity of 3D microstructure features within opaque materials has been shown to be inaccurate and unreliable. Here a 3D analysis of the microstructures of Mg MMCs is considered. Mg MMCs with nanoparticle inclusions were characterized with the aid of 3D rendering software from serial section images. In this study, an unbiased serial sectioning technique is employed to construct high-resolution 3D reconstructions of the materials. The visualized 3D microstructure from serial sections permits the characterization of detailed spatial correlations of the particle inclusions. This study describes both the procedural techniques, as well as the resulting analysis of particle morphology and distribution.

Presenter: Herby, Jean

Authors: *Herby Jean, Robert Bair, Onuz Ozcan, Matt Woodham, and Daniel Yeh*

Research Mentor: *Daniel Yeh*

Department: *Civil & Environmental Engineering, University of South Florida*

Pathways to Sustainable Food Waste

According to the Environmental Protection Agency (EPA), 34 millions of tons of food waste were sent to landfills and incinerators in 2010, creating many environmental problems in the process. Reducing food waste production can mitigate environment issues and prevent unnecessary use of nutrients and energy required to produce food in the first place. Food waste recycling serves the purpose of recovering a portion of the energy and nutrients embodied within the food. Two pathways for food waste recycling are composting and anaerobic digestion (AD). This project investigates a sustainable approach to food waste recycling through AD and beneficial reuse of AD byproducts. Made out of re-purposed water heaters, this small scale constructed 260 Liter AD reactor will be continuously fed organic waste and kept at ambient temperatures. With the help of microorganisms, the food waste will be broken down into biogas, a liquid fertilizer, and a solid soil conditioner. Final design resulted in a sustainable and decentralized method of recycling food waste. 2 Liter of biogas per hour (338 kwh/day) was produced daily. Food waste effluent was 7.4 times more dilute than a commercial fertilizer with a 2:1 ratio of Nitrogen to Phosphorous.

Presenter: Herrera, Osmin

Authors: *Osmin Adonis Herrera, Irina Agoulnik*

Research Mentor: *Irina Agoulnik Osmin*

Department: *Cellular Biology and Pharmacology, Florida International University*

Regulation of INPP4B Tumor Suppressor Activity by Posttranslational Modifications

Standard of care for metastatic prostate carcinoma is castration. At the early stages of development, prostate tumors are dependent of androgens and androgen receptor (AR) for proliferation. Castration lowers circulating levels of testosterone, reducing androgen receptor activity. Castration is successful, halting progression, and shrinking the size of the prostate cancer lesions. Over time, the cancer returns as castration resistant prostate cancer (CRPC), continuing to grow in a low androgen environment. Upregulation of the PI3K/Akt pathway is commonly observed in CRPC. This signaling pathway is triggered by growth factors, activating mutations, overexpression of kinases or inactivation or loss of expression of phosphatases that antagonize this pathway. Inositol polyphosphate 4-phosphatase type II (INPP4B) is an androgen induced phosphatase that is lost in 8% of primary prostate cancer, and 47% of metastatic prostate cancers. Several phosphorylation sites have been identified on INPP4B but their effect has not yet been determined. I will evaluate the effect of hypo-phosphorylation and hyper-phosphorylation on INPP4B stability, lipid and protein phosphatase using western blot analysis and protein and lipid phosphatase assays. This research may identify phosphorylation sites that regulate

INPP4B phosphatase activities, localization and stability, providing a stepping stone for future research on treatment for prostate cancer.

Presenter: Hoffman, Carlie

Authors: *Carlie A Hoffman, Debra A. Fadool*

Research Mentor: *Debra Fadool*

Department of Biological Science, Florida State University

The Influence of Genotype and Diet on Anxiety Levels in Mice

Deleting the Kv1.3 potassium channel produces enhanced olfaction, obesity resistance, and increased metabolism in mice (knockout, KO, mice). KO mice may also mimic the hyperactive phenotype of attention deficit/hyperactivity disorder (ADHD). Because ADHD is associated with anxiety disorders, the anxiety levels of high-fat (HF), control-fed (CF), KO, and wildtype (WT) mice were measured to determine the influences of diet and genotype on anxiety. Though ADHD is associated with increased anxiety, the previously determined relationship between decreased olfaction and increased anxiety resulted in the hypothesis that the KO mice would have anxiety levels equal to or less than their WT counterparts. Anxiety levels were measured using marble burying, the elevated plus maze, and the light/dark box. After performing these tests, KO mice did not bury more marbles and did not spend more time in the enclosed arms than WT mice, regardless of diet. However, KO CF mice spent more time in the dark chamber than WT CF mice, while KO HF mice spent less time in the dark chamber than WT HF mice. Further analysis will be performed to determine the significance of these findings. Thus far, despite inconsistent results, KO mice do not appear to have elevated anxiety levels.

Presenter: Hooi, Chin Gian

Authors: *Chin Gian Hooi, MenHong Liu*

Research Mentor: *Liu Hong*

Department of Aerospace Engineering, Department of Mathematics, Embry-Riddle Aeronautical University

Aerodynamic Analysis and Development of a Microscale Quadcopter

This paper presents the aerodynamic analysis results based on the design and development of a ducted fan microscale quadcopter. The quadcopter is controlled by smartphones and fits into a pocket. Its design has four rotors instead of the classic single rotor helicopter; as such it is more maneuverable. However, the microscale quadcopter operates in the low Reynolds Number region which makes it inherently inefficient due to its high drag or high resistance force. We conducted analysis based on Helicopter Momentum Theory and Blade Element Momentum Theory (BEMT) to analyze the design and performance parameters required for the various flight modes, which include hover, axial climb and descent as well as forward flight. In order to improve the endurance and efficiency, ducted fans were incorporated into the design. As expected, we found that ducted fans improve the performance of the microscale quadcopter, and the most improved mode of operation was hovering flight. In addition, the development process of the microscale quadcopter is also detailed, spanning from system architecture to various design decisions.

Presenter: Hoover, Kevin

Authors: *K. Hoover, R. van Woesik*

Research Mentor: *Robert VanWoesik*

Department of Biological Sciences, Florida Institute of Technology

Modeling Processes Driving Coral-Population Persistence In A Time Of Rapid Environmental Change

Contemporary corals populations are under tremendous stress, both locally and globally. While changes in coral populations are driven by a suite of processes, acting on individual colonies at all life-history stages, we know little about how these vital processes will vary under rapid climate change. This study asked two main questions: (1) what probability distributions are most suitable to model the processes that influence change in coral populations? and (2) which processes are most sensitive to environmental change? This study focused on the probability of four processes: (i) recruitment (new offspring), (ii) colony growth, (iii) partial mortality (transition into a smaller size class), and (iv) total-colony mortality. We determined the most appropriate distributions using field data to compute maximum likelihood estimates. Recruitment and environmental stress followed a Poisson random variable. Growth, partial mortality and mortality followed exponential distributions. During thermal-

stress events recruitment declined and large coral colonies were more likely to die than small coral colonies, changing the sign of the mortality fitting parameter. Persistence only occurred when recruitment was greater than total-colony mortality. This new process-level model increases the accuracy of predictions of change in coral populations in rapidly warming oceans.

Presenter: Hotalen, Bryce

Authors: Bryce Hotalen, Razvan Teodorescu

Research Mentor: Razvan Teodorescu

Department of Electrical Engineering, Department of Mathematics and Statistics, University of South Florida

Quantum Information Processing With Cold Fermi Gases In The Fast Pairing Regime

The use of quantum states to process information is currently a field of intensive research. A classical computer processes information through use of bits in the form of 1's and 0's which correspond logically to true and false. A quantum computer processes information through use of qubits, which due to the nature of quantum mechanics allow for both 1 and 0, or true and false, to exist simultaneously in what is known as quantum superposition. This nature of qubits allows for a quantum computer to perform tasks that would be impossible for a classical computer. A major hurdle in realization of a quantum computer is the instability of qubits; they quickly lose the capability to process information through the process of quantum decoherence. What we propose is a system of quantum computation whose implementation might be achieved with currently available technology that would theoretically be more immune to decoherence than other attempts at quantum computation. The focus of this research is the development of a mathematical model for quantum computation that minimizes decoherence while not being theoretically difficult to implement. If successfully developed, quantum computing would be of great importance to both fundamental scientific research and national security.

Presenter: Hubbard, Dominique

Authors: Dominique Hubbard, Hongmei Chi

Research Mentor: Hongmei Chi

Department of Computer and Information Sciences, Florida A&M University

A Practical Study of Privacy Issues in Location-based Service

Many controversial mobile apps, such as "Girls Around Me", only provides data that is publicly available on social networking such as, Foursquare and Facebook. When certain app summarizes all those information of one specific person, it will reveal privacy. Therefore, any user is supposed to have a conscious choice to make her/his information public. In this poster, we will give an overview for the techniques behind those apps revealing personal information. Meantime, this study will attempt to show how private information can be effectively hidden. In addition, one website that will be set up so that any user can check her/his own information by using his picture or name. This website will use various data mining techniques to uncover information that is found about them on the location-based service. The website will not only show the user all the information that was found on them, but it will also show them various methods to restrict their location-based information so that user can prevent it from being used maliciously.

Presenter: Hulme, Phillip

Authors: Phillip A. Hulme, Nadia Yevstigneyeva

Research Mentor: Nadia Yevstigneyeva

St. Petersburg College

Bursting Bubbles: Personal Finance in Education

Abstract. Since the bursting of the recent housing bubble and the following contraction of the credit market there has been a great deal of discussion about what went wrong and who is to blame. Much of this discussion revolves around government regulation of markets and businesses. However, very little time and consideration has been given to the root of the problem, financial literacy among the average citizen. In this paper I explore the financial literacy rates of different groups of people showing results from other studies. In addition to showing a lack of adequate knowledge I look at the actual financial situation of different groups showing the frightening reality of their fiscal position and need for this knowledge. Following this is an overview of exactly what the standards for financial education are and a comparison between our country and other global leaders. In conclusion it is made

obvious that financial literacy among Americans was complicit in causing the housing bubble and that if the strength of the country is to be taken seriously then this issue must be addressed.

Presenter: Isakov, Khozhiakbar

Authors: Khozhiakbar Isakov, Robert L. Cook, and John A. Friary

Research Mentor: Robert Cook

Department of Epidemiology, University of Florida

Phosphatidylethanol (PeTH): An Alcohol Biomarker for Alcohol Consumption in Hazardous Drinkers

Phosphatidylethanol (PeTH) is an alcohol biomarker that is synthesized in the presence of ethanol by the enzyme, Phospholipase D. We wanted to determine whether PeTH concentrations in the whole blood correlate with self-reported alcohol intake in a sample of hazardous drinkers. We hypothesized these two variables would be correlated. In this pilot study, we studied PeTH in blood in 18 HIV-infected women, classified as hazardous drinkers. We administered the self-report, Alcohol Time Line Follow Back (TLFB), to the participants (n=18) to obtain a retrospective estimate of their daily drinking over a seven-month period. Blood samples were collected from each participant at Baseline, 2-, and 4-Month and sent to a professional lab to measure the concentration of PeTH. TLFB data at each time point was taken to determine the mean standard drinking unit (SDU) for the 14 days preceding the PeTH test. Our results suggest that PeTH values may be able to reliably predict whether an individual's drinking has increased or decreased, but may not be able to quantify the drinking change. A larger study is needed to support PeTH as an effective biomarker that may be implicated in clinical settings as a diagnostic and detection tool for alcohol use.

Presenter: Jacobs, Brittany

Authors: Brittany L. Jacobs, Heidi E. Kloefkorn, and Kyle D. Allen

Research Mentor: Kyle Allen

Department of Mechanical Engineering, Department of Biomedical Engineering, Institute of Cell Engineering and Regenerative Medicine, University of Florida

Assessing Ground Reaction Forces in a Rat Model of Knee Osteoarthritis

Osteoarthritis (OA) therapies are difficult to translate from the laboratory to the clinic, in part due to a disconnect between joint degeneration and pain. In rodent preclinical models of OA, quantifying pain and disability can be challenging; however, gait analysis may be able to quantify the effects of joint destruction caused by OA. The objective of this study is to assess changes in ground reaction forces in a rodent model of knee OA. In 24 male Lewis rats, the medial meniscus and medial collateral ligament were cut (MMT surgery) to create a knee OA model; 24 additional rats served as sham controls. Gait was measured at 1, 2, and 4 weeks, post-surgery, in a custom built arena fitted with 3-component force plates. Decreased peak vertical forces (PVF) were observed in the right, operated limbs of rats that underwent the MMT surgery, as compared to the same rat's left limb and to sham controls. Vertical impulse (VI) also showed an increased inequality between left and right limbs over time. These data demonstrate gait analysis can be an accurate means of quantifying disability associated with OA progression and may be used to evaluate emerging therapeutics and diagnostics in rodent preclinical OA models.

Presenter: Jacobsen, Colin

Authors: Colin Jacobsen, Daniel Maier-Katkin

Research Mentor: Daniel Maier-Katkin

College of Criminology & Criminal Justice, Florida State University

Breivik's Sanity: Historical and Contemporary Right Wing Political Violence in Norway

On July 22, 2011, Anders Behring Breivik bombed the Government quarter in Oslo, killing eight people. Later that day he attacked a youth camp associated with the dominant liberal Labor Party killing 69 people, mostly teenagers. This act of mass murder captured world attention, as did Breivik's infamous electronic document entitled 2083-A European Declaration of Independence, proclaiming a radical-right worldview with unyielding hostility towards multiculturalism and the alleged "Islamization of Europe." My research, drawing on archival research and interviews, examines continuities and discontinuities in the history of right-wing extremism and violence in Norway from the period of Norway's collaborationist Nasjonal Samling to the Breivik trial. The trial, concluded in August 2012, presented the Norwegian juridical system with the question of whether Breivik's actions and xenophobia dominated by aggressive anti-immigrant and anti-Islamic sentiments can be classified as

sane. The Court concluded that you do not have to be insane to believe in and act upon Breivik's manifesto. My interviews with psychiatrists, legal scholars, political leaders, and experts on Nazism and radical-right in Norway suggest that contemporary right-wing violence is rooted in conspiracy theories, profound dislike of political establishment and xenophobia, and is likely to be a continuing problem in Norwegian society.

Presenter: Javed, Anna

Authors: Anna Javed, Kelley Johnson, Taylor Jenkins, Chad Mc.Daniel, and Christos Lampropoulos

Research Mentor: Christos Lampropoulos

Department of Chemistry, University of North Florida

Synthesis and Characterization of the First 1D chain of Mn₁₂ SMMs

Single-molecule magnets (SMMs) represent a molecular approach to nanoscale magnetic materials. An SMM derives its properties from a combination of a large ground-state spin (S) value and an Ising (easy-axis) type of magnetoanisotropy (reflected in the negative zero-field splitting parameter, D). These molecular magnets are mesoscopic particles, since they straddle between the classical and quantum regimes; they display properties from both. They display hysteresis loops in magnetization vs. field studies, as any classical magnet would, as well as quantum tunneling of the magnetization and quantum-phase interference. SMMs are based on 3d-metal central cores, which is then enveloped in an organic shell, which keeps them molecular. The archetypical family of SMMs is that of general formula [Mn₁₂O₁₂(O₂CR)(L)₄] (O₂CR- = carboxylate of various R groups, and L = terminal ligand). What happens if individual SMMs are connected into polymeric 1D chains, 2D grids, or 3D networks has been a question that has been recently under intense investigation, and which has led to the field of single-chain magnets (SCMs). The first family of linked Mn₁₂ SMMs (1D chains) will be discussed, as well as the magnetic, physical, and spectroscopic properties.

Presenter: Jaworski, Jonathan

Authors: Finn Carlsvi, Jonathan Jaworski, and Kevin Matiko

Research Mentor: Hong Liu

Mathematics Department, Embry-Riddle Aeronautical University

Multidisciplinary Development of an Autonomous Underwater Vehicle: A Case Study of Eco-Dolphin I

A highly integrated and streamlined AUV (Autonomous Underwater Vehicle) has been initiated at Embry-Riddle. This vehicle (Eco-Dolphin I) has side fins, a vertical dorsal fin and horizontal tail for cruise stability. It's configured with an internal attitude control and brushless DC (Direct Current) thrusters for propulsion. The design, production and assembly has been done in twelve months. Approximately 90 percent of the vehicle hardware components have been built and produced by the team. The vehicles mission is to be able to cruise autonomously 32 feet below the water (both fresh and salt) surface at 6.5 ft. /sec. The mission is expected to last about two hour which equates to about 10 miles of travel distance. The extensive multidisciplinary nature of the project ranging from hydrodynamics, mechanical, electrical, production to systems integration provided lots of learning opportunities as well as challenges. The team was able to capitalize on the opportunities and tackled the production and financial limitations of the process. Eco-Dolphin promises to be a unique, highly optimized and a competitive underwater robot.

Presenter: Jirmo, Abdub

Authors: Abdub Jirmo, James Taylor, and Radha Pyati

Research Mentor: Radha Pyati

Department of Chemistry, University of North Florida

Garbage on the Green: A long-Term Waste Audit program Five years in the Making

This report is a five year study of University of North Florida (UNF) "Garbage on the Green" waste audit program. The waste audit took place from March 8, 2007 through October 20, 2011. The study's purpose is to identify, and quantify the types and sources of materials in UNF's solid waste stream. The audit is a sample representation of a 24-hour waste generation. The waste audit procedures and instructions for auditing, weighing and recording data were incorporated from the Environmental Protection Agency (EPA). Five sites were identified to serve as sample representative for UNF's total waste generation; they were separated into two academic (Business administration, Social Science) and three residential areas (Food courtyard and Halls). According to the waste audit findings, the academic areas had a higher recovery rate of material both with over 26% recycling efficiency.

One of the residential areas had a 23% recycling rate and the other had an 11%. This study finds evidence to support the conclusion that the university's current recycling rate projected path will not be able to reach the 75% goal by 2020. This report presents new initiatives to help UNF improve its recycling rate drastically

Presenter: Johnson, Katherine

Authors: *Katherine R. Johnson, Melanie P. Madsen*

Research Mentor: *Eric Werner*

Department of Chemistry, Biochemistry and Physics, University of Tampa

Development of a Schiff Base/Pyridine Gadolinium(III) Complex for MRI Contrast Agent Applications

Contrast agents utilizing lanthanide metals are often used to enhance the images produced from an MRI scanner. When injected into the body, such agents are bound by water molecules within tissue and cause an increase in the relaxation rate of water protons, improving image contrast. The effectiveness of any contrast agent can be related to the number of bound water molecules (q) that coordinate the metal. Although gadolinium(III) is the most preferred metal for imaging applications, europium(III) is additionally studied due to its inherent luminescent properties. Luminescence decay lifetimes of Eu(III) complexes can be used to determine the number of bound water molecules. Standard MRI contrast agents have q values of one water molecule, resulting in low proton relaxation rate enhancements.

In this study, experiments were performed to determine the effectiveness of a new ligand, TRIPy, in binding Gd(III) and Eu(III) for imaging applications. In addition to characterizing the metal complexes using UV-Vis, IR, and fluorescence spectroscopy, relaxometry was also used to probe the relevant imaging properties. This tripodal Schiff base/pyridine ligand binds in a hexadentate fashion to the metal, allowing space for additional coordinated water molecules as assessed by luminescence lifetime measurements and determination of proton relaxation enhancement.

Presenter: Jones, Britney

Authors: *Britney Jones, Skyler Williams, and Tracy Alloway*

Research Mentor: *Tracy Alloway*

Department of Psychology, University of North Florida

Media and its Effects on Learning

The topic of media and entertainment and its influence on viewers is currently hotly debated, particularly in light of recent school-based tragedies. In our study, we were particularly interested in young children, as they appear more susceptible to negative media images than positive ones. From an educational perspective, children begin to acquire foundational cognitive skills to succeed in school. However, it is possible that these skills are being influenced by the nature of TV shows they are watching. We recruited 30 children aged between two and four years and gave their parents questionnaires concerning their children's television watching habits (educational, non-educational, adult, and multimedia educational products) and reading activity. We also administered standardized tests of vocabulary and memory. The results are currently being analyzed. We hypothesize that watching more non-educational shows would be related to lower scores in vocabulary and memory. It is also possible that multimedia educational products may not yield the same cognitive benefits as advertised. The results have the potential to impact parents, educators, and policy makers.

Presenter: Kaplan, Matias

Authors: *Matias Kaplan, Kim VanVliet, and Mavis Agbandje-McKenna*

Research Mentor: *Mavis McKenna*

Biochemistry and Molecular Biology, University of Florida

Characterization of Adeno-Associated Virus and its Receptor Galactose

Adeno-Associated Virus (AAV) is in the Parvoviridae family of viruses and is one of the smallest viruses that is able to infect humans. Despite its infectivity, AAV does not cause any human diseases; this unique quality can be exploited to produce safe vectors for gene therapy applications. AAV serotype 9 (AAV9) shows great promise in gene delivery to the heart and by its ability to cross the blood brain barrier. This opens up the possibilities for gene therapy of the brain, which may allow treatment for disorders where current treatments are not sufficient (Parkinson's, etc). My research project focuses on the interaction between AAV9 and its receptor galactose (Bell CL et al 2011). Viruses normally use a sugar and a set of host proteins to bind to the cell surface in order to infect.

A better understanding of these interactions will allow us to generate improved gene therapy vectors. In this project we begin to characterize this interaction using x-ray crystallography to obtain atomic resolution images of the AAV9-galactose interaction. This will provide information about the regions of the virus capsid which are necessary for cellular binding and infection.

Presenter: Kapusta, Annalise

Authors: *Annalise Kapusta, Blaise Denton, and Jendayi Dillard, and Joe O'Shea*

Research Mentor: *Joe O'Shea*

Humanities Department, Florida State University

Mainstream Masochism: How Fifty Shades of Grey Became A Phenomenon

After the successful suffragette movement of the early twentieth century, second-wave feminism of the 1960s sought an egalitarian society. Concurrently, the first erotic romance novel was published in 1972 – *The Flame and the Flower* by Kathleen E. Woodiwiss. However, since their beginnings in the 1970s, no erotic romance novel has achieved such overwhelming popularity as *Fifty Shades of Grey* by E.L. James. As the best-selling novel of this century, this phenomenon is made particularly curious by the book's explicit content. Is this indicative of a new, cultural movement? Some have suggested this has enabled female empowerment through liberation of the protagonist's sexuality and others believe the book hinders it due to the extremely dominating nature of her partner. This project will examine this phenomenon in relation to contemporary, feminist ideas; how it differs from or is similar to erotic romance novels of the past; and what aspects of this particular novel attract readers. Three members will present this project, which is a group assignment for the Undergraduate Research Opportunity Program at Florida State University.

Presenter: Keene, Kristina

Authors: *Kristina Keene, Lauren James, & Christina Beasley, and Jody Nicholson*

Research Mentor: *Jody Nicholson*

Department of Psychology, University of North Florida

Implications of Father Incarceration on Children of Teen Mothers

Introduction: Father absence is detrimental to child development, which is concerning for children born to adolescent mothers as they are less likely to have their biological fathers involved (Howard, Burke, Borkowski, & Whitman, 2006). However, no research has examined the detrimental effect of having a father absent due to incarceration. The following study will examine the detrimental effects of father absence and father incarceration on 18 year outcomes (i.e., behavioral, academic, cognitive) for a sample of children born to adolescent mothers.

Method: Data is drawn from a larger longitudinal study. Adolescent mothers reported if their children were in contact with their fathers and if the fathers were in prison at 6, 8, 10, and 14 years and children's functioning was assessed at 18 years (cognitive, academic, behavioral). By 18 years, 16 children had experienced a father in prison (15.4%).

Proposed analysis: Two variables will be created for father contact and father incarceration, where values range from 0- 4 based on the number of time points where the father was reported in contact or incarcerated. A hierarchical regression analysis will examine whether father contact and incarceration significantly impact child function while controlling for maternal IQ and SES.

Presenter: Keeter, Emily

Authors: *Emily Keeter, Wendy Dahl*

Research Mentor: *Wendy Dahl*

Food Science and Human Nutrition, University of Florida

The Effects of Potato Fiber on Gastrointestinal Functions Symptoms

Novel fibers need to be tested for efficacy such as stool bulking, increased stool frequency, decreased gastrointestinal transit time, and gastrointestinal symptom tolerance. The purpose of this study was to determine the effects of resistant potato starch (RS) on stool bulking, bowel movement frequency and gastrointestinal symptoms (bloating, flatulence, abdominal cramping, etc). Using a randomized, crossover design, healthy adults (n=13) were provided biscotti and Koolaid® fortified with 30 g/d RS or control foods for 7 days and low-fiber meals days 3 to 7, with a 2-week washout period between treatments. Stools were collected throughout the 5-day dietary intervention. Daily diaries were completed throughout baseline and intervention to determine

gastrointestinal symptoms and stool frequency. Participants rated symptoms from “0” no symptoms to “10” severe discomfort. The study showed no significant differences between the control and RS treatment for any gastrointestinal symptoms: bloating (0.7 ± 0.8 vs 0.9 ± 0.6 ; $p=0.47$), flatulence (2.3 ± 1.6 vs 2.2 ± 1.3 ; $p=0.42$), abdominal cramping (0.4 ± 0.7 mean 0.8 ± 0.9 ; $p=0.72$), and intestinal noises (1.2 ± 0.9 vs 1.1 ± 0.8 ; $p=0.37$). Stool frequency did not change, nor did stool bulking (control= 155.3 g/d; treatment= 158.5 g/d). The resistant potato starch had no impact on gastrointestinal symptoms or function suggesting that the proposed fiber may not be resistant to digestion.

Presenter: Khiyani, Neeraj

Authors: *Neeraj Khiyani, Yi Zhang*

Research Mentor: *Yi Zhang*

Department of Pharmacology, University of Florida

A Comparison of Changes in Serum and CSF Leptin in Sprague Dawley and F344xBN Rats

Leptin is an adipose derived hormone integral in regulating energy intake and energy expenditure. It is found in the plasma, the brain and the cerebrospinal fluid (CSF). Leptin concentrations in CSF have been found to be strongly correlated to the plasma levels and body mass index (BMI). Thus, indicating that leptin enters the CSF in proportion to body adiposity. According to the Centers of Disease Control and Prevention (CDC), 35.7% of adults in the United States are obese. This does not include those who are overweight or children who are overweight or obese. When combating obesity, clinicians often turn to weight loss programs first. Weight loss programs have been reported to have different rates of success. The magnitude of change in CSF leptin concentrations may be an indication of how well a patient does while on a weight loss program. Sprague Dawley (SD) rats have been known to be obesity prone while the F344xBN (BN) rats retain leptin sensitivity despite consumption of high fat (HF) diet. After initial measurements have been recorded, these twenty rats will be given a HF (60% kcal) diet. Food intake and body weight will be recorded daily. Blood and CSF will be taken before termination.

Presenter: Khan, Zia

Authors: *Zia Khan, Madhu Pandey*

Research Mentor: *Madhu Pandey*

Environmental Science, University of South Florida

Purification of Brine Using Spirulina Algae

Currently, the world's demand for fresh drinking water far outweighs the supply. In response to this, there is a major global push for desalinating seawater. One popular method of desalination employs reverse-osmosis which forces seawater through a semi-permeable membrane which will filter salts and solids, leaving behind a brine solution with an extremely high salt content. Brine from seawater contains concentrated levels of nitrates and phosphates which at high levels can be toxic to sea life as well as humans. There are species of saltwater algae that thrive on nitrates and phosphates that can survive in the high-salt concentration of brine. The major by-product of algae is lipids which can be used to synthesize bio-diesel products. The major benefit of using algae to purify brine is that other methods require a lot of energy (i.e., evaporation, biofilms), whereas algae primarily requires CO₂ (a greenhouse gas) and sunlight. Spirulina thrives in brackish water environment that requires sunlight, CO₂, nitrates, and phosphates. Spirulina can be used to reduce the nitrates and phosphate levels in the desalination brine. This method is more sustainable alternative that has many benefits: reduction of greenhouse gases, production of bio-diesel, and reduction of nitrates in desalination brine.

Presenter: Klausner, Rachel

Authors: *Rachel Klausner, Valerie Guerra, and Adriaan Brujinzeel*

Research Mentor: *Adriaan Brujinzeel*

Department of Psychiatry, University of Florida

Nicotine Stimulated Brain Activity Using Pharmacological MRI at 11.1-Tesla

The longer a person smokes cigarettes, the more likely it is that a strong addiction will form. The brain areas that control habit formation are the dorsal striatum and prefrontal cortex. Changes in functional responses to nicotine within these and other areas may underlie addiction to nicotine. Mapping functional neuronal activation in response to nicotine and specific nicotine receptors in vivo is thus of key importance to study the acute and long-

term actions of nicotine in the central nervous system (CNS). Here, we show that nicotine evokes increases in blood oxygen level dependent (BOLD) signals. Male Wistar rats were anesthetized with isoflurane using a lateral tail vein catheter for the delivery of nicotine. Magnetic resonance imaging (MRI) was carried out in an 11.1-Tesla MRI scanner. We observed increases in BOLD signals in frontal cortical areas, including the medial areas and motor cortical areas, dorsal and ventral striatum. Activation of these regions was dose dependent for both the volume of activation and percent change in BOLD. At the moment, experiments are planned to examine blockade of nicotine-stimulated activation by specific nicotine receptor antagonists (interfering agent) and agonists (stimulating agent)

Presenter: Klee, Brandon

Authors: *Brandon Klee, Shannon McQuaig*

Research Mentor: *Shannon McQuaig*

Natural Sciences Department, St. Petersburg College

Antimicrobial Effects of *Callicarpa Americana*

Antibiotic resistant bacteria (ARB) are an increasing problem in clinical setting. Due to the growing number of ARB, many pharmaceutical companies, as well as health professionals, are seeking alternative chemical compounds to control the growth of these problematic organisms. The goal of this study was to assess potential antimicrobial effects of compounds isolated from local flora. Research was based on Native American folklore indicating antimicrobial effects of several plants indigenous to Florida. *Callicarpa americana* is a vascular plant commonly found throughout Florida. Samples of *C. americana* were collected, and various portions of the plant were prepared for antimicrobial analysis (e.g. bark, leaves, berries). The berries and bark of the plant had no effect on microbial growth. The leaves of the plant were desiccated and pulverized and applied to agar plates with either Gram-positive bacteria (*Staphylococcus aureus*) or Gram-negative bacteria (*Escherichia coli*). The leaf material had no effect on the growth of *E. coli*, however we did observe a zone of inhibition when plated with the *S. aureus*. These results indicate a potential for *C. americana* to inhibit the growth of Gram-positive bacteria.

Presenter: Klingbeil, William

Authors: *William H. Klingbeil, Mark McRae*

Research Mentor: *Mark McRae*

Biology Department, University of Tampa

Shoaling by Eastern Mosquitofish (*Gambusia holbrooki*) in Response to the Sight of Largemouth Bass (*Micropterus salmoides*)

The influence of a predator on the tendency of mosquitofish (*Gambusia holbrooki*) to form shoals was investigated. Female mosquitofish were collected in a habitat lacking in piscivorous fishes, and were considered naïve to the threat presented by largemouth bass (*Micropterus salmoides*). Our null hypothesis stated that the amount of time a naïve *G. holbrooki* spent near a shoal of conspecifics would not increase due to the presence of *M. salmoides*. Trials were conducted in a large aquarium consisting of three zones: a shoaling zone (five female *G. holbrooki* in a clear plastic container), an empty middle zone, and a predator zone. Two assays were conducted (20 ten-minute trials each), one with a single *M. salmoides* in a clear container in the predator zone, and another that lacked *M. salmoides*. The mean number of seconds spent in each zone by focal fish during the two assays were compared by using unpaired two sample t-tests. Naïve *G. holbrooki* did not spend more time near a shoal of conspecifics when *M. salmoides* was visible than they did when *M. salmoides* was absent, indicating that predator evasion behaviors may be learned through experience, or may be lost through natural selection.

Presenter: Knodel, Hilary

Authors: *Natalia Fitzsimmons, Hilary Knodel, Michelle Turner, and Birgitta Kimura*

Research Mentor: *Birgitta Kimura*

Santa Fe College

Ancient Guinea Pig DNA: A Tool for Studying Human Migration Patterns in the Caribbean

Studying the genetics of ancient guinea pig DNA can shed light on human migration patterns in the Caribbean. In this experiment, researchers extracted, amplified, cloned, and sequenced DNA from a Guinea Pig mandible recovered in Puerto Rico by UF archaeologists. The sample is thought to be between five hundred and one

thousand years old. Extraction of DNA from ancient samples must be performed with great care as degradation and fragmentation often occur over time. DNA was amplified using Polymerase Chain Reactions. Researchers chose to amplify the cytochrome b and d-loop genes because of their high mutation rates. Once amplified, gene segments were ligated into plasmids and introduced into *E. coli* for cloning, a necessary step for sequencing ancient DNA. Sequenced DNA will then be compared to other known Guinea Pig DNA sequences. These results should help to pinpoint the movement of the domesticated species over time. We plan to perform the same procedures on the four other samples collected from other locations in the Caribbean.

Presenter: Kurth, Sarah

Authors: Sarah Kurth, Jenny Stuber

Research Mentor: Jenny Stuber

Sociology Department, University of North Florida

Minimize the Sacrifice: A Look Inside the Military Family and their Coping Tactics

Serving in the military is not only recognized as a highly regarded profession, but as one of the most prominent services one can give to his or her country. Those who do not serve can only imagine the adversities faced by those who do. Well-deserved honor is given to those who serve in the military. However the family members of those serving are also making numerous sacrifices. These sacrifices are made for an occupation that is not their own. This study asks what are the experiences family members endure because of their relationship to the military? This study looks at the various family dynamics of those families with a military husband or father and how the members are able to cope when faced with a deployment or relocation. Data suggests that the members of military families endure a lot of stress and therefore have to find their own way of coping to minimize the strain.

Presenter: Lambrinos, Nikolle

Authors: Nikolle Lambrinos, Jianning Wei

Research Mentor: Jianning Wei

Department of Biological Sciences, Florida Atlantic University

The Regulation of Mitophagy in a Cellular Model of Huntington's Disease

Huntington's disease (HD) is an inherited, autosomal dominant neurodegenerative disorder that is currently incurable. The disease affects approximately 30,000 individuals nationwide, causing progressive damage to neuronal cells in the brain. The accumulation of damaged mitochondria within neurons is one factor thought to play a role in HD pathogenesis, given that it leads to adverse effects on neuron physiology. In healthy individuals, the mitophagy, or "mitochondrial autophagy", pathway regularly degrades the damaged mitochondria. Recent studies indicate that the mitophagy pathway is impaired in HD. We have investigated the Parkin/PTEN-induced putative kinase 1 (PINK1) mitophagy pathway in neuronal cell lines derived from healthy and HD transgenic mice using plasmid transfection, Western blot, and confocal microscopy techniques. To date, we have demonstrated that Parkin efficiently translocates to the damaged mitochondria to stimulate mitophagy in healthy cells but not in mutant HD cells. This leads us to believe that there is an unknown interruption preventing the mitophagy pathway from fully functioning in HD cells. An understanding of such molecular pathways that are altered by mutant huntingtin (mHtt) expression is important for the discovery of novel drug targets for HD treatment.

Presenter: Lara, Joanna

Authors: Joanna Lara, Constance Shehan

Research Mentor: Constance Shehan

Sociology Department, University of Florida

Quality of Housing and Gender: in Mexico

This paper analyzes gender differences among homeowners in quality of housing in Mexico, using secondary data from the National Household Income and Expenditure's Survey (ENIGH) 2006. Quality of housing is estimated using an OLS regression to test several independent variables, such as age, gender, marital status, education, income, the number of household members, locality, locale, and the age of the dwelling. Quality of housing is the dependent variable and is measured with a 7-item housing quality index that includes material of walls, roof and floor, the availability of a water supply system, availability of a toilet, type of sewage system, and the availability of electricity to the dwelling unit. The results show that, after controlling for individual and household

characteristics of the owners of the homes, most of the homeowners are men. Nevertheless, women have higher quality homes. These findings suggest that it is necessary to investigate the strategies women use to improve the quality of their homes, and to review the effectiveness of current public programs that address home improvements.

Presenter: Lasa, Gloriya

Authors: *Gloriya E Lasa, Sean Noah Walsh*

Research Mentor: *Sean Walsh*

Department of Politics and International Relations, Florida International University

Natural Consumerism

Although people master different levels of understanding in the fields of physics, biology, anthropology, and chemistry – the sciences of nature –, there is a set of ideas of nature that is shared by most: the “Lowest Common Knowledge of Nature.” The promotion of products, a basic mechanism and function of the Consumer Society, relies largely on consumerism and its proper functioning. This research aims to demonstrate that the images extracted from the Lowest Common Knowledge of Nature are being utilized throughout the media for the purpose of supporting and justifying the premises of consumerism. The connections that are to be established through the survey of literature on consumerism, of the sources of the Lowest Common Knowledge of Nature, and of pieces of advertising depict the Consumer Society in a new manner, highlighting the relationship between the consumption, consumerism and the ways in which people view nature and understand its principles.

Presenter: Leedy, Aaron

Authors: *Charlotte Gallagher, Anna Pittman, Aaron Leedy, Hanna Giraldo, and Michael Toglia*

Research Mentor: *Michael Toglia*

Department of Psychology, University of North Florida

Is Perceived Creditability for Older Eyewitnesses Influenced by Need for Cognition

We were interested in the connections between need for cognition and the perception of creditability of eyewitnesses based on age, with middle-aged witnesses typically perceived as more credible than older eyewitnesses. Participants read a trial transcript about a child pedestrian-car accident wherein a defendant was charged with manslaughter. The sole eyewitness, either a 49 or 79 year-old male, testified that the child hit his head on a rock after stepping off the curb before the defendant’s vehicle struck the child. Transcripts included direct and cross-examination with half accompanied by the eyewitness’ photo. Participants rendered a verdict after rating witness credibility on nine dimensions including competence, honesty, and suggestibility. Participants also completed a need for cognition scale and questionnaire measuring attitudes towards punishment. There was a significant three-way interaction between age, information type, and need for cognition on perceived credibility ratings. Verdicts were significantly related to NC and influenced by attitudes towards punishment. Results are discussed in terms of their implications within the criminal justice system.

Presenter: Li, Andrew

Authors: *Andrew Li, Paramita Chakrabarty, Li Tianbai, Amanda Herring, Carolina Ceballos-Diaz, Pritam Das and Todd E Golde*

Research Mentor: *Todd Golde*

Department of Neuroscience, University of Florida

Hippocampal Expression of Murine IL-4 Results in Exacerbation of Amyloid Deposition

Alzheimer’s Disease (AD) is the leading cause of dementia and is believed to be triggered by the accumulation of the amyloid beta protein in the brain. Many hypotheses have arisen to discuss the mechanism behind this neurodegenerative disease and neuroinflammation is believed to play an important role. Microglia are the resident immune cells of the brain and are capable of scavenging plaques such as Amyloid Beta (Abeta) and dying neurons and defending the brain against infectious agents. There is evidence that, like other macrophages, microglia can undergo classical or alternative activation to attain either a pro-inflammatory phenotype (M1) associated with injury or an anti-inflammatory phenotype associated with healing, respectively. These differences in activation may affect the response of microglia in the presence of Abeta. In order to assess the effect of activated microglia on Abeta, we purified microglia from primary mixed glial cultures of mice brains. The microglia were then incubated with the pro-inflammatory cytokine IL-6 and anti-inflammatory cytokines IL-4. Then soluble

fluorescent Abeta 40 and 42 were added to the purified cultures and phagocytosis was assessed by flow cytometry and microscopy. We have shown that IL-6 increased phagocytosis while IL-4 decreased phagocytosis of Abeta 40 in vitro.

Presenter: Lim, Monica

Authors: *Monica T. Lim, James Churilla, and Tammie Johnson*

Research Mentor: *James Churilla*

Department of Clinical and Applied Movement Sciences and Department of Public Health, University of North Florida

Vigorous Physical Activity and Body Mass Index in U.S. Adults

In the health field, body mass index (BMI) is a method of estimating body adiposity. It is known that physical activity affects BMI, but little research has shown the effect of various intensities of physical activity on BMI. The purpose of the study is to examine the linear relationship between self-reported vigorous physical activity (VPA) and BMI. Data from the Behavioral Risk Factor Surveillance System (BRFSS) was utilized. BRFSS contains data of health related behaviors in a national representative sample of U.S. adults. Following adjustment for demographic and other lifestyle factors, a significant inverse dose-response relationship was observed between self-reported VPA and BMI. Seventy-five minutes of VPA corresponded to a decrease of 0.1 kg/m² of BMI. These findings illustrate a significant linear relationship may exist between a self-reported VPA (meeting the physical activity recommendations) and BMI. Future research examining potential relationships between physical activity intensities and measures of adiposity is warranted.

Presenter: Lipman, Malorie

Authors: *Malorie J. Lipman, Michael Chester, Pamela S. Soltis, and Douglas E. Soltis*

Research Mentor: *Pamela Soltis*

University of Florida

Chromosome Balance in Naturally Occurring Trigenomic *Tragopogon miscellus* x *T. mirus* Hybrids

Natural hybrids between two plant species *Tragopogon miscellus* and *T. mirus* have been reported in Pullman, Washington, USA. *Tragopogon miscellus* and *T. mirus* are natural hybrids themselves; *T. miscellus* is a cross between *T. dubius* and *T. pratensis*, and *T. mirus* is a cross between *T. dubius* and *T. porrifolius*. Previous work indicated that the *T. miscellus* x *T. mirus* hybrids contain these three genomes, as would be expected in their hybrid. Seeds from natural populations were collected and allowed to germinate and grow. We then analyzed the chromosomes by staining using FISH (fluorescence in situ hybridization) and GISH (genomic in situ hybridization) methods to generate chromosome karyotypes for these individuals. This allowed us to determine which subgenome chromosomes belong to and distinguish chromosomes from each other. The expected karyotype was two complete genomes from *T. dubius* (the shared parent), one complete genome from *T. pratensis*, and one complete genome from *T. porrifolius*, making the hybrids trigenomic (3 subgenomes) tetraploids (four sets of chromosomes). All plants had the expected number of chromosomes, but none in the expected karyotype. Deviations followed compensatory patterns that likely contribute to stabilization. These findings suggest a new model of hybridization distinct from other methods.

Presenter: Louviere, Christopher

Authors: *Christopher D. Louviere, Regina T. Martuscello, Loic P. Deleyrolle, David J. McCarthy, and Regina T. Martuscello*

Research Mentor: *Regina Martuscello*

Department: *Neurosurgery, University of Florida*

The In Vivo Characterization of the Anti-Tumor Effects of Dietary Intervention on Glioblastomas

Glioblastoma tumors, one of the most malignant forms of primary tumors in the CNS, are characterized by invasive tissue growth and resistance to standard chemotherapy and radiation. Glioblastoma cells, like other tumors, rely upon glucose for energy and are largely unable to metabolize ketone bodies for energy production. However, to occur at an increased rate, cellular proliferation also needs increased rates of macromolecule production and mRNA translation. The PI3K-Akt-mTOR pathway activates cellular receptors, ketone bodies, and transcription factors and is important for heightened cellular proliferation. When this pathway is dysregulated, cellular receptors and transcription factors are stimulated. The focus of this research is to investigate a potential

mechanism underlying PI3K-Akt-mTOR dysregulation through the administration of a modified dietary paradigm. This glucose restricting diet will minimize the amount of glucose available to the tumors for fuel, which will delay in vivo tumor progression using a subcutaneous model, yet provide energy substitutes for non-tumor cells. Immunohistochemistry and immunolabeling analyzed by flow cytometry will identify the intercellular effects of the altered metabolic state. It is anticipated that the dysregulated PI3K-Akt-mTOR pathway, caused by altering the energy metabolism of the mice, will produce sustained tumor senescence.

Presenter: Lutz, Charles

Authors: *Charles T. Lutz, Grant C. Trier, Jessica J. Small, and Monica Lara*

Research Mentor: *Monica Lara*

St. Petersburg College

Artificial Reef Sediment Experiment-Sediment Analysis

Sediment samples were collected from local artificial reefs and natural ledges within Pinellas County. The samples were used for a study of sediment composition. The presence of structure provided by the artificial reef is believed to have an effect on the sediment composition, as organisms growing on the surfaces eventually break off and contribute to the sediment. This process alters the sediment composition and could possibly enhance it as a habitat for infaunal organisms. Samples were collected from immediately adjacent to the reef and from a distance away from the reef and were sifted to obtain size fractions. The results showed that a higher percentage of coarse sediment is present in the reef-adjacent samples with a higher percentage of particles larger than 500 μm . Components of the coarse sediment of biological origin are being sorted and identified. Major components of the sediment include gastropod and bivalve shells, echinoderm spines, calcareous polychaete tubes and hard coral fragments.

Presenter: Lynton, Jordan

Authors: *Jordan Lynton, Tiffany Willoughby-Herard*

Research Mentor: *Tiffany Willoughby-Herard*

African American Studies, University of Central Florida

Chinese in the Caribbean: A study of Kinship in Chinese Caribbean Communities

From childhood onwards, the concept of the family plays multiple roles in shaping the individual including: the development of values, the defining of principles, and the formation of identity. Consequently, family has often been used by colonial powers as a method of control and manipulation. This paper seeks to study the formation of kinship and marriage in Chinese indentured laborers imported into the British colonies of Guyana, Trinidad and Tobago, and Jamaica (1853-end of second generation). The meanings that these migrants made about Caribbean and Chinese identity—especially as measured through kinship and marriage— provide an important window into understanding of global transformations in the plantation economy, emancipation of the Africans in the West Indies, and the recruitment and immigration restrictions placed on Chinese people. In particular greater attention to Chinese and Black peoples experiences of involuntary migration has implications for the models through which we examine slavery and indenture and the ways which these systems shape kinship, cultural, and national identities in the present.

Presenter: Mafдали, Alex

Authors: *Alex Mafдали, Vinata Vedam-Mai*

Research Mentor: *Vinata Vedam-Mai*

Department of Neurosurgery, University of Florida

Deep Brain Stimulation and Neural Stem Cells, with Respect to Parkinson's Disease

Parkinson's disease (PD) is a neurodegenerative disease that affects the central nervous system. The symptoms of PD are due to the loss of dopaminergic neurons in the substantia nigra. While dopamine replacement therapy (agonists as well as antagonists) help alleviate the symptoms of the disease, currently no cure exists. The most effective treatment for PD is a surgical procedure called Deep Brain Stimulation (DBS), in which an electrode is inserted into a patient's brain to deliver constant electrical pulses at a set rate. DBS therapy is perhaps the most effective for the treatment of parkinsonian disorders, however its mode of action is still largely not understood. The two neurogenic locations in the brain are the subventricular zone (SVZ) and the subgranular zone (SGZ). We

hypothesize that chronic high frequency electrical stimulation (e.g. DBS) is capable of inducing the proliferation of neural progenitor cells (NPCs) in brain regions other than the SVZ and SGZ, and may contribute to the therapeutic outcome of DBS. Using a rodent model of STN-HFS, we demonstrated that adult NPC's were induced to proliferate in the STN. We hope that using our methods we can unravel the mechanism of action of DBS, and improve the electrode-brain interaction.

Presenter: Magny, Sherlyne
Authors: *Sherlyne Magny, Ewa P. Wojcikiewicz*
Research Mentor: *Ewa Wojcikiewicz*
College of Science, Florida Atlantic University

Investigation of Cell Stiffness and Cytoskeletal Remodeling in Response to Inflammatory Mediators Using Atomic Force Microscopy (AFM)

Atomic force microscopy (AFM) is a novel technology with emerging potential for cancer detection based on cell stiffness measurements. Studies have shown that cancerous cells were recognized to be less stiff than normal epithelial cells. In this study, we will investigate the role of transforming growth factor- β (TGF- β) as a potential mediator involved in altering the biophysical properties such as cell stiffness of mammary epithelial cells (MCF10A). We hypothesize TGF- β will promote decreased cell stiffness through the disruption of f-actin using the AFM. In aim 1 we determined that disrupting cytoskeletal components of MCF10A cells decreased measured stiffness. For our preliminary results, MCF10A cells treated with cytochalasin D, a drug known to disrupt f-actin, significantly decreased cell stiffness than colchicines which is known to disrupt microtubules. In aim 2, we investigated the effects of MCF10A cells treatment with TGF- β . MCF10A cells stiffness have been greatly reduced due to TGF- β .

Presenter: Mandelare, Paige
Authors: *Paige E. Mandelare, Thomas J. Mullen, and Amy L. Lane*
Research Mentor: *Amy Lane*
Department of Chemistry, University of North Florida

Seaweed and Sponge Metabolites as Inhibitors of *Candida albicans* Fungal Biofilms

The fungus *Candida albicans* forms strong biofilms, which are aggregates of cells that adhere to substrates such as bodily tissues and inanimate objects, including pipes and medical devices (catheters). Existing anti-fungal drugs are not highly effective treatments for biofilm-based infections. Thus, there is a strong need for development of drugs that target said biofilms. We hypothesized that marine sponges and seaweeds produce compounds (natural products) that inhibit *C. albicans* fungal biofilm formation. Using a biofilm inhibition assay, 132 seaweed and sponge chemical extracts from Key West, Florida were evaluated for their ability to inhibit *C. albicans* biofilm. Of the extracts evaluated, 39 were found to inhibit biofilm formation by at least 50% relative to controls. HPLC fractionation was carried out with the five most promising chemical extracts to isolate compounds responsible for observed biofilm inhibition. HPLC fractions that were active in the biofilm inhibition assay were further verified for their ability to inhibit the attachment of fungi to surfaces by atomic force microscopy (AFM). The atomic force microscopy revealed a highly filamentous morphology for *C. albicans* on model polystyrene surfaces and dramatic reductions in cell adherence to these surfaces in response to seaweed and sponge compounds present in HPLC fractions.

Presenter: Marano, Alexis
Authors: *Alexis R. Marano, Mary Lou Sole*
Research Mentor: *Mary Sole*
College of Nursing, University of Central Florida

Non-Invasive Postive Pressure Ventilation (NPPV): Its Uses, Complications, & Implications Within Nursing Practice In Acute Care Settings

The use of noninvasive positive pressure ventilation (NPPV) in acute care settings has drastically increased within the past 20 years. Research has indicated that NPPV is equally as effective as traditional mechanical ventilation (MV) in treating acute exacerbations of chronic pulmonary obstructive disease (COPD) and cardiogenic pulmonary edema. Furthermore, the risk of complication from NPPV is much lower than MV, in terms of

ventilator-associated pneumonia and sepsis. It is imperative for the nurse to understand the various indications, interfaces, and potential complications associated with NPPV use. In addition to treating acute exacerbations of COPD and cardiogenic pulmonary edema, NPPV has been used for prevention of reintubation, palliative care, and status asthmaticus. Furthermore, NPPV could be delivered through various interfaces, such as nasal and facial. However, there is limited amount of research available discussing the role of the nurse in caring for the patient with NPPV. There are no standardized guidelines established to assist the nurse in this care, in terms of interface selection, prevention of complications, and staffing patterns. Several recommendations are presented to guide future nursing research, education, and clinical practice, such as exploring the role of oral care and education for NPPV patients.

Presenter: Martin, Kristin

Authors: Kristin Martin, Khanh Ha, and Alan R. Katritzky

Research Mentor: Alan Katritzky

Department of Chemistry, University of Florida

Tandem Deprotection-Dimerization-Macrocyclization Route to C2 Symmetric Cyclo-Tetrapeptides

Cyclic tetrapeptides represent a unique class with a wide diversity in structural type and biological activities including: inhibition of mammalian histone deacetylase, cytotoxicity, tyrosinase inhibition, antimalaria, and antibiotic ability. Despite their interesting properties, cyclic tetrapeptides still find limited applications, mainly because of synthetic difficulty. The cyclization event is often a great challenge and direct macrolactamization is hampered by ring strain. A primary reason for ineffective cyclization of a linear tetrapeptide can originate from a sequence-related difficulty to bring the termini sufficiently close for cyclization. Peptide bonds preferentially adopt trans conformations, and linear peptides prefer more extended conformations. Among contemporary strategies for peptide-mimetic macrocyclization, a tandem dimerization–macrocyclization approach including several tandem click reactions has facilitated difficult lactamization reactions. We now report a novel and versatile strategy for the synthesis of cyclo-tetrapeptides by palladium catalyzed tandem deprotection/cyclization from readily available cbz-peptidoyl benzotriazolides incorporating proline as a turn introducer.

Presenter: Maura, Gabriela

Authors: Gabriela Maura, Natalie C. Ebner, Lars Westberg, and Hakan Fischer

Research Mentor: Natalie Ebner

**Department of Psychology, Department of Pharmacology, University of Gothenburg, Gothenburg, Sweden
Department of Psychology, University of Florida**

Associations of The Oxytocin Receptor Gene (OXTR) Polymorphisms with Brain Response During Reading of Facial Emotions in Young and Older Adults

In the present study, a genetic-neuro-behavioral approach was used to examine associations of the oxytocin receptor gene (OXTR) with brain activity and behavioral response during reading of facial emotions in samples of young and older adults. Participants were genotyped for 15 OXTR SNPs (single nucleotide polymorphisms), which have previously been shown to be associated with social behavior. Of these, the most promising associations were found in relation to rs237887 in 53 participants, 20 identified as A homozygous (AA) and 33 identified as carriers of at least one G-allele (GA/GG). Individuals carrying a G-allele compared to AA-genotype carriers showed increased activity in left fusiform gyrus, right inferior frontal gyrus, and right middle frontal gyrus during reading of emotional expressions in happy compared to angry faces, while also showing decreased activity in bilateral anterior cingulate cortex. In addition, G-allele compared to AA-genotype carriers were slower labeling happy (but not angry) faces and reported greater attention to and clarity of their own feelings in a self-report measure. Several of these observed associations were more pronounced in older than young participants, which is an interesting finding given broad evidence of preferential processing of positive over negative information in older compared to young adults.

Presenter: McBroom, Jade
Authors: Jade McBroom, Jeanne Stacciarini
Research Mentor: Jeanne Stacciarini
College of Nursing, University of Florida

Social Isolation in Latino Adolescents

Social isolation is defined as physical separation from other people. For Latino immigrants, this may include complex psychosocial, linguistic, and cultural factors as well. Social isolation is a major stressor and can significantly impact Latino adolescents' mental health. The purpose of this study is to explore factors associated with social isolation in Latino adolescents. This is a descriptive pilot study. First there was an integrative review of research articles on social isolation in Latino adolescents, including those in rural and urban areas. The review of literature was performed through electronic databases. Second, interviews performed with Latino adolescents who lived in a rural area of Levy County were content analyzed. A total of 16 research articles were identified. Themes from the literature include: role of violence, family relations, school/peer interactions, drug use, and loneliness. Themes from the interviews (n=14) include family, family integrity, friends, routines and places to go, isolation, connections with the community and general feelings. Both the literature and the interviews showed difficulty with the English language were barriers to social connectedness. Also family was an important factor in preventing feelings of isolation where adolescents relied on the family for social connectedness.

Presenter: McCann, Katlyn
Authors: Katlyn McCann, Mandy Zamore, and Christopher Leone
Research Mentor: Christopher Leone
Department of Psychology, University of North Florida

Some Effects of Mere Thought and Social Dominance Orientation on Labor-Management Attitudes

Given mere thought, initially favorable or unfavorable attitudes become more favorable or unfavorable (Tesser et al., 1995). Individuals high in social dominance favor social inequality; individuals low in social dominance favor social equality (Pratto et al., 1994). We hypothesized with increased thought about disputes involving inequality (labor vs. management), attitudes would become polarized - especially for individuals high in social dominance. After thinking about a hypothetical labor-management dispute, participants expressed their attitudes about each side's position. They also completed the Social Dominance Orientation Scale. Using an analysis of variance (ANOVA), we found that attitudes about labor as well as attitudes about management became more favorable with increasing thought. There were, however, no effects of social dominance orientation. Because our failure to find effects of social dominance orientation might be due to insufficient statistical power (Cohen, Cohen, West, & Aiken, 2003), we are collecting more data. Our results might inform both self-generated attitude change theory (i.e., identification of another moderator variable) and social dominance orientation theory (i.e., polarized attitudes associated with social dominance orientation may be the product of biased scanning during thought). Our findings may also have applications to ameliorating actual labor-management disputes (Clarkson et al., 2011).

Presenter: McCray, April
Authors: April McCray, Adam Batley, Lezou Dali, Juan Mohica, John Heiser, and Scott Smith
Research Mentor: John Heiser
Environmental Engineering, Tallahassee Community College

Brookhaven Atmospheric Tracer Sampler: Fabrication and Revision

The Brookhaven Atmospheric Tracer Samplers (BATS) are being redesigned as the original, thirty year old units have become outdated, increasingly unreliable and challenging to maintain. The older internal electronic components are failing and replacement parts are increasingly difficult to find. The BATS units sample tubes, made from stainless steel, and are difficult to rebuild and replace. Knowing the sample volume is essential to achieve high quality field data. In contrast, the new BATS units will give a more reliable and flexible sampling unit. The stainless steel tubes have been replaced with glass tubes that can be easily assessed and/or replaced. They have a mass flow meter and pump controller which will result in accurate and precise flow rates over an operational range from 0 to 450scm. Every sample can be set with a specific start time, flow rate and duration to allow for any kind of circumstances. In addition, sampling data is logged for quality assurance and can be monitored in real time, locally on a liquid crystal display (LCD) screen or via wireless internet. The new BATS

units have on-board global positioning system (GPS) for time synchronization and recording location information which is especially useful for coordinating multiple samplers.

Presenter: McDonald, Jessica

Authors: Andrew P. Daire, Naomi J Wheeler, and Jessica McDonald

Research Mentor: Jenene Case Pease

Department: College of Education, University of Central Florida

Relationship Education for Single Parents: Does it Work?

Research supports the effectiveness of relationship education for couples, married or unmarried, with children or without. There have been very few studies, however, discussing the effectiveness of relationship education for individuals. Relationship education for individuals has primarily focused on prevention of domestic violence. Additionally, single parents are often underrepresented in the relationship education literature in spite of distress often experienced when raising a child independently. This study compares the pre- and post- self-survey results for single parents that attended a relationship education workshop without a partner. All participants received the Outcome Questionnaire 45.2 (OQ45.2), a 45-item self-report survey that measures perceived symptom distress associated with depression and anxiety, interpersonal relations and social role functioning. Participants with the University of Central Florida's Marriage and Family Research Institute complete the OQ45.2 before and after participation in a 12-hour relationship education workshop. Scores pre- and post- workshop are compared for single parents with children to those individuals without children. We hypothesize that the individuals' satisfaction scores will increase from the pre-workshop scores to post-workshop for all single parents, reflecting the effectiveness of relationship education for those without partners as well as those in relationships.

Presenter: McElroy, Daniel

Authors: Daniel McElroy, David Ostrov, and Robert Hromas

Research Mentor: David Ostrov

Department of Medicine, Department of Pathology, University of Florida

Structure-Based Design of New Drugs for Acute Myeloid Leukemia

Acute myeloid leukemia (AML), which is a form of cancer in which white blood cells grow rapidly and accumulate inside bone marrow, interfering with the production of normal bone marrow cells that form the immune system. AML is the most common acute leukemia affecting adults (1 in 254 people). The incidence of AML increases with age. AML is most common in elderly patients, yet is rarely curable because the DNA repair mechanisms are overly activated rendering chemotherapy ineffective. This project is aimed at the development of new drugs to inhibit this amplified DNA repair response in leukemia cells, thus improving the response of AML to chemotherapy. Metnase is a key component of the DNA repair response and represents a novel important target for anti-neoplastic drug development. We used a structure-based strategy to optimize first generation lead compounds for the development of new drugs that target Metnase and promote responsiveness to chemotherapy. We designed second generation compounds that were screened in silico for binding the Metnase transposase domain. The results provide a set of optimized lead compounds ranked for synthetic prioritization. Future studies will evaluate the capacity of second generation Metnase inhibitors to improve the response of AML to chemotherapy.

Presenter: Mejia, Katherine

Authors: Katherine Mejia, Andrew Daire

Research Mentor: Andrew Daire

Education Department, UCF Marriage and Family Research Institute

Examining Ethnic Differences in Parental Adjustment Among Parents in a Relationship Education Program

Individuals, couples, and families differ in coping responses to life's challenges in their own respective ways. Some find the stressors of everyday life to be challenging making it difficult to focus on the positives. Others see that coping with life's unexpected is just part of the human condition. However, the field can benefit from additional research on how family adjustment differs amongst ethnic groups. Some parents revert to the way their parents interacted with them emphasizing on cultural knowledge about child rearing. According to the stress-buffering

model, social support is a shielding factor in response to the adversities of life (Cohen and Wills 1985). Using the Family Adjustment Measure-II (FAM-II), a thirty-item, research-designed tool that measures parental adjustment of parents with children of normal development. The proposed study and presentation will examine ethnic differences in family adjustment from parents participating in a relationship education program. Recruitment and intervention recommendations will be presented.

Presenter: Melichar-Koors Jane

Research Mentor: *Kandis Natoli*

School of Nursing, Bethune Cookman University

Descriptive Study of Incivility in a Nursing Program

The purpose of this study was to describe student perceptions of uncivil behavior and experiences of uncivil or threatening behavior in a baccalaureate nursing program at a Historically Black University. This descriptive study used a self-administered, mixed-method survey tool, "Incivility in Nursing Education." Survey forms were given to 150 sophomore, junior, and senior level students; 100 surveys (67%) were returned and analyzed. The students considered side conversations, groaning, sarcastic gestures, and lateness as the most disruptive student behaviors. The most frequently observed uncivil behaviors were side conversations, arriving late for class, and cell phone use. Faculty behaviors perceived as disruptive were punishing the entire class for the behavior of one person, lack of availability, rankism and condescending attitude. The most frequently observed uncivil faculty behavior was ignoring the disruptive behavior of other students. Within the last twelve months, 41% of the respondents experienced general taunts and disrespect from students or faculty. Students found faculty as less likely to engage in uncivil behaviors compared with students. Incivility is problem in a historically Black University nursing program and this finding agrees with other studies of incivility in nursing education.

Presenter: Mesa, Bianca

Authors: *Bianca Mesa, Tsung-Chow Su*

Research Mentor: *Tsung-Chow*

Department of Ocean and Mechanical Engineering, Florida Atlantic University

The Study of a Liquid Droplet Falling Through Two Immiscible Layers of Liquids

In an exploratory experiment, we noticed the unusual behaviors of liquid droplets falling through layers of oil and water. A rectangular container was filled with an aqueous solution at the bottom and a layer of oil on top. A dropper was used to control the size of the droplet entering the liquid column. It was noticed that initially, the liquid droplet moved through the oil layer and was stopped at the oil/water interface, supported by surface tension and the buoyancy of the oil layer between the liquid droplet and the water below. As time passed, the support was weakened and the droplet would start to fall quickly through the water. In certain cases, the droplet would spontaneously explode before reaching the bottom. Additional experiments are being done to discover the underlying mechanisms of such an occurrence and the reason behind the droplet's flow instability with a focus on the effects of diffusion on surface tension, and the effect of temperature on the droplet's behavior. In addition, water was mixed with a small amount of Bromothymol Blue Dye, a chemical indicator, to visualize the detailed flow processes.

Presenter: Meyer, Cheyenne

Authors: *Cheyenne Meyer, Megan B. Baxter, and Ashley Batts Allen*

Research Mentors: *Ashley Batts Allen*

Psychology Department, University of North Florida

Increasing Self-Compassion in Domestic Violence Survivors

Individuals who experience domestic violence are prone to depressive symptoms, which have the potential to have a negative impact on their life and emotional well-being (Waldrop & Resick, 2004). Self-compassion, the ability to accept our own flaws and inadequacies, reduces stress, and individuals who practice self-compassion report lower levels of depression (Neff & McGehee, 2011; Allen, Goldwasser, & Leary, 2012). In this study, participants will complete measures of self-compassion and positive and negative emotions at a domestic violence shelter during their intake and exit interviews. Throughout their time in the shelter, participants will have the opportunity to attend a self-compassion support group once a week. In the support group, participants will learn about the concept of self-compassion as well as some skills that can lead them to become more self-

compassionate. We hypothesize that participants who attend the self-compassion support group as opposed to other support groups or not attending groups at all will report an increase in happiness and self-compassion as well as a decrease in anger and anxiety from time 1 to time 2. These findings would support previous research showing that self-compassion buffers people against negative emotional experiences (Neff, Kirkpatrick, & Rude, 2007).

Presenter: Mildor, Marsha

Authors: Marsha Mildor, Precious Ezeamama, and Stephanie Bingham

Research Mentor: Stephanie Bingham

Department of Biology, Barry University

A Developmental Analysis of Palmitoyl-Protein Thioesterase Expression in the Zebrafish Embryo

Palmitoyl-Protein Thioesterases (PPTs) are lysosomal enzymes required for lipid metabolism, specifically, catabolism of thioester-linked fatty acyl groups. In the absence of their function, lipids accumulate in vital organs leading to organ system dysfunction and failure, hallmarks of the neurodegenerative disease neuronal ceroid lipofuscinoses (NCL) also known as Batten disease. Here we perform a developmental comparison of PPT-1 and -2 expression in the zebrafish embryo via in situ hybridization analysis; embryos analyzed range in age from the 2-cell stage to 48 hours post fertilization. We are using zebrafish in this study because it has a number of characteristics that make it a suitable vertebrate model: rapid development, large quantity of eggs per breeding pair, and a transparent embryo facilitating single-cell analysis. Probes for in situ analysis were synthesized from DNA mini-prep samples of full-length clones; full-length PPT-2 was first excised from the non-expression vector pDNR-LIB using restriction enzymes BamHI and XhoI, and subsequently cloned into the expression vector PCS2+. We anticipate the expression profiles will provide clues to complementary and distinctive functions of these two critical metabolic enzymes.

Presenter: Miller, David

Authors: David G. Miller, Sonya Cronin

Research Mentor: Sonya Cronin

Department of Religion, Florida State University

J.K. Rowling, "The Casual Vacancy," and the Problem of Evil

J.K. Rowling's "Harry Potter" series, though intended for a young audience, incorporates the mature themes of evil and corruption. Rowling arguably adopts certain Augustinian themes by depicting evil as a corruption of something previously good, with the source of this evil being love of self and pride. Rowling's sole novel for adults, "The Casual Vacancy," expands upon this portrayal of evil, clarifying the philosophical ideas presented in her earlier writings. "The Casual Vacancy" represents new literary territory for J.K. Rowling, exploring more adult themes of relationships; politics; poverty; and religion, and further developing the connection between Rowling's and Augustine's viewpoints. This research aims to better understand the origin and expression of evil within Rowling's writings as presented in "The Casual Vacancy." It will demonstrate both her dependence on Augustine's understanding of evil as expressed in "Confessions" and "The City of God" and her secularization of it, as she constructs her story in a world ungoverned by God.

Presenter: Mobley, Ian

Authors: Ian F. Mobley, Ericka Ghersi

Research Mentor: Ericka Ghersi

Humanities Department, Santa Fe College

Santería: Orishas and Who Owns Your Head

Since the Yoruba faiths were first carried by slaves into North America and the surrounding island nations they have been greatly misunderstood. The most popular religion that evolved out of them being Santería. My focus was to examine how it evolved from its predecessors and where it draws influence and parallels to Catholicism and Western faiths. I most closely examine it where it has had its strongest influence on the culture, that being Cuba. With more than 80% of Cubans claiming that they seek guidance from orishas (Santería spirits) or babalawo (priests), there is nowhere else on Earth where Santería is more prevalent. Although, most citizens of the Western world dismiss Santería as a pagan faith, demonic, or even go as far as to denounce it as witchcraft,

my hope in this study was to enlighten people to what Santería really is, as well as to explain much of its terminology. To do this I read many articles on the subject, several of which were written by practitioners of the faith.

Presenter: Mohammed, Aaron

Authors: Aaron S. Mohammed, Michael Wise, and Maurizio Giannotti

Research Mentor: Maurizio Giannotti

Physical Sciences Department, Barry University

The Impact of Physics Beyond the Standard Model on the Blue Loop Phase of Stellar Evolution

Massive stars go through a stage in their evolution (blue loop phase), when they contract and expand while their surface temperature changes from relatively cold (red) to hot (blue) and then decreases again. Since modern observational techniques allow measuring the relative number of red and blue stars accurately, this phase has extensively been studied experimentally. We showed, with a numerical study, that the evolution of the star during the blue loop phase is very sensitive to the microscopic physics inside the star and therefore can be effectively used as a laboratory to test some of the new models for microscopic physics. Here we discuss how a novel cooling mechanism could red-shift the position of the star in the Hertzsprung–Russell diagram and increase the relative number of red stars versus blue stars. We apply this result to axions, which are hypothetical particles whose existence is required for the correct description of the theory of the strong interactions, and show how this analysis provides new constraints on the axion coupling with photons. Finally, we discuss possible generalizations of this analysis to other physics beyond the standard model. (Supported by NIH-NIGMS RISE Grant, R25 GM059244-12, Barry University; and Physical Sciences Department.)

Presenter: Molina, Laura

Authors: Laura Molina, David Lakin, Umar Twahir, Wen Zhu, Nigel Richards, and Alex Angerhofer

Research Mentor: Alexander Angerhofer

Department of Chemistry, Department of Chemistry & Chemical Biology, University of Florida

Kinetic Studies of OxDC Using a Luminescent Oxygen Sensor

Oxalate decarboxylase (OxDC), an enzyme of the bicupin superfamily, catalyzes the decomposition of oxalate into carbon dioxide and formate at an optimal pH of 4.3 in the presence of oxygen. However, about 0.2% of all reactions occur through an oxidase mechanism that consumes oxygen while producing carbon dioxide and hydrogen peroxide. This oxidase activity can be observed by measuring dissolved oxygen consumption. The poster will present a description of the improved experimental design, using an oxygen sensor based on fluorescence quenching. Initial results based on Michaelis-Menten kinetic analysis will be presented for wild-type OxDC as well as two specifically designed mutants, T165V and SENS161-164, the latter of which exhibits strong oxidase activity. Furthermore, we will compare these results to the oxidase activity of Oxalate Oxidase (OxOx), on which the SENS mutant is modeled. This data provides insights into the reaction mechanism of OxDC and has implications on ESR spin trapping results on these systems, which will be discussed.

Presenter: Molinares, Helen

Authors: Helen Molinares, Leonard Elbaum

Research Mentor: Leonard Elbaum

Department: Physical Therapy Department, Florida International University

Effectiveness of Robotic Devices to Facilitate Neuroplasticity and Improvements in Lower Extremity Motor Skills Among Children with Cerebral Palsy: an Introduction and Systematic Review

Cerebral palsy (CP) is a term that describes a group of motor impairment syndromes secondary to genetic and/or acquired disorders of the developing brain. The concept of neuroplasticity is directly affiliated with this disorder, and has served to sponsor the application of rehabilitation robotics in search of motor enhancements in this population. Recent research has shown that children with CP can improve their motor skills through intensive, carefully guided practice; but the expense of this type of therapeutic intervention is labor-intensive, and the cost is relatively high. Innovative, relatively inexpensive robotic technologies to facilitate intensive therapies have recently emerged, and some are already commercially available. The purpose of this project is to introduce the reader to robotic-rehabilitation technologies, and to present a systematic review of the effectiveness of these

technologies in the facilitation of neuroplasticity and improvement of lower extremity motor skills. The review will follow the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines; which have become the ‘gold standard’ for health-related literature reviews. Ultimately, this data will serve to provide support the understanding of how these technologies work, their future implications on the standards of physical therapy, and their effectiveness over traditional therapeutic methods.

Presenter: Moore, Katie

Authors: *Katie Moore, Hala ElAarag*

Research Mentor: *Hala ElAarag*

Department of Mathematics and Computer Science, Stetson University

A Ubiquitous Non-Binding Fitness Application for Mobile Devices Using Body Sensors

Our goal in this project is to develop a motivational fitness application for a smart phone, using a wearable heart rate monitor that would not only be engaging, but also be able to provide an effective guided exercise for the user. By implementing the application on a smart phone, their fitness data is private, and able to provide exercise instructions uniquely designed for them; advantages not found in other mobile applications to our knowledge.

The gathered data is then used to manipulate a 3D environment as well as ensure that the user is performing at their target heart rate. The smart phone’s screen provides a 3D environment which allows the user to see in real time how they are performing during their exercise routine.

Because the application only requires the smart phone and the wearable Bluetooth heart monitor, as well as only requiring the user’s heart rate, the user is free to exercise on any piece of equipment they prefer, so long as they can safely receive instructions. The application allows the user to have easy access to biological information during exercise that they normally could not obtain except through expensive exercise equipment.

Presenter: Mullins, Andrew

Authors: *Andrew Mullins, Linda Cowan*

Research Mentor: *Linda Cowan*

North Florida/South Georgia Veterans Health System, University of Florida

The Association Between Wound Dressings and Biofilm Measures in Chronic Wounds

This retrospective secondary analysis of an existing wound study will examine the relationship between dressing types and bacterial biofilm quantity in chronic wounds. This analysis augments results from the exploratory wound study in progress titled, “Disruption of Dynamic Reciprocity by Bacterial Biofilms and Proteomic Analysis” IRB 405-08. In the IRB approved primary study, researchers seek to assess the characteristics of a non-healing wound environment versus an acute wound environment. The wound analysis will consist of a biochemical analysis of MMPs, planktonic bacterial and biofilm colony forming units (CFUs), immunohistochemistry, proteomics, and cytokines with a variety of methods. In this secondary analysis, the levels of bacterial biofilms will be measured and compared to the types of wound dressings that the patient used prior to the collection of the wound sample. Data will be collected by retrospectively looking at records showing the biofilm CFUs identified in wounds from the samples taken as described above. This will be compared to the type of most recent dressing (1-2 weeks) that the patient wore previous to the sample being collected. Associations between certain dressings will be determined through statistical techniques and reported based on the findings.

Presenter: Musselwhite, Matthew

Authors: *Matthew N Musselwhite, Iver H. Iversen*

Research Mentor: *Iver Iversen*

Department of Psychology, University of North Florida

Comparison of Backward and Forward Chaining Procedures

Chains of stimuli and responses are components of daily interactions with the environment and with other people. Two training procedures, backward and forward chaining, are common in the literature, but few studies compare the two. The presentation will compare the two methods of training and what types of control of behavior result from the training. By using rats as subjects, it was illustrated that even though the two methods result in a similar overall behavior chain, the two methods nevertheless generate different training progressions and different types of control of behavior, as revealed when certain tests are made. Apparently, training with forward chaining

generates a more “flexible” chain because the subject adjusts more easily to changes made in the chain after it is formed compared with adjustments made to the same changes after training with backward chaining. The presentation will outline implications for use of chaining procedures in applied settings.

Presenter: Mustafa, Mohammad

Authors: Ernesto Aneiros, Zachary Bell, Tatiana Hevia, Mohammad Mustafa, Brandon Patton, Joshua Rowley, Laura Smith, and Carl D. Crane III

Research Mentor: Carl Crane

Department of Mechanical and Aerospace Engineering, University of Florida

Engineered Controllability: Automated Labyrinth

Labyrinths (mazes) have been known since ancient times and figure in one way or another in the folklore and history of many cultures. Presently, mazes are mostly used in puzzles and games, as well as for decorative purposes. Navigating a maze precisely is a difficult and complex task, requiring the use and coordination of multiple sensorial skills. The purpose of this project is to have a computer automatically guide a target ball bearing through a simple maze. The maze-board and frame were designed using Solidworks CAD (computer aided design) and the prototypes were built using a 3D printer. Motors, microcontrollers, and electronic sensors were chosen to meet proper dimensions and functionality. These generic microcontrollers, motors, and electronic sensors were controlled by a program written in LabVIEW, a virtual instrumentation engineering workbench. Using this software, the program is capable of automatically or manually controlling the motors attached to the board, causing it to tilt in a specific direction so that the ball bearing is navigated through the maze. For vision and image acquisition, a PlayStation3 Camera is used to detect the exact location of the ball bearing and adjust the motors accordingly.

Presenter: Myers, Lauren

Authors: Lauren E Myers, Alan Katritzky

Research Mentor: Alan Katritzky

Department of Chemistry, University of Florida

Synthesis of Aminoxy-Analogs for Naturally Occurring Tetrapeptide - Goralatide (AcSDKP)

Plethora of naturally occurring peptides exhibits various biological actions making peptides attractive targets in medicinal research. Despite the known range of medicinal properties, the native peptide backbone exhibits stability and flexibility that prevents peptides from transferring through cell membranes, thus significantly decreasing their bioavailability and utilization in pharmaceutical industry. alpha-Aminoxy peptidomimetic foldamers have proved to have higher efficacy towards vivo cell penetration than the one of native peptide analogs. Goralatide (AcSDKP) is a natural regulator of hematopoietic stem cell proliferation that selectively protects stem cell compartment during chemotherapy, enhancing the myelopoietic responses to GM-CSF. Reported AcSDKP synthetic analogs prevent in vitro primitive hematopoietic stem cells from entering into the cycle of high proliferative potential colony-forming cells. In vivo pharmacokinetics of AcSDKP is extremely short (half-life of 4.5 min). For that reason we developed new AcSDKP aminoxy derivatives that should exhibit higher stability in plasma. In the analogs of AcSDKP the aminoxy (NH-O) group links the C-terminus of aspartic acid with the L-lysine moiety. With this we expect that the alpha-aminoxy analog of a natural peptide, Goralatide, will be provided with a longer half-life and higher ability to pass the cell membranes of the cancer cells.

Presenter: Nasajpour, Amir

Authors: Amir Nasajpour, Alan Katritzky

Research Mentor: Alan Katritzky

Department of Chemistry, University of Florida

Preparation of Novel Peptidylbenzotriazoles as Effective Synthetic Intermediates

Peptides and peptide conjugates such as hormones, neurotransmitters, and neuromodulators act as signal molecules in diverse biological and medicinal applications and thus they have attracted considerable synthetic attentions. Many naturally occurring tetra-, penta-, hexa-, and other polypeptides with molecular weights in the range of 530-840 DA are biologically active compounds: cyclic hexapeptide RA-VII extracted from Rubiae radix exhibits antitumor activity causing a conformational change in the actin molecule and induces G2 arrest by

inhibiting cytokinesis. BACE1, which is involved in amyloid β -peptide production in Alzheimer's disease, is a major target for current drug design. Synthetic potent antimicrobial hexapeptides have a great potential for basic research and drug discovery. We now report the synthesis of novel N-protected peptidoyl benzotriazolides as excellent laboratory bench coupling reagents for different syntheses of peptide conjugates and are deemed more advantageous for fairly simple work-up, no detectable racemization, can be stored in the crystalline state at room temperature for at least five months, and reagents are readily available on a commercial scale.

Presenter: Nelson, Breanna

Authors: *Breanna F. Nelson, Melissa N. Antler, Angela L. Vanella, Sarah R. Sanders, Courtney C. Christovich, Diana M. Calderon, Jasmine S. Gyant, and Shannon N. Whitten*

Research Mentor: *Shannon Whitten*

Psychology Department, University of Central Florida

Investigating the Relationship Between Creativity and Linguistic Style

The present research explored the relationship between creativity and lexical choice. In a preliminary study, 16 participants were asked to write two essays, one about a stressful experience they have had recently and a very short story. The hypothesis was that more creative individuals would show a unique linguistic pattern compared to non-creative individuals. Specifically, creative participants were hypothesized to use a higher variation of pronouns compared with less creative participants, more adjectives, more cognitive process words, and more emotion words compared with less creative participants. The writing samples were analyzed using the Linguistic Inquiry and Word Count software (LIWC, Pennebaker, Francis, & Booth, 2007). A version of the Torrance test of creativity was administered to determine the degree of creativity for each participant. Demographic and personality variables were also collected. Pearson bivariate correlations were calculated between the Torrance test scores and LIWC variables for each essay. The only confirmed hypothesis at this stage is the relationship between creativity and certain emotion words, specifically sadness ($r = .65$). More data is currently being collected to see if this pattern can be replicated in a larger sample.

Presenter: Newsome, Rachel

Authors: *Rachel Newsome, Steven Bruner*

Research Mentor: *Steven Bruner*

Department of Chemistry, University of Florida

Cloning, Expression, and Purification of Modified Human Olfactory Receptors for Crystallization Trials

Human olfactory receptors (HORs) belong to the G-protein coupled receptor (GPCR) class of proteins, which are topologically defined as seven transmembrane helices, connected by three intracellular loops and three extracellular loops. The signaling pathway of HORs is characterized by the activation of the receptor via direct binding of a ligand to the binding pocket of the HOR, resulting in the activation of adenylyl cyclase, and the generation of an action potential that is then relayed to the brain. Our research seeks to determine the crystal structure of the first human olfactory receptor in order to understand the mechanism of ligand binding, and receptor activation.

The gene sequence coding for three HORs were modified to allow the insertion of bacteriophage T4 lysozyme between the third and fourth intracellular loops, which has been shown to stabilize GPCRs and allowing for crystal formation. The recombinant gene sequence was expressed using the commercially available baculovirus expression system. Current research is focused on the purification of these receptors for crystallization trials.

Presenter: Nichols, Richard

Authors: *Richard Nichols, Shannon McQuaig*

Research Mentor: *Shannon McQuaig*

Natural Sciences Department, St. Petersburg College

Characteristics of the Normal Oral Microbiota of the Python regius

Python regius (Royal or Ball Python) are becoming more common as pets. In general, they are nonaggressive in nature; however they have the ability to bite humans while handling. When humans are bitten, the oral microbiota of the snake can be transmitted to the inflicted wounds. Little research has been conducted regarding the normal microbiota of ball pythons beyond their saliva containing Gram-negative bacteria. The goals of this

research are to: 1) Identify members of the bacterial community endogenous to the oral cavity of *P. regius*, 2) determine if community shifts occur over time, and 3) create antibiotic susceptibility profiles for endogenous bacterial isolates. Preliminary efforts to isolate bacteria from the oral cavity of *P. regius* have yielded a limited numbers of bacteria. The bacterial isolates were cultured on varying selective and differential media for preliminary identification as Gram-negative, lactose fermenting bacteria. DNA sequencing was performed, and the bacteria were identified as *Escherichia coli*. Antibiotic susceptibility tests showed the *E. coli* was susceptible to Zithromax, chloramphenicol, kanamycin, and streptomycin.

Presenter: Nizam, Anisulrahman

Authors: *Anisulrahman Nizam, Steven Leon*

Research Mentor: *Steven Leon*

Marketing Department, University of Central Florida

Improving Long-Range Forecast Errors for Better Capacity Decision-Making

Long-range demand planning and capacity management play an important role for policy makers and airline managers alike. Each makes decisions regarding allocating appropriate levels of funds to align capacity with forecasted demand. Decisions today can have long lasting effects. Reducing forecast errors for long-range range demand forecasting will improve resource allocation decision making. This research paper will focus on improving long-range demand planning and forecasting errors of passenger traffic in the U.S. domestic airline industry. This paper will look to build upon current forecasting models being used for U.S. domestic airline passenger traffic with the aim of improving forecast errors published by Federal Aviation Administration (FAA). Using historical data, this study will retroactively forecast U.S. domestic passenger traffic and then compare it to actual passenger traffic, then comparing forecast errors. Multiple forecast methods, both quantitative and qualitative, will be tested extensively in order to identify new trends and causal factors that will enhance forecast accuracy thus increasing the likelihood of better capacity management and funding decisions.

Presenter: Nolan, Michelle

Authors: *Michelle M. Nolan, Shruti B. Seshadri, Bruna Bregadiolli, Jennifer S. Forrester, David Lynch, and Jacob L. Jones*

Research Mentor: *Jacob Jones*

Department of Materials Science and Engineering, Department of Chemistry, University of Florida

Phase Equilibria and Crystallographic Structure of Tetragonal $Pb(1-1.5x)SmxZr(1-y)Ti_yO_3$

Samarium-doped lead zirconate titanate (PZT) is of fundamental interest as it shows an uncharacteristic relaxation in its piezoelectric coefficient at a frequency of 0.1 Hz and has high temperature longitudinal piezoelectric coefficient values that are roughly twice as large as those exhibited by La- and Nb-doped PZT. It is also of commercial importance in SAW devices and hydrophone applications. In this work, a phase diagram of tetragonal Sm-doped PZT was developed. Solubility of Sm in PZT was found to increase with the fraction of the B-site occupied by Ti. Close to the morphotropic phase boundary, the solubility of Sm was found to be 4 mol%, whereas the solubility of Sm in lead titanate was found to be 8 mol%. For practical applications, lead titanate based materials are almost always used with Mn-doping to decrease conductivity and facilitate poling of the material. It was found that the solubility of Sm in Mn-doped lead titanate is 15%. Structural analysis was carried on high resolution neutron diffraction patterns using the Rietveld refinement method, and it was determined that Sm substitutes for the A-site in lead titanate.

Presenter: Nwokoye, Diana

Authors: *Authors: Diana Nwokoye, Dr. Mark Bishop*

Research Mentor: *Mark Bishop*

Department of Physical Therapy, University of Florida

Neurobiology of the Influence Pain-Related Fear has on Musculoskeletal Pain Intensity

This project explores the neurobiology of the influence of pain-related fear on pain intensity (PI) and behavioral effects of fear demonstrated during thermal quantitative sensory testing (QST) testing. Specifically, this research investigates whether pain-related fear predicts PI reported 24-48 hours after an isotonic exercise protocol. It also examines the relationship between brain areas implicated in descending pathways of pain modulation and PI.

Subjects attend six sessions in the primary project, but only data from the first four were analyzed for this current study. Before each session, subjects were given surveys to measure their pain-related fear and PI in their lower back. During the 3rd baseline session, QST, neuroimaging data (using fMRI) was collected and the exercise protocol was preformed. Subjects returned two days later for additional neuroimaging, QST, and surveys. We expect findings to show that 24-48hrs after exercise, higher pain-related fear will be associated with higher sensitivity during QST and higher PI ratings. fMRI scans may also show higher or lower activation in pain processing areas in the brains of subjects with higher pain-related fear. In conclusion, participants' cognitive processing of pain will be shown to have both temporal and behavioral affects that influence pain intensity.

Presenter: Oli, Muna

Authors: Muna Oli, Mark Rohaus, Vinata Vedam-Mai, Ben Griffith, Anish Patel, Loic Deleyrolle, and Brent Reynolds

Research Mentor: Brent Reynolds

Department of Neurosurgery, University of Florida

Gap Junctions in Glioblastoma Cancer

Complex adaptive systems (CAS) are interacting components that react to their environments and to one another. Ant colonies are CAS: each ant has a task, and acts on a few principles, yet the entire colony acts as one single organism. Cancer cell biologists are now applying this ecological concept and thinking of tumors as a collection of cells, considering how communication disruption affects tumor progression. It is first important to determine if and how tumor cells communicate. It is suggested that cell communication occurs through gap junctions (GJs). GJs are specialized channels that couple adjacent cells and permit bidirectional passage of small molecules, allowing cells to communicate and respond. GJs have been shown to play a role in the regulation of processes involving cell growth. The role of GJ coupling in cancer is not well characterized. This research aimed to identify the presence of GJs in Glioblastoma (GB) cells and down regulate GJ using drugs. GJ were identified through various techniques. Results indicated that GJ were present and could be downregulated between GB. Tumor heterogeneity is a leading concern within cancer, and evaluation of the role of GJs in tumor progression will aid in furthering our understanding of tumor biology.

Presenter: Oliver, Mack

Authors: Mack B. Oliver, Paloma Rodriguez

Research Mentor: Paloma Rodriguez

Department of Humanities and Foreign Languages, Santa Fe Community College

Leonardo da Vinci's Dream of Flight

Leonardo da Vinci was known as a great inventor, painter and student of an innumerable amount of studies. Because of this, it is hard to single out just one of his studies that really captured who he was as a person; however, dreaming big is what Leonardo did best and one of these big dreams was his life-long goal to create a flying machine. I was interested to find out why Leonardo was so obsessed with creating a flying machine and if any of his designs would have actually worked. My poster explores Leonardo's interest in flying and the effectiveness of four of his most famous designs: a helicopter, a glider, one powered by flapping, and an early parachute design. The only project of his that was unsuccessful, was his design based on flapping. This design based on flapping marked some of Leonardo's earlier attempts at creating a flying machine. He later abandoned this approach to focus more on gliding.

Presenter: Olsen, Alexandra

Authors: Alexandra Olsen, Deana Rohlinger

Research Mentor: Deana Rohlinger

Sociology Department, Florida State University

New Hispanic Immigrant Destinations and Their Implications for Immigrants and Their Communities

Past research has shown that immigrants face many challenges in their transition into a new country that have serious implications for their overall success. This research aims to look at the experiences of immigrants within new immigrant destinations to try and better understand the interaction between policy and access to resources (job training, English learning, and legal resources) as it affects an immigrant's transition into the United States.

Specifically, the experiences of Hispanic immigrants in Gadsen County, Florida and Washington D.C. will be examined through participant observation, qualitative interviews, and analysis of policy. Though these places differ, as one is urban and the other rural, this comparison works to explain differences in experiences by destination and whether or not these experiences differ because of the function of policy within these communities. Previous research shows that when resources are accessible and meet the needs of the community, immigrants are able to make a smoother transition into the United States; consequently I predict that in immigrant destinations where policy has been made that works to directly reach the community, immigrants and organizations will be more satisfied with immigrant's ability to transition.

Presenter: Ooi, Frances

Authors: Frances Ooi; Joseph S. DuChene; Jeremy O. Graham; Jingjing Qiu, and David Wei

Research Mentor: David Wei

Department of Chemistry and Center for Nanostructured Electronic Materials, University of Florida

A Facile Synthesis of Octahedral Iron Oxide Nanoparticles

In recent years, the field of nanomaterials has become very attractive due to its wide variety of applications in photocatalysis, energy storage, biosensing, solar cells, and imaging. Specifically, iron oxide nanoparticles have become very desirable in the biomedical field due to their versatility and tunability. In this investigation, a facile method for synthesizing magnetic, octahedral iron oxide nanoparticles has been developed. In order to elucidate the growth mechanism, a time-dependent study on the transformation of the octahedral iron oxide nanoparticles was conducted and insight into the role of each reagent was obtained. These investigations suggest that the evolution of the iron oxide nanoparticles is governed by a dissolution and recrystallization growth mechanism. Furthermore, oleylamine and 1,3-diaminopropane (DP) seem to work synergistically to facilitate the growth of octahedral iron oxide nanoparticles. Conclusions from this investigation will help improve synthesis methods and increase the ability to customize these materials for biomedical applications.

Presenter: Orozco, Nohelia

Authors: Nohelia P. Orozco, Randall Hughes

Research Mentor: Randall Hughes

Department of Biological Sciences, Florida State University

Effects of Host Plant Species on Feeding and Behavioral Preferences of Littoraria Irrorata

Consumer diet and behavioral variation can have large impacts on plant communities across a range of systems. Given the recent evidence that consumer control is important in salt marsh ecosystems, we examined the strength and consistency of diet and behavioral variation within the primary consumer, the marine snail *Littoraria irrorata*. We examined variation in snail climbing and feeding preferences over time, as well as the impacts of these behaviors on the host plants, *Spartina alterniflora* and *Juncus roemerianus*. We tested whether snail preferences were affected by the plant species the snails were collected from in the field; whether snail preferences were affected by the presence of a predator; and whether snail preferences were consistent over time. Finally, we tested the effects of snail presence on both host plant species in different plant communities. We found that snails prefer to consume *Spartina*, yet they exhibit a climbing preference for *Juncus*. The feeding preference for *Spartina* can have negative impacts on their abundance in the ecosystem. However, when *Juncus* is present, snails use this plant species as a refuge from predation and their impact on *Spartina* is decreased. These results suggest that mixed-species plant communities will be more resistant to consumer pressure.

Presenter: Osmani, Tasnia

Authors: Tasnia M Osmani, M Freytes, and Mary E Young

Research Mentor: Mary Young

Public Health and Health Sciences Department, University of Florida

Communication, Family Functioning, and Veteran's Post-deployment Reintegration: A Pilot Study

As the number of returning Veterans from the conflicts in Iraq and Afghanistan continues to grow, evidence documenting the toll of war on Veterans and their families keeps mounting. Findings show that deployment to war and exposure to combat leads to numerous problems in military families including strained intimate relationships and difficulties with family readjustment. Attention to the family unit is critical because Veterans with family support exhibit better functional recovery and reintegration outcomes post-deployment.

Communication, or the exchange of information among family members, is an important aspect influencing overall family functioning. Styles of communication have been shown to vary by race. Using the Family Assessment Device (FAD), this pilot study examines differences in communication between White and Black couples and how these differences impact perceptions of family functioning. We will conduct regression analysis to examine the relationship among demographic variables, communication, and family functioning. We predict there will be differences between White and Black couples and that these differences will in turn impact family functioning. Identifying factors that impact family functioning may help us modify current practices or develop new strategies to address pertinent post-deployment family reintegration issues, particularly approaches that are sensitive to minorities.

Presenter: Palmeira, Amanda

Authors: Amanda Palmeira, Kimberly Voss

Research Mentor: Kimberly Voss

Nicholson School of Communication, University of Central Florida

Suing Their Way Into the Newsroom: How Mary Lou Butcher and Women at the Detroit News Changed Journalism

Mary Lou Butcher was proving to be a talented journalist and became one of the few women working in the newsroom at The Detroit News in the 1970s. She and the other women were not there for long, however, as the male-dominated field of journalism had a glass ceiling that was waiting for the right conditions to be challenged. These conditions arose with the women's liberation movement and the first legislative support of workplace equality through the Civil Rights Act of 1964. This study examines the impact on the field of journalism from Mary Lou Butcher and how women utilized the judicial system to change history by filing lawsuits against several large publications in the 1970s and 1980s. Publications including the New York Times, The Detroit News, the Associated Press and Newsweek all came face to face with the women's liberation movement when their female workers filed class action discrimination lawsuits under Title VI of the Civil Rights Act of 1964, and the momentum caused by one suit perpetuated another elsewhere, causing a movement that changed the face of journalism forever.

Presenter: Patel, Kunal

Authors: Justin Juelich, Sean Sileno, and Iryna Lebedyeva

Research Mentor: Alan Katritzky

Center for Heterocyclic Compounds, University of Florida

7-Methoxycoumarin-Tryptophan Peptidomimetics Linked via Copper-Catalyzed Azide-Alkyne Huisgen Cycloaddition

Covalently linked acceptor-spacer-donor (A-S-D) multichromophoric systems have previously been discussed largely in mechanistic terms, with emphasis on the roles of electronic and nuclear functions in determining the factors of internal electron transfer. In this work we designed versatile 7-methoxy-2-oxo-2H-chromene-3-carboxylic acid/tryptophan (D-A) labeled native peptide biosensors taking into account D-A relative orientation as well as the distance-dependent parameters in order to predict the energy transfer rate for a given D-A separation. We enhanced the fluorescence of the two fluorophores (7-methoxy coumarin as electron donor and tryptophane as electron acceptor) by linking them to the N- and C-peptide moieties via 1,2,3-triazine linkers. Peptide linkers were assembled using benzotriazole methodology. Azido group was introduced into the molecule either with acylation of amino acids or di-, tri-peptides with benzotriazolyl azides, or through the nucleophilic substitution of chlorine atom with sodium azide. The combination of the D and A in a linker can be provided by various methods. Copper(I)-catalyzed azide-alkyne cycloaddition (CuACC) has proved to be one of the most effective bio-orthogonal conjugation techniques.

Presenter: Paul, Thomas

Authors: Thomas J. Paul, Ryan H. Gumpper, Kyle Brunette, H.Astrid Vega, Nicholas Christiano, and John T. Reilly

Research Mentor: John Reilly

Department of Chemistry and Mathematics, Florida Gulf Coast University

Temperature and pH Dependence on the Catalytic Activity of Histidine Ammonia Lyase

The effect of temperature and pH on the enzymatic catalysis of histidine to trans-urocanic acid by histidase (Histidine Ammonia Lyase, EC 4.3.1.3) and its regulation of the acid mantle in skin was examined. Using an enzymatic assay from Sigma Aldrich and a UV-Vis spectrophotometer (Model Shimadzu UV 2450) with a temperature-controlled cell holder (Model TCC240) the growth of the trans-urocanic acid peak at 277 nm was monitored. Histidase activity, using five concentration of histidine, at temperatures ranging from 25°C to 37°C and at pH values of 6, 7, 8 and 9 were examined. Michaelis-Menten kinetics was used to obtain the catalytic parameters; V_{max}, K_M, and K_{cat}. At a pH of 9 the rate of catalysis was a minimum at approximately 32°C, close to the average skin temperature, and a maximum at 25°C. At a pH of 6 the enzymatic activity of histidase diminished to nearly zero. Results are discussed further in relation to the acid mantle of skin.

Presenter: Pegram, Matthew

Authors: *Matthew Pegram, Joseph D. Henthorn, Netra Mishra, Christopher D. Haun, Ana L. Castro, Brian Stadelmaier, Jay S. Huebner, and Christos Lampropoulos*

Research Mentor: *Christos Lampropoulos*

Department of Chemistry, Department of Physics, University of North Florida

Synthesis and Characterization of the First 1D Chain of Mn₁₂ SMMs

Molecular clusters of transition metals have been vigorously investigated in recent years for a variety of reasons, including their often interesting magnetic behavior (superparamagnetic properties identified in single-molecule magnets), their potential use in heterogeneous catalysis, as well as their biomimetic properties for the modeling of the active sites of metalloproteins (Oxygen Evolving Complex in Photosystem II, Nitrogenase center, and others). The core of 3d transition metal clusters often has the structure of a small piece of a metal-oxide network, which makes them attractive candidates for catalysis and/or sensing. As such, we have been investigating transition metal clusters on contact-based chemical sensors. Photo-Electric Chemical Sensors or PECS are contact sensors for the detection of various chemical analytes, with a wide range of applications, using different Analyte-Recognition Compounds (ARCs). The ARC-analyte interaction on the surface of the sensor generates photovoltages (PVs), and detection of analyte is documented as modified PVs upon excitation of both the analyte and the ARC using an optical source providing fast light flashes (<10μs). In the present study we are using molecular clusters as analyte recognition compounds (ARCs) in PECS[1] devices for the detection of various analytes.[2,3]

Presenter: Pelfrey, Jennifer

Authors: *Jennifer Pelfrey, Eugenio Zaldivar, and Vertigo Moody*

Research Mentor: *Eugenio Zaldivar*

Humanities and Foreign Languages Department, Natural Sciences Department, Santa Fe College

Ethical Analysis of Human Embryonic Stem (hES) Cells

The progression of hES cell research is limited by ethical and legal boundaries. Research involving hES cells is at the center of the ethical debate about stem cells and their potential use in regenerative medicine. Since embryos from which hES cells are extracted are destroyed in the process, concerns about the morality of the process are raised by the possibility of moral obligations toward embryos. The development of a human embryo is a continuous process which progresses through several phases and the extraction of hES cells occurs during the pre-embryo phase (pre-implanted blastocyst stage). The controversy surrounding hES cell research proceeds from the premise that human life is intrinsically valuable at all stages. Alternative forms of obtaining pluripotent embryonic stem cells are less problematic but not as successful in producing viable germ lines. The original research conducted found that people who are informed about embryonic stem cells understand that there is no cause for ethical concern regarding the derivation of hES cells during the early stages of pre-implantation development.

Presenter: Petit, Ryan

Authors: *Ryan K. Petit, Jason M. Montgomery*

Research Mentor: *Jason Montgomery*

Department of Chemistry, Florida Southern College

Versatile SERS Substrates using Period Arrays of Silver Conical Nano-Frustums

Systems involving arrays of periodic metallic nanostructures have been of much current interest due to their ability to reliably enhance the intensity of the electric field through surface plasmon excitation. These excitations occur at resonance frequencies determined by the nanoparticle's size shape and environment, making them very specific to a particular structure. The corresponding SERS enhancement in these structures involves the excitation wavelength used, but also the emission wavelength of the analyte. A unique structure intended to excite multiple resonance frequencies corresponding to both of these wavelengths was designed and modeled. Two and three dimensional finite-difference time-domain (FDTD) calculations were utilized to analyze possible structures. Ultimately, through varying the dimensions of conical nano-frustums, and by utilizing dielectric spacers, a structure capable of exciting at both $\lambda_{ex} = 785\text{nm}$ and $\lambda_{em} = 850\text{nm}$ was designed. The structure exhibited maximum SERS enhancement on the order of 109, which when compared to nano-posts (cylinders), shows a significant improvement.

Presenter: Phillip, Brandon

Authors: *Brandon Phillip, Ankit Pandey, Merna Youssef, Marie Hanna, Kevin Lukose, Madhu Pandey, and Leon Hardy*

Research Mentor: *Madhu Pandey*

ESPG Department, University of South Florida Saint Petersburg

Piezoelectric Application of ZnO

The first part of my research is to optimize the placement of piezo discrete patches on rectangular plate structure such that it can act as effective noise / vibration absorber. One case study with simply supported rectangular plate with attached piezo patches modelled as attached rigid mass is carried out using finite element analysis through Ansys software. Results show that when we place four piezo sensors symmetrically, these sensors fall in the region of higher deflections even if mode shape is modified. But when we place only one sensor, this piezo sensor fall in lower deflection region due to modification of the mode shape. That is why four sensors are advisable instead of one. Further, the mass of the patches should be more than 0.3% of plate mass for necessary mode shape change. The second part of my research is to develop a scheme so that the piezo patches in turn can be used to develop electromechanical acoustic resonator for harvesting of acoustic energy. A scheme has been proposed. Experiments are still to be undertaken.

Presenter: Pierce, Rikiesha

Authors: *Rikiesha Pierce, Lanita Jacobs, Amon Emeka, and Sharon Hays*

Research Mentors: *Lanita Jacobs*

Department of Sociology, University of Southern California

Gangsta' Feminism: Hip-hop and the Fourth Wave Feminist Movement

This is a multi-method and multi-disciplinary audience reception study rooted in sociology, psychology, anthropology, African American studies, and performance studies. Complementing an investigation of hip-hop and gender studies, the research asks if hip-hop can be an effective protocol to use to teach urban youth about feminism. Its innovation is a highly reflective performance ethnography piece starring the author, under the pseudonym "Big Rik Locc", as a fourth-wave hip-hop feminist icon. The research entails a music video that highlights unequal gender relationships and sexual power relations in hip-hop musical culture. Results and discussion suggest that college-aged people of color without previous exposure to gender studies can use hip-hop music videos to identify gender inequity. The discussion suggests hip-hop's vast utility both in the classroom, and as a feminist platform, especially for people of color. Conclusions suggest that hip-hop has further utility in a variety of public and private educational settings.

Presenter: Planas, Anthony

Authors: *Anthony Planas, Evelyn Frazier*

Research Mentors: *Evelyn Frazier*

Department of Biological Sciences, Florida Atlantic University

Analysis of Cuban Treefrog (*Osteopilus septentrionalis*) Predation on Native Florida Treefrog Species

Globally, native amphibian and reptile populations have been in decline with Florida being the most severely impacted state within in the continental U.S.A. due to its subtropical climate allowing exotic species to proliferate.

The Cuban treefrog's high fecundity and ability to predate on insects and small animals has caused a negative impact on native treefrog species. The objective of this study is to determine the effects of predation on the native Florida treefrogs from the invasive Cuban treefrog. Moreover, we will investigate the habitat preference of the Cuban treefrog as it relates to available water sources. Using PVC pipes set up in the FAU preserve, a xeric (dry) habitat, as well as Jonathan Dickinson State Park, a mesic (wet) habitat, we will monitor native and exotic treefrog populations. We hypothesize that Cuban treefrogs will be most abundant in areas of greater water availability, and predation rates on natives will be highest within mesic habitats. It is important to understand whether the Cuban treefrog is outcompeting the native Florida treefrogs for territory and food and/or significantly predated on native species.

Presenter: Ponce, Francesca

Authors: Francesca Ponce, Akito Y Kawahara

Research Mentors: Akito Kawahara

Department of Biology, Department of Entomology and Nematology, University of Florida

Molecular Phylogeny of Eumorpha Hawkmoths

Hawkmoths (Lepidoptera: Sphingidae) include many model species that are studied across a wide range of biological disciplines, such as taxonomy, ecology and conservation. The family is widely distributed across the world and comprises approximately 1400 species, which occur predominantly in tropical regions. The hawkmoth genus *Eumorpha* includes 26 species that are restricted in distribution to the New World. Most species are Neotropical, but some occur in the United States. While they are often perceived as staples of Neotropical hawkmoths, little is known of their phylogenetic relationships.

We constructed a preliminary molecular phylogeny with molecular data using four genes (CAD, EF1-alpha, wingless and COI). Fourteen *Eumorpha* samples were sequenced and we supplemented our dataset with available COI sequences from GenBank. Maximum Likelihood analyses were conducted with GARLI and RAxML 7.2.8-ALPHA and Bayesian Inference analyses in MrBayes. Analyses were conducted on individual genes and on the concatenated three-gene dataset. Results indicate that the genus *Eumorpha* is monophyletic with strong support and that there are several well-supported relationships that were previously unknown. This project is the first step towards understanding relationships within *Eumorpha* and we hope that future research will add additional data that can strengthen support for nodes across species within this genus.

Presenter: Portalatin, Gilda

Authors: Gilda M. Portalatin, Jeremy W. Chambers

Research Mentors: Jeremy Chambers

Department of Cellular Biology and Pharmacology, Department of Biology, Florida International University

Inhibition of p38 Prevents Oncogenic Metabolism and Induces Cell Death in Human Neuroblastoma Cells

Neuroblastoma is a common cancer among children less than one year of age. Stage 4 neuroblastoma patients are treated with a combination of surgery, chemotherapeutics, and radiation. No viable neuroblastoma-specific treatments exist. Evaluation of neuroblastoma susceptibility to mitogen-activated protein kinase (MAPK) inhibitors revealed that inhibition of p38 signaling by SB-203580 increased SH-SY5Y cell death in a dose-dependent manner. We hypothesized that p38 contributes to neuroblastoma pathophysiology by modulating cellular metabolism and other cellular processes. Examination of SH-SY5Y metabolism using the Seahorse Biosciences XF-96 Extracellular Flux Analyzer revealed that p38 inhibition (1M SB-203580) reduced glycolysis but had no impact on oxygen consumption. To examine if sub-cellular localization of MAPK signaling influenced p38 modulation of glycolysis, we interrupted MAPK-binding to the mitochondrial scaffold Sab using a small peptide, Tat-SabKIM1. Similar to SB-203580, treatment of SH-SY5Y cells with the Tat-SabKIM1 peptide reduced the rate of glycolysis in the cells with a modest increase in the oxygen consumption rates suggesting that mitochondrial p38 signaling may be contributing to the observed glycolytic regulation. These data suggest that p38 is an oncogenic signal effector in human neuroblastoma contributing to cancer cell metabolism; consequently, p38 inhibitors approved for use in clinical trials may represent new neuroblastoma treatments.

Presenter: Prado, Adriana

Authors: *Adriana M. Prado, Jeremy W. Chambers, and Herbert Wertheim*

Research Mentor: *Jeremy Chambers*

Department of Cellular Biology and Pharmacology, Department of Biology, Florida International University

Evaluation of Hepatotoxicity and Neurotoxicity of the Anti-nerve Agent Novel Therapeutic Oxime, K-027

Oximes are compounds used to combat organophosphate poisoning. Organophosphates disrupt the mechanism in the nervous system used to transfer messages from nerves to organs. Certain nerve agents irreversibly bind to and inactivate acetylcholinesterase, an enzyme that breaks down the neurotransmitter acetylcholine. High dose exposure can be fatal; survivors suffer long-term neurological damage and psychiatric effects. Oximes have been found to reverse this effect; moreover, oximes have been experimentally validated as potential antidotes for nerve gas poisoning. Currently, there exists no single, broad-spectrum oxime that can reverse the damage of all nerve agents. If oximes are to be used as a therapeutic drug, one must understand the potential inherent toxicity these drug may have. We are performing toxicity assays on human hepatocellular carcinoma cells and human neuroblastoma cells treated with K-027, a novel oxime, to test neuro- and hepato-toxicity, respectively. Utilizing the Seahorse XF-96 metabolism analyzer and several viability assays, we will be able to examine the toxicity of K-027. It is expected to have little to no toxicity, as other oximes have demonstrated minimal toxicity in animal models. The significance and goal of our work is to increase the number of oxime drugs available to safely treat nerve gas intoxications.

Presenter: Pryor, Makenzie

Authors: *Makenzie Pryor, Heidi Harley*

Research Mentor: *Heidi Harley*

Psychology Department, New College of Florida

The Effects of Video Game Training on the Visuospatial Cognition of Older Adults

Certain aspects of perception and cognition deteriorate with age. Decline in perceptual abilities can lead to serious problems in daily activities. Typical treatments for visual problems are invasive and can be difficult for older patients. Recent research has suggested that it is possible to improve visual perception abilities by playing action video games. In this study older adults will be tested on a measure of visuospatial perception: useful field of view, i.e., the area of the visual field from which information can be extracted at a glance. Following the visual pre-test, participants will play either a racing or a puzzle game in fifteen one-hour sessions over a period of three weeks, after which they will retake the visual test. Pre- and post-test scores will be compared to determine whether there is any change following training. It is expected that adults who train on the video games will show visual improvements while a control group will not. If these video games improve visual abilities, then older adults will have a potentially enjoyable way to improve their vision without invasive treatments.

Presenter: Puentes, Carlos

Authors: *Carlos Puentes, Robert DeRubeis, Nicholas R. Forand, Robert J. DeRubeis, Lois Gelfand, and Jay Fournier*

Research Mentors: *Robert DeRubeis*

Psychology Department, University of Central Florida

Toward Precision Medicine: A Method for Identifying Individuals who are Expected to Benefit from Antidepressants

Antidepressant medications are an effective treatment for depression; however, many who take them do not experience a response greater than they would have if they had taken a placebo. This heterogeneity of antidepressant response begets the question of what traits might predict a better response to one treatment versus another. Our study is intended to develop a predictive model with the shared intention of understanding these discrepancies and crafting a means of accurately estimating treatment outcome prior to the administration of the treatment. We developed a treatment selection algorithm that identifies whether antidepressant medications are likely to provide a benefit over that provided by placebo for any specific individual. We utilized data from 180 participants in an 8-week randomized controlled trial of antidepressant medication versus placebo to develop a

predictive regression model identifying both prescriptive (variables that interact with treatment to predict response) and prognostic indices (variables that predict response irrespective of treatment) using a leave-one-out cross validation, a method that optimizes the predictive power and offers some protection against type II error. The model is used to make predictions for individuals to determine whether they would have been likely to respond to placebo, medication, both or neither.

Presenter: Quinlan, Matthew

Authors: Matthew Quinlan, Hala ElAarag

Research Mentors: Hala ElAarag

Computer Science, Stetson University

NFC Security on Android Devices

In this paper we investigate the impact that the addition of NFC technology has had on the security of Android mobile devices. We introduce the NFC technology and briefly cover its inner-workings. We investigate the potential malicious abuses of NFC on Android devices. From this investigation, we attempt to ensure that, after the implementation of NFC technology, a user's data on their Android mobile device is secure. We discuss several categories of attack vectors, show real-world case studies of an attacker utilizing the attack vector, and we provide solutions or mitigations to help reduce these attacks. Researchers have shown that NFC-enabled mobile devices are prone to various flaws in their NFC stack implementation. We discuss the NFC stack's implementation on Android phones and also discuss the process of testing the NFC stack on Android to find various errors and bugs. These flaws in the NFC stack have been shown to result in compromised user data or attackers gaining remote control of the mobile device.

Presenter: Quinn, Natalie

Authors: Natalie Quinn, Paloma Rodriguez

Research Mentor: Paloma Rodriguez

Department of Humanities and Foreign Languages, Santa Fe College

Pieter Bruegel's The Census at Bethlehem

My poster studies *The Census at Bethlehem* by Flemish Renaissance artist Pieter Bruegel. Like many of his works, Bruegel has hidden in the details of this painting current political allusions and his own reflection on the role of faith. The painting depicts the everyday life of a Flemish village with ordinary people. The villagers are all outside participating in various activities like preparing a feast for the arriving travelers or enjoying an alcoholic drink, while children are playing games with each other. Mary and Joseph do not stand out in the painting, because Bruegel wanted to show that they were part of the ordinary life of the villagers. There is a church in the horizon, a common element in Bruegel's paintings, that he uses to show the importance of faith. As expected in *The Census at Bethlehem*, Joseph and Mary appear arriving to the town of Bethlehem a couple of days before December 24 to pay their taxes. However, Bruegel paints a plaque above the inn with a symbol of the Habsburg family, who were collecting the taxes in Flanders. The Flemish of Bruegel's day had to pay half of the taxes to the Spanish empire which resulted in many rebellions.

Presenter: Rafalski, F

Authors: Timothy F. Rafalski, Shannon McQuaig

Research Mentor: Shannon McQuaig

Natural Sciences Department, St. Petersburg College

Investigations into the Differences in Protein Expression of *Proteus mirabilis* in Select Carbohydrate Sources

Proteus mirabilis is a bacterium with two defined morphs that are known to cause disease in humans. These bacteria have several biochemical pathways enabling them to utilize various carbohydrates as energy sources. The goal of this study was to establish carbohydrate acclimation in *P. mirabilis* and determine if acclimated strains exhibit carbohydrate preference. *P. mirabilis* was grown in different carbohydrate broths for several generations to acclimate the strain. These acclimated strains were then plated together to observe the possible formation of Dienes lines, which are lines of inhibited growth where strains meet. In a future direction the acclimated strains will be then plated on solid media containing 4 carbohydrate sources and incubated to observe carbohydrate preference. Proteins will be extracted from acclimated strains, and protein expression will be assessed using 2-D

analysis. No Dienes lines were observed, however a reduction of growth as colonies meet was observed. All the carbohydrate sources, with the exclusion of the oligosaccharide-only tube, were shown to support growth. We hypothesize differences in protein expression will be observed. We have confirmed that *P. mirabilis* has adapted to utilize a variety of carbohydrate sources through various biochemical pathways.

Presenter: Ramirez, Christopher

Authors: Christopher Ramirez, Yi Liao

Research Mentor: Yi Liao

Department of Chemistry, University of Central Florida

The Effect of Novel Photoacids in Gels

Interest in environmentally sensitive gels has grown rapidly with a major emphasis on pH sensitive gels. This is primarily due to potential applications in artificial muscles, drug delivery, biosensors and much more. It has been shown that hydrogels are capable of enormous size changes with accompanying mechanical property changes by immersing in media with varying pH. However, this change is irreversible, slow and extrinsic. In order for use in the applications mentioned above the change has to be intrinsic, fast and reversible.

Recently our group discovered a series of photoacids, which change pH largely and reversibly upon irradiation with visible light. Synthesizing gels with these photoacids dispersed in them provides for stimulation of the gel intrinsically using light as a non-invasive tool. This work describes the fundamental study of the effect of these photoacids in hydrogels and organogels. Mechanical and physical properties of these gels were carefully tested and analyzed.

Presenter: Rathi, Alisha

Authors: Alisha Rathi, Mercedes Rivera, Ju-Youn Lee, Sasanka Chukkappalli, Irina Velsko, Indraneel Bhattacharyya, L. S. Holliday, and Lakshmyya Kesavalu

Research Mentor: Lakshmyya Kesavalu

Sciences, Orthodontics, Periodontology and Oral Biology, University of Florida

Effect of Enoxacin, bis-enoxacin, and Alendronate in Polymicrobial Infection-Induced Periodontal Disease in Rats

Periodontal disease is a biofilm mediated polymicrobial disease which results from colonization by a consortium of pathogens including *Porphyromonas gingivalis*, *Treponema denticola*, and *Tannerella forsythia*. Colonization by these species results in inflammation, alveolar bone resorption and ultimately tooth loss. Enoxacin, a fluoroquinolone antibiotic, possesses anti-osteoclastic properties. Enoxacin-linked bisphosphonate, inhibits osteoclast formation and bone resorption. Sprague Dawley rats were orally infected with periodontal pathogens to induce periodontal disease. Then the rats were injected with enoxacin (25 mg/kg/day) or a bisphosphonate derivative of enoxacin, bis-enoxacin (5, 25 mg/kg/day) daily. We studied their ability to inhibit alveolar bone resorption (ABR) in polymicrobial infected rats. Periodontal disease (oral plaque and ABR) and infection of the heart and aorta were examined by PCR for bacterial genomic DNA. Three bacterial genomic DNA were detected in oral plaque, heart and aorta indicating oral colonization and bacteremia, respectively. This is the first study examining their role in periodontal disease.

Presenter: Reifenrath, Amanda

Authors: Amanda Reifenrath, Bobby Hom

Research Mentor: Bobby Hom

Humanities Department, Santa Fe College

Jack Kerouac: The Rebel Road

Jack Kerouac's unconventional life leads him to be the front man for the counter cultural movement known as the Beat Generation. The experiences of his life provided inspiration for his novel *On the Road*, which later became the testament of the Beat Generation. His confrontational subject matter and beliefs influenced the youth of post World War America to abandon characteristic norms of late 1940's society. Exploring and promoting the ideas of spirituality, spontaneity, sexual openness, and opposing materialism and conformity fueled the attitudes of "Beatniks". This nontraditional path that Kerouac chooses becomes the mindset of a generation who is disgruntled with the pressures of American society to conform to a traditional lifestyle. The objective of this research is to showcase how Kerouac's beliefs and approach to life fueled his journey from unconventional to

mainstream. Ultimately, Kerouac's life of living "outside" of American culture, made him a part of American culture.

Presenter: Richards, Tesla

Authors: *Name of Authors: Tesla Richards, Michelle Wagener, Charles Gunnels*

Research Mentor: *Charles Gunnels*

Department of Biological Sciences, Florida Gulf Coast University

Establishment of Social Networks, Including Homosexual Displays, Among Captive Adolescent Male Giraffa Camelopardalis

Complex social networks play a critical role in many species of mammals; animals can enhance their fitness by maintaining long-term social relationships with specific individuals within a group. Giraffes show variable social networks. Female giraffes display social preferences and structure based on life-long mother/daughter bonds as well as associations among unrelated females of different ages. By comparison, adult males are solitary, unless associating with females temporarily in order to reproduce. Adolescent male giraffes form bachelor herds. However, it remains unclear whether they form social networks and whether these networks are sexual. This study evaluated the presence of social networks among a population of freely roaming captive adolescent male giraffes (*Giraffa camelopardalis*) located at Naples Zoo at Caribbean Gardens. Captive adolescent male giraffes displayed social networks. In addition, these social networks have a homosexual structure; repetitive patterns of sociosexual behavior among preferred partners was observed. It is clear that social networks exist in captive adolescent male giraffe populations, however the reasoning behind this phenomenon needs further examination. It remains unclear how these sociosexual interactions affect captive male giraffes and how this translates to natural situations.

Presenter: Richmann, Todd

Authors: *Todd Richmann, Kyle Rohde*

Research Mentor: *Kyle Rohde*

Burnett School of Biomedical Sciences, University of Central Florida

Understanding the Role of tmRNA in Tuberculosis Pathogenesis

Tuberculosis is one of the leading contributors to mortality around the world. A rapid and effective, yet inexpensive, therapy remains to be discovered. Mycobacterium tuberculosis (Mtb), the causative agent of tuberculosis, is a resilient bacterium that utilizes an array of mechanisms to survive in the host. One of these mechanisms is the transfer-messenger RNA (tmRNA) system. Although the tmRNA system is conserved across different species of bacteria, its role in Mtb pathogenesis is not fully understood. We present a multi-faceted approach to better understand many aspects of the tmRNA system and its role in Mtb virulence. First, protein tagging methods, such as Western Blotting, will be used to identify substrates of the tmRNA system. PCR techniques will be used to locate and identify the tmRNA operon(s) in Mtb and determine how those genes are regulated. Finally, phenotypic differences between wild type Mtb and tmRNA-deleted Mtb will be observed and compared to understand the role of tmRNA in Mtb virulence. This approach will help understand the role of tmRNA in Mtb virulence and will assess the tmRNA system's potential as a drug target.

Presenter: Rigano, Kimberly

Authors: *Kim Rigano, Angela Munoz, and Michael Grace*

Research Mentor: *Michael Grace*

Biology Department, Florida Institute of Technology

Visual Capabilities of Yellow Ratsnakes (*Elaphe obsoleta quadrivittata*) as Predators of the Threatened Florida Scrub-jay (*Aphelocoma coerulescens*)

In habitats considered ideal for threatened Florida scrub-jays, such as Merritt Island National Wildlife Refuge, scrub-jay populations continue to decline. Videography suggests that yellow ratsnakes are important predators of scrub-jays. Therefore, this research aimed to elucidate the sensory capabilities of yellow ratsnakes in order to better understand the threat they pose to scrub-jays. Ratsnakes were tested under controlled conditions to determine the roles of vision and olfaction in predatory targeting. Because vision proved especially important, a functional analysis of retinal architecture was conducted. The relative abundance and distribution of rod and

cone photoreceptors was determined by anti-opsin immunofluorescence in the retina using laser-scanning confocal microscopy. Cones far outnumbered rods in both juveniles and adults, but relative abundance of rods increased with age. Photoreceptor densities and lens diameters were quantified to calculate theoretical spatial acuity, which demonstrated higher visual acuity in daytime than in dim light (dusk/night). Calculations suggest that nest-height birds may be barely visible to adult snakes in dim light. Thus, adult ratsnakes likely target flying birds during daytime, and attack nests at night using chemosensory cues. Juvenile ratsnakes likely avoid contact with potentially lethal scrub jays at all times. This research supports the development of scrub-jay conservation programs.

Presenter: Rix, Alice

Authors: Alice Rix, Sharon Abramowitz

Research Mentor: Sharon Abramowitz

Department of Anthropology, University of Florida

Transgender Individuals and their Perceptions of Possible Medical Interventions

Currently, there is very little published research addressing the personal perspectives of transgender individuals receiving medical treatments that alter their gender presentation. Transgender is defined as a person who identifies with or expresses a gender identity that differs from the one that corresponds to the person's sex at birth. The purpose of this study was to understand how transgender individuals perceive their medical encounters and medical treatment, and how they understand the role of medicine in the context of their transgender identities. Ten participants were recruited for one-hour semi-structured interviews. In-person interviews took place on campus at the University of Florida and for participants that do not live in the Gainesville area, interviews took place through Skype calls. Questions included information on social, biological and legal issues related to available medical treatments and participants' expectations versus the realities of intervention. The study included narratives from a diverse population of informants that ranged in age, length of time in transition, gender identify, and physical presentation. Overall, this study intends to uncover the meaning of personal and bodily integrity in the process of gender transition and how this intersects with societal influences within American culture.

Presenter: Rodriguez, Patricia

Authors: Patricia Rodriguez, Yerko Berrocal

Research Mentor: Yerko Berrocal

Department of Cellular Biology and Pharmacology, Florida International University

College Student Awareness of Modifiable Risk Factors and Warning Signs of Stroke

Stroke is the 4th leading cause of death in the United States, and according to the 2012 Heart Disease and Stroke Statistics, by the year 2030 an additional 4 million people are expected to suffer a stroke. [1] Knowledge and early prevention are essential when treating manageable risk factors for stroke, and research shows that there is a lack of stroke awareness among the general population. [2] This study will aim to evaluate the knowledge of modifiable risk factors and warning signs of stroke within the Florida International University student community. A questionnaire will be distributed electronically to students and results will be analyzed using descriptive statistics. The results of the questionnaire are expected to agree with current studies that represent poor knowledge about risk factors and warning signs, thus, supporting the need for educational intervention among college students in order to increase stroke awareness.

Presenter: Rodriguez, Violeta

Authors: Violeta J. Rodriguez, Jeremy W. Pettit

Research Mentor: Jeremy Pettit

Department of Psychology, Florida International University

The Role of Race in Attention and Memory Bias Among College Students

Current evidence indicates that anxious individuals display a memory and attention bias toward threatening stimuli such as angry faces. Extant research has demonstrated that cognitive biases are influenced by exposure to other races and racial prejudice, although past studies have only used the faces of Caucasian actors. Thus, there is a gap in the literature regarding the potential role of actors' race in computerized attention and recognition

memory bias tasks. The present study investigated the role of race and racial prejudice on attention and memory bias to angry faces. Participants were 300 racially and ethnically diverse undergraduate students who completed computer-administered measures of attentional bias, racial prejudice, and recognition memory. Results showed participants displayed significantly higher attention bias scores on a task using racially diverse stimuli than in a task with Caucasian actors, and that participants' race predicted differences in attention bias scores across tasks. Consistent with prior research, participants exhibited significantly greater recognition for actors of their own race. Lastly, attention bias scores were significantly positively correlated with scores of racial prejudice. Evidence from this study highlights the need for caution in face stimuli selection for tasks used to measure attention and recognition memory biases toward threatening stimuli.

Presenter: Rodriguez, Peter

Authors: P. Rodriguez, J.M. Ricketts, D.G. Novo, T.K. McClenen, K.S.W. Mccarty, T.M. Malinowski, K.L. Malinowski, B.L. Keener, S.R. Foster, M.A. Flynn, K.K. Edwards, J.C. Dunnom, M.D. Drayton, R.E. Brito, S.A. Bowe, D.C. Baker, and S. Bazazzadeh, M.P. Robinson

Research Mentor: Michael Robinson

Department of Biology, Barry University

Does Fluctuating Asymmetry Predict Immune Function in Male House Crickets, *Acheta domesticus*

Although choosing mates based on their good genes is a well-supported phenomenon, two important questions remain: which genes or traits should a choosy female select and how can she measure male quality? We examined the relationship between immune function and fluctuating asymmetry (FA) in male house crickets, *Acheta domesticus*. Immune function is a probable source of heritable quality as offspring should inherit stronger immune systems when their fathers have stronger immune systems. FA is a measure of small fluctuations in symmetry that should indicate the ability of an individual to develop properly in the face of environmental stressors. FA should be an indicator of good genes but unlike immune function might be more easily observed by females directly. We found a significant relationship between the three measures of immune function (i.e., hemocyte count, total protein and lysozyme activity) and symmetry. These results support the hypothesis that FA is an indicator of male quality and can be used by females to judge the quality of immune function in potential mates. (Funding was provided by the NIH-NIGMS MARC: T34GM008021 award and the NIH-NIGMS MBRS RISE: R25 GM059244 awards to Barry University.)

Presenter: Roles, James

Authors: J. Andrew Roles, Hala ElAarag

Research Mentor: Hala ElAarag

Department of Computer Science, Stetson University

The Smoothest Path: Algorithm and Learning Tool

In this paper we present an extension of the Shortest Path Problem: the Smoothest Path. A Smoothest Path algorithm optimizes both distance and slope to produce the least rigorous path available. Useful in simulated and real-world path finding, a smoothest path algorithm can provide useful data for a variety of applications. While smooth path algorithms exist, the notion of a smoothest path is fairly new. Simulated visualizations of algorithms have become a popular and effective learning tool. In the past, algorithms have been taught through exhaustive chalkboard drawings and pseudo-code guidelines. Visualization tools are therefore an attractive learning essential for instructors and students alike. Increased performance in languages such as Java along with robust graphical interfacing libraries such as Swing and JOGL make this a conquerable problem. In this paper, we also present a tool to visualize our smoothest path algorithm. Our goal is to simplify the algorithm into a series of visual steps that can be understood by elementary computer science students.

Presenter: Roque, Asiel

Authors: Asiel Roque, Zhiyong Shao, and Daniel A. Colón-Ramos

Research Mentor: Daniel Colon Ramos

Department of Biological Sciences, Program in Cellular Neuroscience, Neurodegeneration and Repair, Department of Cell Biology, Florida International University

Identifying Molecules that Maintain C. Elegans AIY Presynaptic Pattern

The nervous system of mammals consists of hundreds of billions of neurons interconnected with one another, forming the functional neural networks that underlie behaviors. Although the nervous system is largely established during embryogenesis, the position of the synaptic sites can be maintained throughout the life of animals. Synapses are macromolecular structures that regulate intercellular communication in the nervous system, and are the main gatekeepers of information flow within neural networks. Where and when synapses form determines the connectivity and functionality of neural networks. Therefore, our knowledge of how synapse formation is regulated is critical to our understanding of the nervous system and how it goes awry in neurological disorders. Synapse formation involves pairing of the pre- and postsynaptic partners at a specific neurospatial coordinate. To better understand how the presynaptic pattern is maintained, we conducted forward genetic screens to identify genes that maintain the *C. elegans* A1Y presynaptic position. We isolated five mutants that regulate presynaptic position maintenance.

Presenter: Ross, Daniel

Authors: *Daniel Ross, Milap Sandhu, and David Fuller*

Research Mentor: *David Fuller*

Department of Physical Therapy, University of Florida

Effects of Intermittent Hypoxia Air Training and Chondroitinase after Spinal Cord Injury and Fetal Spinal Tissue Graft on Respiratory Recovery

Spinal Cord Injuries (SCI) damage the central nervous system, and often result in dramatic loss of function. The cervical level is the highest section of the spinal cord and contains the phrenic motoneuron pool, responsible for controlling respiration. The effects associated with impaired respiratory function are the leading cause of death for SCI. One of the most studied treatments is spinal cell transplantation. Scaring on the injury site and inhibitory molecules can reduce recovery, but recently the enzyme Chondroitinase ABC (ChABC) has been shown to reduce scaring and counteract inhibitory molecules. When combined with spinal cell nerve grafts, ChABC has shown an exceptional ability to regenerate neural pathways and reinnervate spinal tissue. Another treatment method is acute intermittent hypoxia, involving alternating rounds of low-oxygen air and normal air for a few minutes every day. This has shown to increase spinal synaptic activity. The effects of each individual treatment on their own are known, as is combining ChABC with cell transplantation. This study will combine all three of these treatments and examine the effectiveness of hypoxia training on recovery of respiratory function when paired with ChABC and stem cell transplantation. This study will use Sprague Dawley rats as an animal model.

Presenter: Rousseau, Celeste

Authors: *Celeste A. Rousseau, Elisa J. Gonzalez-Rothi, Lynne M. Mercier, Barbara E. O'Steen, Paul J. Reier, and Michael A. Lane*

Research Mentor: *Michael Lane*

Department of Neuroscience, University of Florida

Characterization of Spinal Interneurons Associated with Respiratory Plasticity Following Spinal Cord Injury

Cervical spinal cord injury (cSCI) results in life-threatening respiratory dysfunction. However, clinical and experimental studies have revealed some spontaneous recovery, albeit limited. Experimental studies have shown that this recovery (functional plasticity) coincides with reorganization of respiratory circuits (anatomical plasticity) following cSCI. A number of studies have shown that spinal interneurons are capable of contributing to the formation of novel multi-synapse pathways that can circumvent the injury or strengthen existing connections to spared motoneurons. Although spinal interneurons are key to post-SCI anatomical and functional plasticity, little is known about which interneurons are involved and what functional role they play. The present work will begin to address this gap in knowledge by investigating the basic phenotypic properties of interneurons. We have begun identifying the neurotransmitter ligands and receptors expressed by respiratory interneurons following an experimental cSCI. Pseudorabies virus (PRV) - a retrogradely transported transsynaptic neuroanatomical tracer - was delivered to the diaphragm either ipsi- or contralateral to injury to label spinal phrenic motor- and interneurons. Combined immunohistochemistry for PRV and neurotransmitters is being pursued. A better definition of the phrenic interneurons following cSCI will enable therapeutic approaches to more effectively target these cells and their activity.

Presenter: Royce, Jenni
Authors: *Jenni L. Royce, Julie Langford*
Research Mentor: *Julie Langford*
History Department, University of South Florida

Matriarchal Marketing: The Emperor, The Empress, and the Army

During the reign of Emperor Septimius Severus (193-211 CE), his wife Julia Domna received the title of Mater Castrorum, or Mother of the Camp. Although this title suggests that the Empress had a close relationship to the Roman military, recent research has found that it was issued by the Imperial administration and that it was minted onto coins that were distributed to civilian populations not the military. This led to the conclusion that the idea of the Empress being close to the military was a way for the Imperial family to convince civilians that they had the backing of the military and thus gain their support. My research investigates the continued use of this title following the deaths of Septimius Severus and Julia Domna. I examined Roman coinage and inscriptions to determine whether the title was used in the same way for later empresses. I found that unlike with Julia Domna, the title is not found on any published coins. Instead it is found solely in inscriptions, used not only by the imperial administration but by Roman provincials and the military. This means that later emperors used the Mater Castrorum title to strengthen the bond between themselves and the military.

Presenter: Rubiano, Carlos
Authors: *Carlos Rubiano, Jeffrey St Firmin, and Sulekha Rao Coticone*
Research Mentor: *Sulekha Coticone*
College of Arts and Sciences, Florida Gulf Coast University

Chemistry and Specificity of Cannabinoid Detection

According to the Federal Bureau of Investigation (FBI), drugs are becoming more prominent as motivations for crimes. The most recent data from the Federal Bureau of Investigation (FBI) show that 12.2 percent arrests in 2008 were for drug violations, the most common arrest crime category. The drugs with the highest dependence or abuse levels were marijuana, prescription pain relievers, and cocaine. Many of these drugs are considered “controlled substances” that have a legally recognized potential for abuse. Detecting and identifying controlled substances is a critical step in law enforcement's fight against drug-related crime and violence. Tetrahydrocannabinol, present in Marijuana is detected by the Duquenois-Levine Test, a chemical spot test based on the aldol condensation reaction. However, the mechanism of the reaction is not fully understood. In the present study we tested several plant materials and phenolic compounds in order to better comprehend the mechanism of the reaction. Preliminary data indicates the presence of a 1,3 resorcinol derivative is necessary and sufficient to obtain a positive result (purple color). We are investigating whether the presence of substituents on resorcinol can affect the color of the reaction. These studies provide a better understanding of the specificity and mechanism of the Duquenois-Levine Test.

Presenter: Ruffin, DeLorean
Authors: *DeLorean Ruffin, Alec Davila, Anna-Lecia Lyn-Cook, Laura Mudd, and Stephanie Bingham*
Research Mentor: *Stephanie Bingham*
Department of Biology, Barry University

Investigation of DNA Methylation in Response to Ethanol Exposure

Environmental exposures drive epigenetic changes that may alter the normal balance of gene expression leading to disease onset and progression. Rather than inducing changes in the gene sequences directly, epigenetic triggers alter the regulatory messages that instruct genes to become active or inactive; gene expression is typically activated in response to acetylation and repressed following methylation. We propose that alcohol exposure induces epigenetic changes in the developing nervous system. DNA methylation plays important roles in key developmental events such as tissue differentiation and DNA repair. By investigating a potential link between embryonic ethanol exposure and DNA methylation, we hope to shed light on the molecular mechanisms underlying birth defects associated with fetal alcohol syndrome and fetal alcohol spectrum disorders.

Supported by: NIH MARC Grant T34 GM008021, Barry University; Department of Biology, Barry University; Faculty Incentive Grant, Barry University; Department of Energy Grant DE-FG02-06CH11438

Presenter: Ruskai, Christopher
Authors: *Garrett Colas, Chris Ruskai, and Janusz Zalewski*
Research Mentor: *Janusz Zalewski*
Computer Science, Florida Gulf Coast University

Cross-Platform Software Layer For Developing Educational Games On Mobile Devices

The objective of this project is to create a cross platform software standard for educational video games that utilize a word/definition format. The current practice in playing games requires a connection to the servers that contain the user's information. The benefits of the new standard presented here are: games that can be played without the use of a data connection, faster loading times for games, cross platform capability, and cross developer capability. Both mobile and desktop applications will implement the standard through the use of configuration files, the only requirement being basic access to the file system. The target mobile operating systems include all versions of the Android, Apple's iOS, and Windows Phone Operating Systems. The target desktop operating systems include: Windows, Mac OSX, and Linux. The results of this project show that the methodology is successful and the proposed standards greatly increase the flexibility and speed of mobile flash card games.

Presenter: Sachkouskaya, Volha
Authors: *Volha Sachkouskaya, Judith D. Ochriotor*
Research Mentor: *Judith Ochriotor*
Department of Biological Sciences, University of North Florida

Characterization of Basigin Gene Expression in Mouse Tissues

The Basigin gene expresses two major splice variants in the neural retina. The shorter form, named Basigin, is expressed on Müller glial cells, blood vessel endothelial cells, and the retinal pigmented epithelium in the eye and on epithelial surfaces throughout the body. The longer form, named Basigin-2 is expressed only by photoreceptor neurons. The two forms differ by exon 1A – that is found in Basigin-2 but not Basigin. Previous studies of Basigin gene expression in neural retina suggested that the primary transcript contains exon 1A, which is spliced out in all cells but the photoreceptors, as trace amounts of exon 1A are found in the mRNA pool of Müller glial cells. Therefore, the purpose of this study was to analyze Basigin gene expression in various mouse tissues to determine if the primary Basigin transcript does indeed contain exon 1A. Quantitative RT-PCR was performed using primer sets specific for exon 1A and also for the mature Basigin transcript. The data indicate that exon 1A is present in the primary Basigin transcript, as it was detected in trace amounts in all tissues tested. This suggests that exon 1A is universally transcribed but then spliced out in all cells except for photoreceptor neurons.

Presenter: Saintibert, Jessica
Authors: *Jessica Saintibert, Lu Yu, and Likai Song*
Research Mentor: *Likai Song*
Departments of Biology, Biochemistry, Tallahassee Community College

Fluidity and Polarity of HIV Virion Mimic Membranes Defined by EPR Spin-Labeling Methods

At the National High Magnetic Field Laboratory located in Tallahassee, FL, we introduced cholesterol to the pseudo- HIV-1 Virion Membrane. There were a total of two groups, a control group and an experimental group, that were temperature dependent and with each consisting of two specimens. The control group contained 45% cholesterol and the experimental group contained 0% cholesterol. The names of the groups are 5- Doxyl PC and 16- Doxyl PC. They are named 5- Doxyl PC and 16- Doxyl PC due to their position in the pseudo- HIV-1 Virion Membrane. With these two groups, we were able to determine its fluidity meaning its movement against certain temperatures that were set. Also, we were able to determine its polarity meaning to see its electric charge. This behavior was able to be seen by the high peaks and low peaks of the two groups. To continue, the Electro Paramagnetic Resonance also known as EPR was used to help determine the fluidity, polarity as previously mentioned. In addition to finding the fluidity and polarity, we were able to determine the membrane order parameter and its amplitude of motion.

Presenter: Salazar, Daniella

Authors: Daniella Salazar, Jeanne-Marie R. Stacciarini, and Rebekah Smith

Research Mentor: Jeanne-Marie Stacciarini

College of Nursing, University of Florida

La Guia- The Development of an All-Purpose Resource Guide for Latino Immigrants

Studies have targeted the development of a program led by promotoras (lay-health workers) but there is lack of information on the development of resource guides for promotoras. The purpose of this study is to describe the development of a resource guide to be used by promotoras working with an immigrant, Spanish speaking community. The specific aims of this study were to: 1) describe the literature on developing resources for promotoras and 2) describe the process used to develop a resource guide in two different states in the US. This is a qualitative pilot study. An integrative review of research articles on the development of a promotoras resource guide was performed by searching electronic databases. Using online search engines, La Guia for two rural counties (North Florida and South Alabama) were developed. Evidence demonstrated promotoras are respected so they are valuable tools in providing health information to communities. Interactive activities and cultural emphasis are essential in educating promotoras. While developing La Guia, information was easily provided. In Florida, there were more organizations with bilingual informants than Alabama. Although the literature describes success of promotoras implemented programs, limited evidence was identified on the development of promotoras resource guides.

Presenter: Sanchez, Yineth

Authors: Yineth Sanchez, Timothy Dixon

Research Mentor: Timothy Dixon

Division of Humanities, Nova Southeastern University

A Comparative Study of the United States Response to Haiti's 2010 Earthquake and Indonesia's Indian Ocean Tsunami in 2004

This paper evaluates how the United States government responded to two of the world's worst natural disasters: Haiti's 2010 Earthquake and Indonesia's Indian Ocean Tsunami in 2004. The Haitian Earthquake resulted in approximately 220,500 casualties and 1.8 million people displaced. Similarly, the Indonesian Tsunami caused catastrophic effects in the southeast region of the globe devastating more than twelve countries in less than ten minutes. In Indonesia particularly, the tsunami caused 225,000 deaths and left 1.7 million individuals displaced. Both of these disasters were regarded as national emergencies for their respective countries. During the initial recovery period, Haiti and Indonesia faced serious challenges which led them to reach out to the international community for assistance. The theory tested by this paper is that the U.S. assistance to Haiti for the earthquake was more substantial than the support given to Indonesia. The systematic analysis of Congressional and Executive Branch reports supports the tenability of the proposed theory. This analysis shows an asymmetrical response to these two natural disasters by the government of the U.S. This disproportionate reaction was mainly due to the attitudes of the participants. Haiti received U.S. assistance more willingly than Indonesia who placed firm restrictions on international relief operations.

Presenter: Sands, Krysta

Authors: Jennifer Bowie, Jane Melichar-Koors, Kellyann Robinson, Krysta Sands, Yvonne Wheeler, and Kandis Natoli

Research Mentor: Kandis Natoli

Nursing, Bethune Cookman University

Exploration of Student Perceptions of Incivility in a Nursing Program

Research indicates that nursing schools' high stakes academic and clinical environments contribute to uncivil behavior. The majority of students and faculty in nursing programs report frequent encounters with incivility. This inappropriate conduct negatively affects those involved and can transfer to the workplace, resulting in negative patient outcomes. This qualitative study is an exploration of student perceptions of contributing factors to incivility as well as how students and faculty contribute to incivility within the academic and clinical environments. The single most important contributing factor to incivility in nursing school is stress. Stress amplifies the five major threads of uncivil behavior identified in this analysis. "Disrespectful" behaviors,

unsupportive “environment,” “lack of communication,” “lack of accountability,” and “lack of professionalism” are interwoven to create the tapestry of incivility. Students suggest that establishing and communicating “ground rules,” life coaching to “promote mature behavior,” and administration of consistent and timely disciplinary action will prevent or mend the effects of an uncivil environment.

Presenter: Santiago, Maillim
Authors: Maillim Santiago, Andrew Gay
Research Mentor: Andrew Gay
Film Department, University of Central Florida

Little Women: Study of Female Representation in Teen Films and How They Affect Gender Perception

Since their inception in the 1950s, the teen film genre has been instrumental in shaping the perceptions of gender roles in teen society. The goal of this study is to monitor how women between the ages of 15 to 23 feel towards themselves after viewing teen films focused on the plights of a teenager. This has been monitored through a couple of steps. The first: a teen film, produced by the University of Central Florida, was made based on two female characters. The second: two other films made in a similar fashion were selected to be screened alongside the more positive portrayal of female independence. The third: after the films were viewed collectively together, a survey took place reflective on the young women’s ideals about themselves, their career, and romantic aspirations. In general, research on teen films has shown that such cinema has a negative influence on the self-esteem of young female viewers. More forward-thinking films regarding the status of females in mainstream society should be made to reflect positivity and equality amongst gender roles in teen society.

Presenter: Sauer, Michelle
Authors: Michelle Sauer, Candace Ward
Research Mentor: Candace Ward
English Department, Florida State University

Journal of the Plague Century: Illegitimacy as Disease in 18th Century England

The eighteenth century has often been called the “age of illegitimacy” in which the concept of illegitimacy was viewed and treated as a birth defect, a disease of the soul that produced an innate depravity in the bastard child. These misbegotten children are seen as marked from birth by the plague of illegitimacy to live a life diseased by the sin of their conception. The course of this “disease” often culminates in criminality. The objective of this project is to examine the social and cultural progression of the disease of illegitimacy through the tracing of the lives of bastard children from parish records to criminal cases recorded at Newgate Prison, and the depiction of the criminality of illegitimates as “fated” by their nature in the literature of the eighteenth century. The primary text examined in this project is Moll Flanders by Daniel Defoe which chronicles the criminal activities throughout the life of Moll, a bastard living in eighteenth-century London.

Presenter: Schau, Kyle
Authors: Kyle Schau, Oren Masory
Research Mentor: Oren Masory
Department of Ocean and Mechanical Engineering, Florida Atlantic University

Ejection of a Rear Facing, Golf Car Passenger

Golf car accidents have become increasingly prevalent in the past decade. The commercialization and integration of these vehicles has led to their widespread use in many areas outside the golf course. The following report details the findings of a series of experiments performed on a commercially available, shuttle style golf car during several maneuvers involving rapid accelerations of the vehicle. It is determined that the current set of passive restraints on these types of golf cars are not adequate in preventing ejection of a rear facing passenger during rapid accelerations in the forward and lateral directions. Experimental data and simulations show that the minimum height above the seat a hip restraint must be in order to secure a passenger during sharp turns is approximately 13 inches, compared to the current restraints of 5 inches. Furthermore, it is determined that a restraint directly in front of the rear facing passenger is necessary to prevent ejection.

Presenter: Schmidt, Jordan

Authors: *Jordan Schmidt, Vinita Chittoor, and Lucia Notterpek*

Research Mentor: *Lucia Notterpek*

Department of Neuroscience, University of Florida

In Vitro Screening of HSP90 inhibitors for Heat Shock Response in Schwann Cells

PMP22 gene encodes for peripheral myelin protein 22, which is expressed mainly in Schwann cells and is a major component of myelin. Mutations in this gene are associated with neuropathies in humans, such as CMT1A. Failure of this protein to be trafficked properly to the membrane or degraded through quality control mechanisms results in the formation of intracellular aggregates associated with peripheral neuropathies. Heat shock proteins (HSPs) are a group of functionally similar proteins which aid in the folding and trafficking of other proteins. HSP pathway activation via inhibition of the 90 kDa heat shock protein (HSP90) improves the intracellular processing of PMP22. Geldanamycin (GA) is a potent natural HSP90 inhibitor that causes cytotoxicity at concentrations necessary for adequate pathway activation. Therefore, seven other compounds, currently in cancer clinical trials, were screened through quantitative RT-PCR and immunochemical methods for their efficiency in inducing the pathway in cultured rat Schwann cells. A synthetic compound, NVP-AUY922 and a natural compound, Celastrol, were found to induce robust expression of HSP70 and HSP27 at levels comparable to GA, without significant cytotoxicity.

Presenter: Schumacher, Krista

Authors: *Krista Schumacher, Anna Peterson*

Research Mentors: *Anna Peterson*

Religion Department, University of Florida

Understanding the Ethical Principles of Christianity in Warfare: How U.S. Military Chaplains Reconcile Religion and Violence

In the United States military, the moral relevance of war is a question military chaplains are inevitably faced with at some point during their career. The purpose of this thesis is to understand how military chaplains - acting as moral representatives in their religious faiths within the military - are able to reconcile warfare with the teachings of their respective religions. My research makes clear three main points: first, military chaplains understand the relationship between religion and war through the lens of the just war tradition; second, there is disagreement among chaplains about their responsibility regarding morality in military operations; third, there is a lack of communication concerning ethics among chaplains and chaplains and their commanders. It is quite possible therefore - at least as seen from the perspective of these chaplains - to fulfill a function that is ethically proper without considering the ethics of the overall structure to which they belong. In a massive organization, such as the United States Armed Forces, this process of reasoning becomes even easier, especially as the decision-making is largely outside of one's own influence thus rendering the actions of chaplains rather anonymous. My research calls into question the extent that military chaplains should play in the morality of foreign affairs as religious representatives in the United States military.

Presenter: Screven, Ryan

Authors: *Ryan Screven, Eric Freundt*

Research Mentor: *Eric Freundt*

Biology Department, University of Tampa

TMEV and the Role of Autophagy for Replication

Theiler's Murine Encephalomyelitis Virus (TMEV) is a pathogenic single stranded RNA virus in the Picornaviridae family. It is known that several RNA viruses such as poliovirus, which is also a member of Picornaviridae, have the ability to modulate the autophagic cellular pathway in order to replicate. When a normal autophagic cascade has been induced, the cell will form double membrane vesicles (DMV) in an attempt to enclose undesired elements inside the cell. The DMV will then fuse with a lysosome and the contents inside will be broken down by various lysosomal enzymes. Blocking the lysosome allows the virus to use the DMV as a scaffolding structure to replicate. If the autophagic pathway is blocked by chemical inhibitors during infection by poliovirus, viral titers drop drastically. In an attempt to see if TMEV also induces autophagy for replication, infected BHK cells were treated with wortmannin and DMSO. Wortmannin is a known inhibitor of autophagy. Replication of TMEV was

quantified using plaque assays to determine viral replication kinetics. The results show that there is no statistical difference in viral titer between our control (DMSO) and experimental (wortmannin) groups. Thus, TMEV does not rely on the formation of DMV in order to replicate.

Presenter: Scurti, Craig

Authors: *Craig Scurti, Nicolas Auvray, Michael Lufaso, Hideo Kohno, and Daniel Arenas*

Research Mentor: *Daniel Arenas*

Department of Chemistry, Department of Physics, University of North Florida

Electron Microscopy of Sillenites

In this undergraduate project, the student performed transmission and scanning electron microscopy measurements on two sillenite compounds: Bi₁₂SiO₂₀ and Bi₂₅InO₃₉. To our knowledge, the electron diffraction patterns of sillenites have not been reported in the literature before. Sillenites are interesting for nonlinear-optics applications. The family of sillenites we are investigating include iron, silicon, gallium germanium, titanium, and indium as the metal cation in the structure. Our goals are the synthesis and characterization of new sillenites, such as Bi₂₅InO₃₉, and to improve our understanding of how the structure influences the optical properties. Our preliminary results show that both the tetravalent and trivalent compound have electron diffraction patterns consistent with the sillenite structure. The diffraction patterns also hint at in-homogeneous disorder in the bismuth-oxygen framework that is consistent with previous optics results. Using concepts from undergraduate solid-state physics, and vector calculus, the student will explain how the electron diffraction patterns were analyzed.

Presenter: Sello, Mpho

Authors: *Mpho Tau Sello, Dan Dickrell III*

Research Mentor: *Dan Dickrell*

Mechanical and Aerospace Engineering, University of Florida

Engineering Design and Programming Activity Development for K-12 & Undergraduate S.T.E.M. Courses

The primary objective of this research was to develop some programming example activities for use in S.T.E.M. courses. These activities were done using a combination of computer programming and hardware design. The tools used for this project were the LEGO Mind Storms NXT Hardware and National Instruments Labview. Research on this is subject is very vital, due to the rapid progression of science and technology. The NXT Base (Brick) can be used to complete many tasks. This device has the ability to retain data fed to it by light, infrared, sound, touch, and temperature sensors. Both the NXT hardware and Labview software tools were used in conjunction, solely for the purposes of sensor operation and data logging and analysis. In this project, the brick was programmed using Labview. This allowed access to all mechanical, as well as sensor activation functions. This project mainly incorporated mechanical and computer engineering, but has the potential and ability to venture into many other engineering disciplines.

Presenter: Sepulveda, Natalia

Authors: *Natalia Sepulveda, Martha Garcia*

Research Mentor: *Martha Garcia*

Spanish Department, University of Central Florida

The Importance of Education from a Global Perspective: Teaching Don Quixote in the 21st Century

The objective of this study is to concentrate on the topic of education in the Cervantine works, by examining the importance and significance from a global perspective using a 17th century text, Don Quixote of La Mancha, as part of the teachings in the 21st century classroom. In order to fulfill this objective, the following exegesis will consider specific episodes of Don Quixote and it will delve into the following questions: How do specific episodes reflect how education influences those surrounding Don Quixote? How do Don Quixote and his squire Sancho have a continuous learning process of what is considered real versus what should be considered ideal? How are Don Quixote's values reflected in the 21st century? How the text Don Quixote impacted the 21st century's education? In order to answer these questions, this study will include cultural aspects of the period and its historical and its social context.

Presenter: Serrano, Juan
Authors: *Juan C Serrano, Siva S Panda, and Alan R Katritzky*
Research Mentor: *Alan Katritzky*
Department of Chemistry, University of Florida

Metronidazole Bis-conjugates with Antibiotics and Amino Acids

Crohn's Disease (CD) is a chronic transmural inflammatory condition of the gastrointestinal mucosa that can affect any portion of the gastrointestinal tract from mouth to anus. It is a life-long disease that often presents with symptoms of chronic diarrhea, abdominal pain, anorexia, fever and musculoskeletal abnormalities. Temporary remission may be achieved with pharmaceutical based treatment but most patients require surgical extraction of affected areas. Metronidazole is the only antibiotic that has been shown to provide clinical benefits for patients with ileocolonic and perianal CD and to delay the recurrence rate after ileal resection. It's been suggested that ciprofloxacin in combination with metronidazole may be more effective than metronidazole alone in treatment of perianal CD and for selected patients with refractory intestinal CD. Amino acids have been used as carriers of drugs because of their ability to translocate into mammalian tissue and metronidazole and ciprofloxacin play vital roles in CD. Our long standing involvement in benzotriazole mediated peptide chemistry inspired us to design a new, effective and flexible methodology for synthesis of metronidazole bis conjugates. Herein we report the synthesis of metronidazole bis conjugates with quinolone antibiotics and amino acids which show high potentials as antibiotics against CD.

Presenter: Silva, Lauren
Authors: *Lauren Silva, Tammy Euliano*
Research Mentor: *Tammy Euliano*
Department of Anesthesiology, University of Florida

Prediction of Pre-Eclampsia

Pre-eclampsia is a set of symptoms experienced by pregnant women as early as 20 weeks gestation. These symptoms include high blood pressure, protein in the urine, edema, and neurological symptoms. Thus far, the exact causes of pre-eclampsia are unknown and the only treatment is premature delivery, which results in a high count of infant deaths. The Prediction of Pre-eclampsia study focuses on collecting heart rate variability via ECG and pulse wave analysis via PPG from high-risk pregnant women and healthy controls. Women are considered "high-risk" if they have one or more of the following criteria during their current or previous pregnancy: chronic/gestational hypertension, pre-eclampsia, gestational/chronic diabetes, liver disease, obesity, and/or multiple fetuses. Participants will be monitored throughout their pregnancy - after 16 weeks of pregnancy until delivery. The study's eventual goal is to design a small, inexpensive, portable device that employs smart phone technology to predict a mother's risk of developing pre-eclampsia and approximately recommend necessary level-of-care for delivery. No cure has been found for pre-eclampsia; therefore alternative routes must be sought. If a woman's risk of developing pre-eclampsia can be estimated, the total number of fetal and maternal deaths can be dramatically reduced, especially in the Third World.

Presenter: Silverman, Andrew
Authors: *Andrew L Silverman, Anne E Mathews*
Research Mentor: *Anne Mathews*
Food science and Human Nutrition, University of Florida

Self-identified Barriers and Motivators for Health Behavior Change as Predictors of Change

Previous studies have examined factors contributing to chronic disease such as diet, physical activity, psychosocial variables, and body composition. Social pressure was not found to be a critical variable, while dietary changes made a significant impact on the development of disease (Huang TT, Kempf AM; Kempf AM, Strother ML; Carroll). Young adults often develop enduring lifestyle habits at this critical stage of development. Putting preventative measures into place by understanding the modifiable factors motivating and deterring college students in achieving healthy lifestyles may lower medical costs and increase productivity. Therefore, the overall objective of this project is to evaluate whether self-identified barriers and motivators for health behavior change are predictive of health behavior change in an undergraduate college population. To address my objectives, this

project will be completed in two phases: 1) focus groups to identify barriers and motivators to participating in healthy behaviors and 2) creating summer and fall semester courses where individual barriers and motivators are identified and assessed in relation to reported participation in health behaviors. This class will be designed as a semester long course starting in the summer of 2012. My ongoing research work will last a minimum of one year in duration.

Presenter: Singh, Rohini

Authors: *Barry Byrne, Darin Falk*

Research Mentor: *Barry Byrne*

Department of Pediatrics, University of Florida

Adeno-Associated Virus (AAV) Vector Therapy for Treatment of Spinal Muscular Atrophy with Respiratory Distress Type I (SMARD1)

Spinal Muscular Atrophy with Respiratory Distress Type I (SMARD1) is a rare autosomal recessive genetic disease, which is the result of insufficient levels of Immunoglobulin Mu binding protein 2 (IGHMBP2). The disease is characterized by severe motor neuron pathology, which greatly diminishes voluntary muscle function and respiratory function as a result of diaphragmatic paralysis. Most newborns live until they are toddlers, however they experience severe complications including breathing distress, impaired movement, and the inability to swallow and sit without support. To date there is no treatment available for SMARD1 and palliative care is the only option. It is hypothesized that the investigation and development a new long-term effective treatment for SMARD1 by producing a functional IGHMBP2 gene-delivery system can be done successfully. Transfection (plasmid DNA) and infection (AAV) of primary mouse fibroblasts (wild-type and SMARDS1) and mouse skeletal myoblasts (C2C12) will be performed to determine expression of the IGHMBP2 protein. Immunoblotting and immunostaining techniques will be used to confirm protein expression levels and transfection/infection efficiency. The final stage of the project will incorporate the SMARD1 mouse model for determination of AAV-IGHMBP2 transduction efficiency and efficacy.

Presenter: Skarsten, Sondre

Authors: *Sondre Skarsten, Susan Bluck, and Natalie Ebner*

Research Mentor: *Natalie Ebner*

Department of Psychology, University of Florida

Mental Time Travel and Healthy Lifestyle Decisions: A Vividness Mediation Model

Previous research has found that mental time-travel to past and future rely on similar neurological mechanisms, however cognitive studies have found that memories from the past are more vivid than anticipated events in the future. Research has also shown that mental time-travel to the past or future changes how we perceive the present. In this study we built on these two factors by looking at mental time-travel to the future and past, how it can effect lifestyle-decisions we make in the present, and whether vividness acts as a mediator. The thirty-seven participants were asked to create a mental image of forty-four time-frame balanced events. The time-frames were past, future and control (e.g. shape of USA), after each event they made a health related lifestyle decision (e.g. how likely are you to eat fast-food in the next two weeks) and answered several questions on the mental image. Participants then filled out several questionnaires about the mental images they generated. Our tentative results are in concurrence with the literature, and builds on it by illustrating that mental time travel to both past and future generated healthier decisions than control, a possible mediation effect due to vividness is discussed.

Presenter: Slater, Christopher

Authors: *Christopher J. Slater, Gilberto D. Gil Jr., and Jong-Yeop Kim*

Research Mentor: *Jong-Yeop KIM*

Department of Environmental Engineering, Florida Gulf Coast University

Investigation of Hydrologic and Water Quality Modification of Stormwater by Permeable Interlocking Concrete Pavement (PICP) Systems

Increased imperviousness in urban areas results in the hydrologic and hydraulic modification and water quality degradation. Impervious surfaces such as asphalt, concrete, and brick pavers force natural stormwater in communities to be discharged, in some cases, to nearby rivers and streams. Urban storm water is contaminated

with heavy metals from vehicles and accumulated debris that break into finer particles along roads and sidewalks. Permeable Interlocking Concrete Pavement (PICP) systems have a high possibility of capturing these harsh particles in fill stone separating each brick paver.

Two FGCU Undergraduate Engineering students studied a PICP system to examine infiltration rate and particle removal efficiency of the jointing filling stone size over a simulated long-term pollutant loading condition. To evaluate the duration of water quality benefits, two typical influent particle size loading conditions (winter sand and NJCAT protocol sediment) were used until remedial cleaning was deemed necessary. This study will not only demonstrate water quality and quantity benefits, but also aid in developing effective maintenance strategy as a function of: particle mass loadings, buildup-wash off cycle affected by regional precipitation pattern, jointing stone material size, and relative paver/joint configuration.

Presenter: Sloane, Forrest

Authors: *Forrest Sloane, Leslie J. Murray*

Research Mentor: *Leslie Murray*

Department of Chemistry, University of Florida

Synthesis and Reactivity of Trinuclear Fe and Co Complexes of a Macrobicyclic Tris- β -diketiminato Ligand

Basic multi-electron redox reactions are among the most essential reactions in nature, yet remain challenging synthetically. These reactions, including CO₂ reduction and O₂ and H₂O interconversion, will be pivotal to a greener, post-petrochemical future. However, due to high activation barriers and selectivity issues, catalysis is necessary, and one attractive possibility is homogeneous catalysis by molecular metal clusters. Enzymes that catalyze these reactions contain active sites that house multiple transition metal ions to provide the required redox equivalents and also enforce selectivity through positioning of ions and neighboring functional groups. With this inspiration, we aim to develop effective synthetic catalysts in which a macrobicyclic host pre-organizes several metal centers around a substrate binding pocket. To these ends, I developed a trinucleating macrobicyclic ligand featuring the β -diketiminato donor. The Fe(II) and Co(II) complexes of this ligand have been isolated and I am exploring their reduction reactions. Crystallographic evidence indicates that reduction induces a shift of metal ions to η^6 coordination of the ligand phenyl rings. Reduced complexes are reacted with substrates including N₂, H₂, and CO₂. Characterization of the mechanisms and products will provide insight into the role of metal-ion cooperativity in these reactions and also into the mechanisms of certain enzymes.

Presenter: Snider, Rachel

Authors: *R. Snider, J. York, C.A. Embry*

Research Mentor: *Chelsea Embry*

Department of Integrative Health Science, Department of Chemistry, Stetson University

Curcumin Inhibits Activation of Toll-like Receptor 4 by Amyloid-Beta in Human Monocytes

Alzheimer's disease (AD) is characterized by the formation of insoluble plaque deposits of amyloid-beta (A β) protein that disrupt neuronal communication. Toll-like Receptor 4 (TLR4) on microglia, a resident immune cell of the brain and spinal cord, recognizes A β and initiates an inflammatory response that results in neuron death. In our study, we investigated whether the turmeric spice phytochemical Curcumin could inhibit the inflammatory response of human monocytes to A β peptide (1-40). We find that pre-treatment of THP-1 cells with Curcumin inhibits TNF- α gene expression in response to activation with A β peptide. Curcumin has been shown to bind to the TLR4 co-receptor lymphocyte antigen 96 (MD-2), inhibiting MD-2 interaction with ligand. Our molecular modeling analysis predicts additional potential binding sites for Curcumin on TLR4 itself and on the co-receptor cluster of differentiation 14 (CD14), indicating that Curcumin may inhibit AB activation of TLR4 by blocking ligand interaction at multiple levels. Thus, Curcumin may represent a novel 'spice therapy' for inhibition of A β -induced inflammation that drives AD progression.

Presenter: Stafford, Jenna
Authors: Jenna Stafford, Ericka Gherzi
Research Mentor: Ericka Gherzi
Foreign Languages Department, Santa Fe College

Race Relations in Cuba

"Race Relations in Cuba" examines the cultural/political evolution of race relations in Cuba. It is undeniable that blacks influenced Cuba in many ways that transcended culture and arts. Cuba would not be Cuba, without its diversity. From its inception, Cubans from diverse backgrounds and races fought for freedom from Spain. They longed to create a country that would be their own, and represent the best of Cuban people. In their collective efforts to be free from Spain's oppression, new Cuban ideas, theories and heroes emerged. Famous heroes such as José Martí, Carlos Manuel de Céspedes and Antonio Maceo rose to prominence during this turbulent time. Maceo and others who successfully built upon this legacy are examined in this research, focusing on their vision and action that created the foundation that is Cuba. Other central aspects of this research highlights more contemporary aspects of race relations under Fulgencio Batista and Fidel Castro as well as the paradoxical influence of the United States on race relations in Cuba.

Presenter: Stevenson, Olivia
Authors: Olivia Stevenson, Ashley Allen
Research Mentor: Ashley Allen
Psychology, University of North Florida

Self-Compassion: A Tool For Empowerment?

Given its numerous psychological benefits, self-compassion may be a tool for empowerment. We hypothesized that participants manipulated to think self-compassionately about a previous fight in a romantic relationship would feel more empowered than participants in a control condition. Furthermore, we hypothesized participants high in trait self-compassion would report higher levels of empowerment. After completing many psychological measures, female participants wrote about a big fight in a romantic relationship. Participants in the self-compassion condition received prompts designed to encourage a more self-compassionate response while participants in the control condition received general prompts not focused on self-compassion. Participants' empowerment was assessed. A significant positive correlation was found between trait self-compassion and empowerment as participants high in trait self-compassion reported higher levels of empowerment than participants low in trait self-compassion. These findings suggest that self-compassion and empowerment have a strong relationship and provide further evidence that self-compassion represents a construct characterized by strength and resilience rather than weakness and self-pity.

Presenter: Stewart, Jynesia
Authors: Jynesia Stewart, Hongmei Chi
Research Mentor: Hongmei Chi
Computer and Information Sciences, Florida A&M University

Community Detection in Complex Networks Based on Visualization

With the rapidly growing evidence that various systems in nature and society can be modeled as complex networks, community detection in networks has become more of search results recently. With the study of complex networks is an active area of scientific research that is inspired largely by the empirical study of real-world networks such as computer networks and social networks. The community detection aims to detect groups of nodes within the connections that are dense and also detects connections that are sparser. Community structure has plethora algorithms that are proposed so far, that want to detect community structures in different complex networks, where most of the algorithms are not suitable for very large networks because of their time complexity. In this research project, we will focus on using data visualization tools, such as Vizster and RandFlux, which we are using to visualize a large amount of data from social media.

Presenter: *Stickel, Amber*
Authors: *Amber Stickel, Quincy Gibson*
Research Mentor: *Quincy Gibson*
Department of Biology, University of North Florida

Determining Residency Patterns and Seasonality of Bottlenose Dolphins (*Tursiops truncatus*) in the St. Johns River by Photo-Identification

The St. Johns River (SJR) may be an important estuarine habitat for Bottlenose dolphins. However, it is not yet known whether these dolphins inhabit the river year-round, seasonally, or are transient. From March 2011 to February 2012, the UNF Marine Mammal Research team has conducted weekly photo-identification surveys of dolphins in the SJR. This effort has generated sighting histories for 284 individual dolphins (non-calves). Of these, 43.0% have been sighted on more than 5 survey days and 9.9% have been sighted on 10 or more days. Four dolphins were seen in 9 or more months; however, no dolphins were sighted every month of the study. Out of all individuals, 17.3% were sighted in all 4 seasons, 24.3% in 3 seasons, 25.0% in 2 seasons, and 33.5% in 1 season. More than half of the individuals (57.8%) were sighted in summer (Jun-Aug), but not in winter (Dec-Feb). Of these, 68.9% were only sighted once or twice during the summer. These data indicate that the majority of dolphins present only during the summer are transient; however, some dolphins are using the river year-round. Contrary to previous data, these data suggest that the SJR is an important year-round habitat for dolphins.

Presenter: *Swaidan, Victoria*
Authors: *Victoria R. Swaidan, Sarah L. Desmarais, Elisabeth Hunt, Brian G. Sellers, William G. Iacono, Matt McGue, and Marina A. Bornovalova*
Research Mentor: *Marina Bornovalova*
Psychology Department, University of South Florida

Testing the Direct Effect of Childhood Emotional, Sexual, and Physical Abuse on Adult Victimization: A Discordant Twin Design

Child physical, sexual, and emotional abuse (CA) is associated with an increased risk of adult victimization (i.e., direct violent, direct nonviolent, and indirect violent; AV). This relationship has typically been assumed to be a direct effect; however, the association may be due to genetic or shared environmental factors. The objective of this study is to test the relationship between CA and AV for genetic and shared environmental influences. To examine this, we assessed monozygotic twin pairs on CA and AV using a discordant twin design to compare twins who were exposed to CA to their unexposed co-twins on AV. Standard biometric models were used to calculate genetic and environmental influences on AV. Results indicate that participants who were exposed to sexual CA were significantly more likely than their non exposed twin to experience direct violent AV ($d = .74$). The failure to detect relationships between the other CA types and AV types indicates genetic and shared environmental contributions in these domains.

Presenter: *Swerdlow, Benjamin*
Authors: *Michael Hartel, Benjamin Swerdlow, Song Chen, and Franky So*
Research Mentor: *Franky So*
Department of Materials Science and Engineering, University of Florida

Defect-Induced Loss Mechanisms in Polymer-Inorganic Planar Heterojunction Solar Cells

Organic photovoltaic solar cells are of interest because of their potential to make flexible solar cells with roll-to-roll printing and processing. Despite the name, metal oxides and other inorganics have been used as electron acceptor layers in these devices due to their high dielectric constant that facilitates better exciton separation and the lower cost in comparison to fullerene molecules (ordinarily the main component of fully organic acceptor layers). However, devices with ZnO electron acceptors have been limited to power conversion efficiencies (PCE) of around 1%. This study seeks to investigate solar cell performance loss mechanisms caused by ZnO nanoparticle (NP) film defects—such as dangling bonds and oxygen vacancies. The devices used a poly[N - 9'-hepta-decanyl-2,7-carbazole- alt-5,5-(4',7'-di-2-thienyl-2',1',3'-benzothiadiazole)] (PCDTBT) polymer/ZnO NP bilayer

structure. The ZnO NP films in the devices were subjected to ultraviolet ozone (UVO) treatments to passivate defects in the ZnO NP acceptor layer. Time-resolved photoluminescence (TPL) and transient photovoltage (TPV) measurements of the devices before and after passivation showed that ZnO NP film defects caused decreased charge dissociation and increased charge carrier recombination such that, when the defects were pacified, an over 270% increase in PCE was achieved.

Presenter: Taveras, Kendymill

Authors: *Kendymill Taveras, Susana Chan, Stephanie Bingham, Peter Lin, and Teresa Petrino*

Research Mentor: *Teresa Petrino*

Biology Department, Barry University

A Morpholino-Based Investigation of Polycomb Gene Function

Proteins encoded by the Polycomb (Pc) group genes are involved in gene regulation during development. Previously, we identified and cloned zebrafish Pc1, Pc2 and Pc3. Through in situ hybridization analysis of a developmental series we determined that Pc1 is expressed differentially. Initially (4-cell to 12-somite stage) it is expressed broadly. At later stages, the expression becomes progressively restricted. Expression was observed at the 4-cell stage indicating that the transcript is maternally derived and suggests that this gene may be critical in early development. To investigate the potential role, we are using a reverse genetics approach to disrupt Pc1 expression and function. Reagents known as morpholinos prevent translation in a sequence-specific manner by binding mRNA and sterically hindering the translation initiation complex. Morpholinos were designed to target a region upstream of the translation initiation site of Pc1. The goal is to microinject zebrafish embryos at the 1 – 4-cell stage thereby disrupting Pc1 translation. Zebrafish is an ideal model organism to carry out these studies in vertebrates because fertilization is external. Determination of Pc gene function will be an important step in understanding the role of these genes during embryonic development. Support: NIH-NIGMS RISE Grant, R25 GM059244-12; Barry University Minigrant; DOE Grant No. -DE-FG02-06CH11438.

Presenter: Thakker, Yatit

Authors: *Yatit Thakker, Nima Mohajer, Chang-Yu Wu, and Nicoleta S. Hickman*

Research Mentor: *Nima Mohajer*

Department of Environmental Engineering, University of Florida

Modeling Lunar Dust Collection onto an ELDS

Lunar dust particles on the moon are charged and easily levitated due to the lack of an atmosphere to block solar wind, and the low gravitational conditions. These levitated, charged lunar dust particles proved especially troublesome during previous moon landing missions because they often stuck to solar panels that were used as a power source, reducing their efficiency. A proposed solution to counteract this hindrance is to use two parallel-charged plates that will induce a magnetic field to collect the charged particles; this device is known as an Electrostatic Lunar Dust Collector (ELDC). Our research expanded on the efficiency of an ELDC by modeling it under varying particle concentrations, voltages, and plate geometry. Using EDEM Solutions, Inc.'s modeling software, DEM, we developed models that simulated the behavior of an ELDC over time as particles were collected and their charge reduced the collection efficiency of future incoming particles. We found that the best way to counteract a reduced collection efficiency was to increase the applied voltage in order to overwhelm the charge of the collected particles.

Presenter: Thomas, Odari

Authors: *David R. Walker, Scott A. Banks*

Research Mentor: *Scott Banks*

Dept. of Mechanical and Aerospace Engineering, University of Florida

Matching 3-D Models to Fluoroscopic Images to Assess RTSA Implant Performance

Reverse Total shoulder arthroplasty (RTSA) is a technique used to treat patients suffering from rotator cuff deficiency or a failed traditional shoulder arthroplasty. This treatment proved successful in restoring shoulder function to the patients who received it however there was no method to quantitatively determine how effective the procedure was in restoring that function. The development of fluoroscopic imaging techniques now allows the kinematics of these implants to be assessed in vivo. In our research, we have performed 3-D to 2-D model-image registration using the JointTrack software to measure the performance of RTSA implants. Subjects were asked to perform elevation and lowering of the arm in the coronal plane. Implant models were successfully matched to the fluoroscopic images and kinematic data was acquired for comparison with data from normal patients. We found

that reverse shoulders do not function like normal shoulders. From the kinematics measured, we calculated the scapulohumeral rhythm (SHR) of the shoulder. This ratio gives us a relation between humeral and scapular motion. In normal shoulders this ratio is 3:1. For reverse shoulders this ratio is 1.8:1. This indicates greater scapular motion. The results will help refine the design of the reverse implant and improve surgical and rehabilitative techniques.

Presenter: Thomas, Morgan

Authors: Morgan Thomas, Don Samuelson

Research Mentor: Don Samuelson

College of Veterinary Medicine, University of Florida

Corneal Neo-Vascularization in Pinnipeds

The inability of organisms in the pinniped order to induce corneal neo-vascularization has been implicated in the high rate of ocular disease in these mammals. Captive populations of pinnipeds exhibit frequent keratitis and ocular lesions. Corneal vascularization in terrestrial mammals is triggered by protein factors released from stressed or hypoxic cells. Vascular endothelial growth factor (VEGF) is a primary protein factor involved in regulating neo-vascularization. We used immunohistochemistry and light microscopy to search for indication of neo-vascularization in diseased pinniped corneas. We also quantified the presence of VEGF-A and VEGFR-2 protein factors in pinniped corneas with ocular insult as compared to VEGF levels in normal and diseased canine corneas. Using H&E staining, we found support for the initiation of neo-vascularization in pinniped corneas; however, we found no well-developed corneal blood vessels. Staining of the endothelial lining of newly formed vessels in pinniped corneas indicated VEGF-A and VEGFR-2 presence. Future research should focus on protein factors other than VEGF, such as fibroblast growth factors, that may be inhibiting the development of neo-vascularization in pinniped corneas.

Presenter: Thomas-Winfield, Arianna

Authors: Arianna M. Thomas-Winfield, Jenny Stuber

Research Mentor: Jenny Stuber

Sociology Department, University of North Florida

Out of the Closet: Gay Youth Navigate the Coming Out Process

For homosexuals, “coming out” is the act of revealing one’s sexuality. But how does one go about revealing their sexuality? Using data from six in-depth interviews with Current College students, I explore how young gay men approach and navigate the coming out process. I find that these young men approach the coming out process by first coming out to themselves. Next, they reveal their sexuality for the first time to close friends, usually “female” friends and last, to family members. More so, gay respondents describe “coming out” as an ongoing process that will never “end” and that will instead last their entire lifetime. In studying the coming out process, sociologists can better understand how such a process is navigated and managed by gay individuals. This includes how homosexuals decide to come out for the first time, who they choose to come out to (who finds out) and how they deal with the repercussions of coming out. Sociologists can also study how “coming out” is an intricate part of the gay experience. Through the process of “coming out,” gay individuals establish a sense of “self” and actively share themselves with others.

Presenter: Tokar, Derek

Authors: Derek R. Tokar, Judith Ochrietor

Research Mentor: Judith Ochrietor

Department of Biology, University of North Florida

Characterization of Basigin Gene Expression in the Mouse Pineal Gland

The Basigin gene expresses Basigin and Basigin-2 via splice variation. The neural retina produces both, with Basigin, the shorter variant, expressed by Müller glial cells and the retinal pigmented epithelium and Basigin-2, the longer variant, expressed by photoreceptor neurons. The two gene products associate with monocarboxylate transporters and form a metabolon thought to be critical for photoreceptor function. Since Basigin-2 expression has only been detected in photoreceptor neurons, the purpose of this study was to determine if both forms of Basigin are expressed in the pineal gland, a photoreceptive region of the brain. RNA and protein were isolated from mouse pineal glands using the TRI reagent protocol. Expression of Basigin and Basigin-2 transcripts was

quantified through q-RT-PCR. Protein samples were subjected to immunoblotting analyses. The results indicate that, although both transcripts were detected, Basigin-2 is expressed in trace amounts. Immunoblotting analyses indicated that only Basigin is translated into a protein in the pineal gland. The data suggest that Basigin-2 is generated but is only a primary transcript for a starting point for splicing of the shorter form. Therefore, Basigin-2 protein expression remains a photoreceptor neuron-specific phenomenon.

Presenter: Tran, Trung

Authors: *Trung Tran, Wesley Bolch*

Research Mentor: *Wesley Bolch*

Department of Biomedical Engineering, University of Florida

The Impact of Pediatric Anthropometric Patient-Phantom Matching on Organ Doses During Interventional Fluoroscopic Procedures

Fluoroscopy-guided interventions contribute to a significant fraction of radiation dose among medical procedures. Because of the heightened risk of radiation-induced injury associated with high-dose medical exposures, especially among pediatric patients, there is a need to quantify radiation doses during procedures and to record dosimetric information after procedures. A key advancement to the assessment of radiation doses received by patients is the hybrid phantom, a computational representation of human anatomy. The hybrid phantom succeeds the earlier generation of stylized phantoms, which use only basic geometric shapes and general spatial positions to model anatomy. The purpose of this study is to investigate the effectiveness of pediatric patient-phantom matching of hybrid phantoms in comparison with stylized phantoms for determining organ doses in fluoroscopy-guided interventions. First, patient-specific phantoms are constructed from computed tomography images of pediatric patients. The patient-specific phantoms represent an exact computational replica of the person providing the imaging data and are the basis for comparison. Then, the radiation transport of fluoroscopy is simulated, and dosimetric calculations are computed for the patient-specific phantoms, the stylized phantom, and the hybrid phantoms. It is predicted that radiation dose calculations will be more accurate for hybrid phantoms than for stylized phantoms.

Presenter: Tran, Jeffrey

Authors: *Jeffrey Tran, Bradley Germain, and Ching-Hua Chuan*

Research Mentor: *Ching-Hua*

School of Computing, University of North Florida

Facial Recognition with Artificial Neural Networks

In this project, we applied artificial neural networks to create a computer program that can accurately recognize human faces. Artificial neural networks are mathematical models inspired by biological neural networks. A biological neural network consists of billions of cells called neurons that transmit electric signals to each other to perform a specific function. Scientific attempts to model the system of networks for use in computers have resulted in the creation of artificial neural networks. In this project, the artificial neural network simulates the mechanism of perceiving and recognizing a person's face. Our program uses a standard webcam to capture the image of a person, detect his or her face even if other people are in the background, and feed the image through a neural network for processing and identification. A live demonstration of the program will be presented in the conference. Such programs can be further used to create biometric systems for security, personal and professional use for logging into computers, and many other applications.

Presenter: Trier, Grant

Authors: *Jessica J. Small, Grant C. Trier, Charles T. Lutz, and Monica Lara*

Research Mentor: *Monica Lara*

Department Natural Science, St. Petersburg College

Artificial Reef Sediment Experiment-Biological Analysis

Sediment samples were collected from local artificial reefs and natural ledges within Pinellas County. The samples were used for a survey of biological organisms found in the sediment sounding the reef. Artificial reefs are believed to enhance an area by increasing abundance and diversity of organisms. It is known that higher numbers of fishes and invertebrates are found than in adjacent soft-bottom areas. This study was to test the idea that the

reef may enhance the diversity and abundance of infaunal benthic organisms and thus increase food sources for the other organisms in the area. Samples were collected from immediately adjacent to the reef and from a distance away from the reef. The sediment samples were preserved in formalin and ethanol and then stained with Rose Bengal to reveal any of the organic material. Samples were then washed and benthic infauna was sorted into various taxa. Based on preliminary observations, benthic populations differed in the two types of samples. There appears to be a large difference in the abundance of several phyla including Nematoda, Mollusca, Arthropoda and, Annelida. Organisms are currently being taxonomically identified to look for differences in patterns of biodiversity and abundance.

Presenter: Trim, Charelle

Authors: *Charelle Trim, Rosemary Hickey-Vargas*

Research Mentor: *Rosemary Hickey-Vargas*

Earth and Environment Department, Florida International University

The Effects of Magma Mixing on Subduction Zone Continental Rocks at the Calbuco Volcano

The base rocks found under the Calbuco Volcano in Chile is unique as it is different from those found at other volcanoes in its vicinity. An important question is whether the bedrock found at Calbuco became molten and assimilated into the magma chamber or whether the magma chamber was fed by new magma from the subduction zone. The assimilation of crustal basement rock can introduce water from dehydrating minerals into the magma thereby enhancing the explosiveness of volcanic eruptions. Therefore, understanding this process will help to predict the eruptive behavior of specific volcanoes. In order to determine what happened at the base of the volcano, thin sections were made of one of the rock samples which were collected by Dr. Hickey-Vargas. The thin sections were analyzed under a light microscope to identify which minerals were present. The thin sections were then analyzed in the scanning electron microscope to determine chemical composition. Sections of the rock sample will also be powdered and dissolved to be analyzed in the inductively coupled plasma machine. Using the type of minerals found in the rock sample and rock compositions, the results will show whether the crustal rock melted and the melt was assimilated.

Presenter: Tsai, Christina

Authors: *Christina Tsai, Tsung-Chow Su*

Research Mentor: *Tsung-Chow Su*

Pre-Engineering Department, Florida Atlantic University

Visualization of Salt Fingers and Double Diffusion

Salt finger and double diffusion are interesting phenomena in ocean mixing processes. The diffusion and convection across liquid interface are studied using flow visualization technique in conjunction with high speed photography. A rectangular acrylic container was filled with water solution of Bromothymol Blue in the bottom. A thin layer of coconut oil was first placed above the water, with a few degrees of temperature dropped, the coconut oil freeze to separate top and bottom solutions. Then a slightly warmer salty solution of NaOH was laid on top. Since salty water is heavier than water, once the warmer solution on top layer melted the coconut oil, the diffusion and convection occurred across the interface. Bromothymol Blue, a chemical indicator which helps changing color of fingers from both side of interface to reveal the detail flow and transport processes. Both single finger and multiple fingers were investigated. The interactions between multiple fingers were revealed. By varying the height of salt water column, various flow regimes were obtained.

Presenter: Tsiaklides, Michael

Authors: *Michael Tsiaklides, Lauren Easler, and Kenneth Kohutek*

Research Mentor: *Kenneth Kohutek*

Department of Psychology, University of Tampa

What is EF? An Assessment of Executive Functioning.

Executive functioning is a psychological concept that encompasses many different cognitive processes required to plan and direct activities. While there are several methods to assess executive skills, there does not appear to be a standard practice across articles. There are many instruments used to assess executive skills and they fall under either informal or formal measures. Such instruments used to assess executive skills are, questionnaires for parents, teachers, and students, work samples, interviews, neuroimaging, and psychometric measures. Many tests

have been developed claiming to assess executive functioning. One such formal measure developed to assess executive functioning is the Woodcock Johnson-III. Spatial Relations and Concept Formation are two subtests in the Woodcock Johnson-III. Spatial relations and concept formation are supposed to be highly correlated with one another. The purpose of this study is to assess if there is indeed a correlation, and whether these two sub-measures are actually assessing similar executive functioning constructs. Preliminary findings from a pilot study are soon to be realized.

Presenter: Turcotte, Madeleine

Authors: *Madeleine Turcotte, Paris Grey, Mickey Emmanuel, Katrina Cuddy, and David Oppenheimer*

Research Mentor: *David Oppenheimer*

Department of Biology, University of Florida

Bacterial Expression of a Plant Regulator of Actin Dynamics

The activity of the actin cytoskeleton is central to a wide variety of cellular processes such as cell motility, membrane trafficking, and intracellular transport. These processes are regulated by a variety of proteins and factors that facilitate the polymerization and depolymerization of actin subunits into filaments or monomers. The actin depolymerizing factor/cofilin (ADF) family of proteins plays a key role in regulating the depolymerization of actin filaments. Our lab recently discovered a novel protein that inhibits ADF function – we named this protein ITB3. There are 21 additional related proteins within this family, which we named ITB3-like (ITB3L) proteins. This study focuses on whether a particular member of this family, ITB3L-10, is also a regulator of ADF. We created a bacterial protein expression vector that contains a yellow fluorescent protein tag in addition to the affinity purification tags in order to express and isolate ITB3L-10. Using this vector will allow the expression levels of the ITB3L-10 protein to be monitored under different bacterial growth conditions prior to purification. This will allow us to determine appropriate bacterial media and growth temperature to optimize ITB3L-10 expression levels. Subsequent purification and in vitro analysis of ITB3L-10 function will shed light on this new family of ADF regulators.

Presenter: Urul, Daniel

Authors: *Daniel Urul, Steven Bruner*

Research Mentor: *Steven Bruner*

Department of Chemistry, University of Florida

Cloning, Expression, and Crystallization of Tfu1858, a Putative Novel [2Fe-2S] Iron Reductase Protein

The discovery of iron-sulfur ([2Fe-2S]) proteins and their prospective roles as iron reductases has improved upon our understanding of the iron transport and metabolism systems of various bacteria. On such protein - FhuF, found within *E. coli* - has been suggested to function as a siderophore reductase, based on EPR and Mossbauer spectroscopy. Recently a new, putative [2Fe-2S] protein - Tfu1858, derived from the moderate thermophile *T. fusca* - has been shown by BLAST to contain structural similarities to FhuF, specifically regarding the arrangement of cysteines near the C-terminal motif. Obtaining the structure of Tfu1858 via protein crystallization may confirm its suggested role as an iron reductase, providing useful information regarding parallels in iron metabolism systems between various bacteria. Initial attempts at protein crystallization involved the addition of separate affinity tags of both small and large size (polyhistidine-tag and maltose-binding protein [MBP], respectively) to assist in purification and, in the case of MBP, stability of the fusion protein. Current attempts focus on genetic engineering - including linker chain length adjustment and strategic substitution mutations - chemical modifications - particularly through the addition of DTNB and cyclodextrin - and protein expression enhancement through adjustment of the culture growth media, all to better optimize protein crystallization.

Presenter: Vallejo, Celeste

Authors: *Celeste Vallejo, Jo Ann Lee, James Keesling, Verena-Ulrike Lietze, Christopher Geden, Drion Boucias, and James Keesling*

Research Mentor: *James Keesling*

Department of Mathematics, University of Florida

Epidemiology of MdsGHV in *Musca Domestica*

Musca domestica salivary gland hytrosavirus (MdSGHV) is a disease that enlarges the salivary glands of Musca domestica (the common housefly), as well as causes infertility in female houseflies. An infected female fly will no longer produce or lay eggs and will refuse a male's mating attempts. Collaborating with the University of Florida's Entomology Department, we have hypothesized that the virus is primarily transmitted through male-male aggressive interactions. The constant aggression between males causes damage to the flies' appendages, allowing the virus entry into the hemocoel, and subsequently infecting the internal organs. Environmental contamination and contamination of the food source are the two other possible modes of transmission. For females, MdSGHV seems to be transmitted largely through food and environmental contamination. There is no evidence that females exhibit aggressive behavior or that mating is a mode of transmission. We determined that the infected male flies have the highest death rate, while the healthy female flies have the lowest death rate. The death rates for healthy male and infected female houseflies are approximately equal. Using a set of differential equations, we used the aforementioned parameters to model the transmission of MdSGHV through a population of Musca domestica at a Florida dairy farm.

Presenter: Van Bommel, Eric

Authors: Eric Van Bommel, Marcel Ilie

Research Mentor: Marcel Ilie

Mechanical and Aerospace Engineering, University of Central Florida

CFD Analysis of a Subsonic HWB UAV

The HWB, or hybrid-wing-body, is an aircraft design featuring a swept wing configuration and is a new area of study for many in the field of aerospace engineering. This paper serves to show the expected lift and drag forces on the HWB and the effect of turbulence modeling on the aerodynamic forces observed using CFD. The two turbulence models which were compared were the standard K-Epsilon model and the Spalart-Allmaras model. One major conclusion of this study is that in order for the HWB to lift-off, it must be traveling at least 50 m/s with a 4 degree angle of attack which would be achieved by altering the design of the landing gear to create this angle. In order to produce the maximum lift-to-drag ratio the HWB must be flying at angles of attack between 6 and 7 degrees depending on the flight condition. In addition, it was found that the K-Epsilon model predicted lift forces which were slightly lower, and drag forces which were slightly higher than the Spalart-Allmaras model with lower angles of attack and had the opposite effect on large angles of attack. However, all discrepancies between the two models were found to be less than 1%.

Presenter: Vargas, Leticia

Authors: Leticia Vargas, Tanja Godenschwege, and Jana Boerner

Research Mentor: Tanja Godenschwege

Department of Biological Sciences, Florida Atlantic University

Characterization of Lis-1 Loss of Function at the Neuromuscular Junction of Drosophila melanogaster Larvae

Lissencephaly (smooth brain) is a brain malformation caused by mutations in the Lissencephaly gene Lis-1, causing incomplete neuronal migration. Studies investigating Lis-1 in Drosophila melanogaster revealed similar mutant phenotypes to the human disease. In addition, our lab also studies the LI-type cell-adhesion molecule Neuroglian (Nrg). It is thought that DLis-1 protein is affecting Nrg localization. In this study, we used Drosophila to determine if DLis-1 Loss of Function (LOF) impacts the synapse formation and axonal growth at larval neuromuscular junctions (NMJ's). Furthermore, this study will observe the affects of DLis-1 LOF on Nrg. Both DLis-1 and Nrg affect neuron physiology and are thought to interact, we hypothesize that the DLis-1 LOF larvae will have an altered NMJ morphology with an accumulation of Nrg within the synapse that overall causes an interruption in synaptic function, such as crawling behavior. This study will allow for a better understanding of the peripheral synapse of the Drosophila larvae affected by DLis-1 in correlation with Nrg.

Presenter: Vasileva, Mariya

Authors: Mariya Vasileva, Joel Burdick

Research Mentor: Joel Burdick

Division of Engineering and Applied Science, California Institute of Technology

Object Recognition And Localization Using Tactile Sensing

Tactile sensing is the process of determining physical properties and events through contact with objects in the surrounding world, and plays a vital role in effective robotic manipulation. Object recognition through touch is a fundamental problem in intelligent systems that, if solved, would enable robotic devices to interact autonomously with unstructured environments and perform sophisticated manipulation tasks without human supervision. As part of the NASA JPL Robotic Manipulation group, my research focuses on exploring the feasibility of using data from capacitive array tactile sensors implemented on dexterous robotic hands for estimation of the position, orientation and geometry of unfamiliar objects. A simplified solid mechanics model employing basic contact theory is used to reconstruct the physical phenomena at the interface between a rigid object, and the compliant skin of the sensor. After modeling the mechanics of different types of contact, interpretation algorithms for tactile data were built and implemented in a real-time adaptive control system. The ultimate project goal is designing a control algorithm that would determine “the next best touch” of the robot fingers in order to maximize the information content of each tactile sample, and extract the most useful parameters for distinguishing contact type and inferring local geometry.

Presenter: Velez, Gerardo

Authors: Gerardo T. Velez, Ian D. George, Arshad Muzaffar, Shawn E. Christ, and Kristina Aldridge

Research Mentor: Kimberly Conner

Departments of Pathology & Anatomical Sciences, Surgery, and Psychological Sciences, Florida State College at Jacksonville

Is Brain Development Affected by Abnormal Skull Shape

Craniosynostosis is a condition defined by the premature fusion of one or more sutures between the bones of the skull. Metopic synostosis, premature fusion of the two frontal bones, can be characterized by a triangular-shaped head and narrowly spaced eyes. Growth and development of the underlying brain is also affected. Among the cognitive impairments associated with craniosynostosis are speech and language problems, which are related to function the temporal lobe. Here we test the hypothesis that infants with isolated metopic craniosynostosis (IMC) display abnormalities in volume of cortical gray matter of the temporal lobe.

Our study sample consisted of magnetic resonance images (MRIs) of three infants with IMC and four unaffected infants, acquired at the University of Missouri Brain Imaging Center following approved IRB protocols. We segmented the cortical gray matter of the right and left temporal lobes from the MRIs and measured volume using Amira 5.4©. Volumes were statistically compared between the two groups using a Mann-Whitney U test.

Our results showed that the mean temporal lobe volume was 15% greater in the IMC group as compared to the unaffected group. The findings suggest that the speech and language deficits observed in these infants may not result solely from differences in temporal lobe size.

Presenter: Vera Tata, Nestor

Authors: George E. Tita, Michael T. McBride, Blake Allison, and Nestor Vera Tata

Research Mentor: George Tita

Criminology, Law and Society, University of Central Florida

The Individual Motives that Cause Violence Within Gang Members and the Lack of Social Support Networks that Drives Young Adults to Join Gangs.

The purpose of this preliminary investigation is to demonstrate that two main causes behind juveniles joining gangs are related to: the necessity of building a social supportive network and that violence incurred by gangster members occurs more for individual motives than for group-coordinated motives. This research was conducted by examining studies of existing gang models. By identifying the different elements in diverse gangs, one can see what factors are repeating and what events can influence violence in urban gangs. Gangs promote violence as means of power in order to increase respect among their peers and advance in their group. The use of violence resulted in more homicides, which are found principally in intraracial and intergang conflicts. Although scholars have studied the decline of crime since the 1990's, little is known about the decline of violence in recent years pertaining to criminal gangs. The amount of aggression resulting from a personal interest of a gang member, or from the gang as a group, eludes acquired knowledge. A mathematical model based on game theory will be utilized to assess whether violence is more a product of rivalry between gangs or a particular member of a gang looking to elevate his individual needs.

Presenter: Viecco, Tatiana

Authors: *Tatiana Viecco, Cecilia Lin, Jose A. Sepulveda Waldemar Karwowski, Serge Sala-Diakanda, and William Thompson*

Research Mentor: *Jose Sepulveda*

Industrial Engineering and Management Systems, University of Central Florida

Improving the Orlando VA Medical Center: A Simulation Approach

This poster is a graphical representation based on an actual simulation that was generated in collaboration with a graphic design student in hopes to increase the work between STEM and Art disciplines. The research consisted of a system redesign and healthcare facility improvement as part of a project from the Institute for Advanced Systems Engineering at the University of Central Florida in collaboration with the Orlando VA Medical Center. The use of discrete event simulation as a tool to find various “What if” scenarios is essential in providing the decision-makers of the medical center with parameters that could be used for the improvement of their service; some of the suggestions included changing the slot size of the visits, overbooking in order to have least amount of idle time, and changing number of operating days to include Fridays. The presentation will cover the results obtained from the simulation and possible areas of additional research that can follow from this project.

Presenter: Villarroel, Laura

Authors: *Laura Villarroel, Kaustuv Saha, Etienne Cartier, and Habibeh Khoshbouei*

Research Mentor: *Habibeh Khoshbouei*

Department of Neuroscience, University of Florida

Methamphetamine Decreases the Lateral Mobility of Dopamine Transporter at the Plasma Membrane

Methamphetamine, the second most popular illicit drug world-wide, is highly neurotoxic. The brain tissues of human methamphetamine abusers show long-term damage to dopamine neurons even after years of abstinence. Methamphetamine, a dopamine transporter (DAT) substrate, increases synaptic dopamine levels by competing with dopamine uptake and stimulating reverse transport of dopamine via DAT. Previous research has shown that association of DAT with lipid-microdomains in plasma-membrane regulates DAT's lateral mobility and activity. We used confocal microscopy and Fluorescence Recovery After Photobleaching (FRAP) to examine lateral diffusion ($t_{1/2}$) and mobile fraction (Mf) of Yellow Fluorescent Protein (YFP)-tagged DAT (YFP-DAT), in Chinese Hamster Ovarian (CHO) cells before and after 10 and 15 min methamphetamine exposure. Methamphetamine exposure (10 μ M) significantly decreased the $t_{1/2}$ of YFP-DAT at the surface membrane and altered Mf compared to the vehicle control ($p < 0.05$, $n=15-23$ cells). We have shown that intact N-terminal phosphorylation sites on DAT molecule are required for the methamphetamine-induced alteration in DAT function. Our ongoing studies examine the hypothesis that regulation of DAT mobility is dependent upon methamphetamine-induced phosphorylation of DAT. The results of our studies will reveal potential mechanisms of methamphetamine toxicity and novel drug targets on DAT. Funding provided by DA026947/DA/NIDA and NS071122/NS/NINDS.

Presenter: Villatoro, JuanCarlos

Authors: *Leonora Bojko-Sosa, JuanCarlos Villatoro*

Research Mentor: *Thomas Henry*

Department of Leadership, University of North Florida

Rare Earth Elements: National Security Risks & Solution for Domestic Supply

Over the last ten years, China has grown in monopolizing power of rare earth elements and other basic commodities throughout the world. The “routine” that China has done in the past years, from controlling mines in Africa, to securing the control of the earth's supply of the commodities for future growth in production is the result from China's long term development strategy. As holding a title of one of the low-cost manufacturers in the world, and a primary source that holds and controls the majority of rare earth elements, will put the Chinese in a competitive advantage standing for a few green energy products. In the United States there is a strong domestic demand for the use of these elements for today's products. The United States strong demand for China's supply of rare earth elements used for our U.S. military defense system creates a link to

national security risk on the rise. This national security threat can be solved through a U.S. developed technology called Plasma Gasification. This technology has the abilities to solve the imported scarcity of these goods through redistribution of rare earths when recycling electronic waste. The sustainability of this technology is an advantage on China's poor mining (using lax practices) by recycling e-waste through renewable energy, and with minimal negative impact in the environment. This solution will secure the future of our country through positioning the rare earths back in the U.S. industry for our domestic manufacturers in today's market. This technology will assure assistance to the U.S. domestic high demand for rare earth elements.

Presenter: Villatoro, JuanCarlos

Authors: *Terence Cavanaugh, Leonora Bojko-Sosa, and JuanCarlos Villatoro*

Research Mentor: *Terry Cavanaugh*

Department of Leadership, University of North Florida

Educational Development for Rural Areas in the Dominican Republic: The Computer Container Classroom Project

This paper describes a pilot project to develop technology resources for village schools in rural areas of the Dominican Republic. The remoteness of these school cause inabilities for students to further their education and set them behind urban areas by lack of education resources and experiences with modern technology. As part of a pilot project a shipping container retrofitted as a computer lab with satellite access and delivered to a remote village in the Dominican Republic; as a means of sustainable education and as a resource for community economic growth. This initiative will hopefully lead to such villages participating in distance learning as a means of continued collaboration and learning.

Presenter: Villatoro, JuanCarlos

Authors: *Terence Cavanaugh, Leonora Bojko-Sosa, and JuanCarlos Villatoro*

Research Mentor: *Terry Cavanaugh*

Department of Leadership, University of North Florida

Self-Contained Health and Education Learning Labs (SHELL) Project

Stage 2 funding from the USAID Development Innovation Ventures (DIV) program. The SHELL Project addresses several development challenges: (1) poor academic achievement among middle school students, (2) inequities in Internet access, (3) inadequate electrical power for computer use; and (4) the need for sustainable agriculture to enable economic development. Shipping containers retrofitted for use as computer-equipped classrooms will be installed adjacent to K-8 schools. During the school day, middle school students will participate in online distance learning programs. After school, local farmers and students will collaborate in service-learning projects to implement sustainable agriculture techniques. This project builds upon an existing pilot project and includes a rigorous evaluation of effectiveness, cost-effectiveness, and scalability. Project partners include the University of North Florida, JetBlue Airways, and Crowley Maritime Corporation. The project also aligns with current U.S. Department of State aid priorities. BICI has successfully obtained and managed federal, state, and local grants, including a \$10M grant from USAID for HIV/AIDS education and prevention in South Africa.

Presenter: Villegas, Mariana

Authors: *Mariana Villegas, Jennifer Leo, and Jon Maner*

Research Mentor: *Jon Maner*

Department of Psychology, Florida State University

Does Social Anxiety Moderate the Ability to Detect Genuine Smiles Following Rejection

Social rejection thwarts the fundamental human need to belong. Following rejection, individuals become attentive to cues that represent social affiliation in order to find new opportunities to re-affiliate. Research has shown that following rejection, individuals have an increased ability to distinguish between genuine (Duchenne) and disingenuous smiles. However, an individual's ability to discriminate between smiles may depend on their level of social anxiety, because these individuals are hyper-vigilant to potential rejection. We predicted that rejection would make participants with high social anxiety better at discriminating between genuine and disingenuous smiles than individuals with low social anxiety. We manipulated social rejection by telling participants that they were going to be alone for the rest of their lives. We assessed social anxiety using the Social Anxiety Interaction

Scale. Participants viewed 20 short video clips of a person smiling and following each clip they indicated whether they perceived the smiles as genuine or disingenuous. Our results discovered that rejection made individuals with low social anxiety more accurate at discriminating between smiles. The participants with high social anxiety were accurate at discriminating between genuine and disingenuous smiles, regardless of whether or not they had experienced rejection. Our findings suggest that socially anxious people are equipped with skills to avoid rejection threats.

Presenter: Walsh, Jennifer

Authors: Jennifer Walsh, Luciano Berardi

Research Mentor: Luciana Berardi

Department of Psychology, University of Central Florida

Attachment and Adjustment During the High School-College Transition

This study examined the role of attachment to parents on first year students' adjustment to college. Bowlby's theory of attachment can be defined as the interaction and bond between a child and their caregiver. In previous studies, attachment has been shown to correlate with how adults deal with stress throughout life (Banerjee 2006). The study will present findings using data from a survey collected from freshman students (N=700) about students' college experience. Attachment was measured by the Inventory of Parent and Peer Attachment (IPPA). From this measure, students were described as having either high (secure) or low (insecure) levels of attachment. Adjustment was measured on two different subscales: personal-emotional adjustment and social adjustment. Personal-emotional adjustment was measured with a focus on physical and psychological health while social adjustment focused on social life. Both levels of adjustment were measured by using questions from the Students Adaptation to College Questionnaire (SACQ). A significantly high correlation was found suggesting that students with a high attachment to their caregiver have healthier personal-emotional and social adjustment to college suggesting that attachment does have an effect on how students deal with stressors. This study also highlights the importance of studying students' relationship with parents.

Presenter: Ward, Katelyn

Authors: Katelyn Ward, Shige Taguchi, and Jamie Foster

Research Mentor: Eric McLamore

Department of Biological Engineering, Department of Microbiology and Cell Science, University of Florida

A Self-Referencing Micro Sensor for Studying the Effect of Dispersants on Marine Systems

After the 2010 Deepwater Horizon oil spill, innovative restoration is urgent to avoid ecological and economic distress. One of the most popular techniques involves dispersant distribution. While effective for oil-decomposition, many of the dispersants also harm the Gulf ecosystem. Microbes can effectively metabolize hydrocarbons that have negatively affected Gulf wildlife; however, environmental threats associated with dispersants are less readily apparent. Recent research shows dangerous levels of hydrocarbons in fish (often killing the fish eggs) from dispersants, and reproductive anomalies in clams. One technology currently under development involves nutrient-infused aerogels seeded with oil-degrading microbes. The use of these natural microbes aims to reduce dispersant levels without adding additional inorganics to the chemical cocktail poured into the Gulf to counter oil spills. The objective of this research is to develop a sensor to detect characteristic molecules in oil spill dispersants. This sensor will be used in a self-referencing "flux" modality, measuring transport of key elements found in dispersants. These measurements will be combined with existing sensors to justify feasibility of microbe-aerogel copolymers. This sensor will provide justification for bioremediation techniques that may be costly or time-consuming, and support using microbes for dispersant-removal (a natural, non-toxic removal method) to enhance Gulf remediation efforts.

Presenter: Warda, Firas

Authors: Firas Warda, Liora Shoshani, and Judith D. Ochriotor

Research Mentor: Judith Ochriotor

Department of Biological Sciences, University of North Florida

Characterization of Gene Expression in Retinal Pigmented Epithelium of Basigin Null Mice

The Basigin null mouse is characterized as blind from the time of eye opening with degeneration of the photoreceptor cells beginning at eight weeks of age. Specifically, it is thought that inappropriate expression of

monocarboxylate transporter 1 (MCT1) by photoreceptor cells accounts for the lack of photoreceptor function. Although it has been established that MCT1 expression in the Basigin null retinal pigmented epithelium (RPE) is altered, little else is known about the biochemistry and physiology of those cells. Therefore, the purpose of this study was to evaluate the expression of several transporters and enzymes within normal and Basigin null RPE. Immunohistochemistry using antibodies specific for Basigin, MCT1, carbonic anhydrase (CA) XIV, and the Na⁺/K⁺ ATPase were performed on frozen sections of normal and Basigin null eye cups. It was determined that neither Basigin nor MCT1 is expressed at the RPE plasma membrane of Basigin null mice. Expression of CA-XIV was unaltered in the tissue. Most notably, expression of Na⁺/K⁺ ATPase changed from apical-only to both apical and basal portions of the RPE. It can be inferred that the cellular environment of the neural retina of Basigin null mice is negatively affected by the change in expression of this transporter protein.

Presenter: Warner, Sharon

Authors: *S. Warner, Z. Khatoon, M. Pandey*

Research Mentor: *Madhu Pandey*

Organic Chemistry Department, University of South Florida

Characterization of Chlorophyll in Invasive Plant Species in West Central Florida for use in Photosynthetic Electricity Production

Photosynthetic solar cells compete with vegetation used for food consumption in a way similar to how biodiesel compete for corn normally consumed by livestock. To reduce the competition that may arise from the simultaneous demand for energy it is useful to look at chlorophyll sources that will not create competition. This research project looks at the chlorophyll content of invasive plant species in west central Florida and their potential as viable sources for the production of photosynthetic solar cells. The viability of photosynthetic solar cells is dependent to a large extent on the quantity and types of chlorophyll that it contains and forms the basis of this research. Our method for analysis is extraction of chlorophyll with methanol, and characterization of chlorophyll a and b using UV-Vis Spectroscopy. Wet photosynthetic solar cells will be produced and tested for conductivity and longevity. Chlorophyll a and b are essential in the light harvesting complexes of photosystem I and II of plant cells and their abundance in the selected plant species will be indicative of their potency for use in photosynthetic solar cells.

Presenter: Washington, Adam

Authors: *Adam Washington, Paloma Rodriguez*

Research Mentor: *Paloma Rodriguez*

Humanities and Foreign Languages Department, Santa Fe College

Pankration: The First Mixed Martial Art

In recent years, the sport of mixed martial arts has exploded in popularity. Organizations like the UFC have inspired a revival of many martial arts, as fighters from many different disciplines share techniques. This has spurred a rapid evolution of combat sports in the past decade that has been staggering, culminating in a mix-match of all styles referred to as MMA. But contrary to the perception of MMA as a novel, revolutionary sport, the world of combat sports has seen this concept before in the ancient Greek sport of pankration. In 648 BCE the first pankration event was held at the Olympics, marking the birth of the first known mixed martial art. The culture of pankration, including athletic professionalism, die-hard fandom, and even controversy of adverse health effects very closely resemble modern day sports culture. Although perceived as brutal and violent, pankration displayed sophistication of techniques that rival modern MMA, and through training and competition it evolved into a comprehensive system of fighting techniques. My poster provides a glimpse into the beginnings of combat sports and public sporting events, and explores the issues and cultural perceptions that modern MMA shares with its ancient counterpart.

Presenter: Welsh, Kristen

Authors: *Kristen Welsh, Rachel Silverman*

Research Mentor: *Rachel Silverman*

Communication Department, Embry Riddle Aeronautical University

A Violent Brotherhood: An Analysis of the Film "Jar Head" by Sam Mendes

This paper is a critical analysis of the film *Jar Head*, by Steve Mendes. *Jar Head* focuses on the relationship between men and violence, particularly within the United States Marine Corps while men are deployed. The film exemplifies how men use violence to demonstrate society's definition of masculinity as a way to connect and form relationships with other men. The behavior, while accepted among other men, can be detrimental to other relationships formed outside the military setting. This violent way of thinking leads to other negative thought processes such as the reduction of women to material objects and the withholding all emotion from loved ones. And yet, this violent behavior is not only supported within the military setting, it is encouraged. The film works to demonstrate the larger symbiotic relationship between violence and male comradery within the Marine Corps but provides universal messages which are true of violence witnessed in other male spaces in society.

Presenter: White, Emily

Authors: *Emily A White, Neha Lodha, andCarolynn Patten*

Research Mentor: *Carolynn Patten*

Brain Rehabilitation Research Center of Excellence, University of Florida

Fatigue-induced Adaptations in Cortical Excitability Post-stroke

Fatigue is among the most prevalent and disabling consequences following stroke. The aim of this study was to investigate concurrent behavioral and neurophysiological effects of fatigue in individuals with stroke compared to age-matched controls. Participants performed repeated submaximal (30% of maximal age-referenced norm) isometric power grip to task-failure. Maximal voluntary isometric grip force (MVC) was assessed at: baseline, following every 10th repetition, and at task failure. Using transcranial magnetic stimulation (TMS), we measured silent periods to determine intracortical and interhemispheric inhibition. Cortical excitability was determined by the area of the motor evoked potentials (MEParea). Time to task-failure was exaggerated in the non-paretic, compared to both paretic and control hands. Immediately post-fatigue we observed prolonged cortical silent period and reduced ipsilateral silent period durations indicating increased intracortical and reduced inter-hemispheric inhibition, respectively. MEParea was increased in the hemisphere ipsilateral to the fatigued hand. This effect was markedly greater in the ipsilesional hemisphere (i.e., non-paretic hand fatigued). Concurrent observation of reduced contralateral-to-ipsilateral hemisphere inhibition and increased MEParea suggests facilitation of cortical excitability in the non-fatigued hemisphere that may result from reduced inter-hemispheric inhibition. Fatigue-induced facilitation, especially in the ipsilesional hemisphere, may offer a novel therapeutic approach for effective rehabilitation of paretic limbs.

Presenter: Williams, Richard

Authors: *Richard A. Williams, Ciara Johnson, Jubin David, and Doris Terry*

Research Mentor: *Doris Terry*

Department of Chemistry, Florida A & M University

One Step Gel Electrophoresis

Sodium dodecyl sulfate polyacrylamide gel electrophoresis (SDS-PAGE) is a widely used technique for protein separation that requires several steps, including sample separation on acrylamide gel, staining, destaining, and imaging. At times, the staining procedure with Coomassie blue yields a very dark background, which would require long destaining process (several hours to complete). This current study uses diluted concentrations (0.00125 – 0.005%) of the standard dye solution for the SDS-PAGE procedure to develop a shorter and more efficient way to perform gel electrophoresis and stain in one-step. The procedure includes the incorporation of Coomassie blue dye G250 and R250 in the electrophoresis buffer during the actual run of SDS-PAGE. The proteins were stained while being separated providing only the need to fix after electrophoresis and image. The proteins that are separated using this one-step procedure are comparable to the standard Coomassie blue, silver-nitrate and Sypro Ruby protein staining procedures. Unlike the automated electrophoresis procedures using chips technology, the separated proteins can be utilized for further analysis such as mass spectrometry. The diluted dye is easy to make and can considerably enhance efficiency and shorten time periods of procedures. It is cost efficient and produces a lower background.

Presenter: Wittman, Tyler
Authors: *Tyler N. Wittman, Kenneth Fedorka*
Research Mentor: *Kenneth Fedorka*
Biology Department, University of Central Florida

Male Mate Choice in Regard to Female Immunological Condition in *Drosophila Melanogaster*

Research has shown that females are able to discriminate potential mates over their immunological condition and have a strong preference for non-infected individuals. However there is a dearth of knowledge regarding if males can discriminate female condition and also exhibit an immunological preference. We address this hypothesis using the fruit fly *Drosophila*. To this end, infected and control females were placed in opposite ends of a circular mating arena (~4cm dia) separated into four quadrants. Two females (one infected and control) were decapitated and then placed into the arena (decapitated females stand up-right but motionless, minimizing female behavior). Males were then introduced into the arenas and their location and courtship behavior was recorded for 30 minutes. Preliminary data suggest that males spend more time in quadrants with females than those without ($P < 0.0001$). Although not significant, there was also a trend for males to spend more time with uninfected females ($P = 0.16$). Perhaps most interesting was that courting males tended to court uninfected females first ($P = 0.0153$). These preliminary results suggest that males are discriminatory toward female immunological condition and exhibit a preference for healthy mates.

Presenter: Wood, Cecily
Authors: *Cecily R. Wood, Dylan K Palamittam, Sean E Mathis, Nyasha M Jawahir, Alexandra R Grotton, and Ann H Williams*
Research Mentor: *Ann Williams*
Biology Department, University of Tampa

Microbes in an AP Biology Classroom: A Hit or a Miss?

Microbes are ubiquitous, yet our awareness about them is surprisingly sparse. The objective of this project was to design a four day course for a high school AP Biology class which can be used to demonstrate the presence and impact of microbes in our environment. The course utilized case studies and discussions with images and plated organisms with the goal to boost retention through experiential learning. To track student progress we had routine in class discussions as well as a pre and post test on relevant material. There was a 23% increase in correct responses from pre to post on the test. A survey was also administered at the end of the project. All the students rated the project as highly useful and beneficial, and answered a 5 (strongly agree) to 89% of the six questions. This course was delivered by University of Tampa undergraduates and professors to a local high school AP Biology class and is being standardized with the Hillsborough County teaching standards. The goal is to have this teaching module accessible to teachers to use across Florida public school systems.

Presenter: Woodfine, Kelly
Authors: *Kelly J. Woodfine, Lucas H. Armitage, Stephen Bennett, Stephanie A. Casas, Navarre Elam, and Ana de Prada Pérez*
Research Mentor: *Ana de Prada Pérez*
Department of Spanish and Portuguese Studies, University of Florida

The Acquisition of Differential Object Marking by Heritage Speakers and L2 Learners of Spanish

Spanish Differential Object Marking (DOM) exhibits an 'a' that precedes certain direct objects, as in *Vi a María* (I saw Maria), which is semantically restricted; it signals animacy and specificity. With no comparable linguistic phenomenon in English, Heritage speakers (HS) and second language (L2) learners of Spanish of all degrees of proficiency do not converge on native-like knowledge of DOM (Bowles & Montrul, 2009; Guijarro-Fuentes & Marini, 2009; Guijarro-Fuentes, 2011). Comparing these two groups provides important information about bilingual speech (Montrul 2008). However, there are no studies, to the best of our knowledge, comparing both groups of bilinguals with regards to DOM. The present study redresses this oversight. 41 participants, divided by proficiency level and speaker type into five subgroups were given a grammaticality judgment test with 96

sentences, manipulated for specificity, animacy, and grammaticality. Results indicate that L2ers, as predicted, demonstrated more sensitivity to specificity than to animacy. HSSs, contrary to previous findings, behaved more native-like. Surprisingly, proficiency was not a significant factor. This paper contributes to the fields of language contact and bilingualism by providing further evidence of the combined effect of external and internal factors in the development of a bilingual variety (Thomason and Kaufman 1988).

Presenter: Wu, Gloria

Authors: Gloria Wu, Anne Mathews

Research Mentor: Anne Mathews

Department of Food Science and Human Nutrition, University of Florida

Fish and Omega-3 Fatty Acid Intake of College Students

A daily intake of one to three grams of omega-3 polyunsaturated fatty acids (omega-3s) is thought to reduce the risk of chronic diseases such as hypertension and arthritis. The 2010 Dietary Guidelines recommends that adults consume 8-12 ounces of seafood per week to encourage the adequate consumption of omega-3s. While various surveys regarding the consumption of omega-3s by adults exist, little information about the fish and omega-3 consumption by young adults attending college remains scarce. Even while transitioning into college life may make it more difficult for these young adults to maintain a healthy and well-balanced diet, which raises the question: are college students consuming enough omega-3s? The goal of this study is the collection and evaluation of data on the average level of omega-3 intake of college students enrolled in a health promotion course, which mentions omega-3s. Upon data evaluation of 24-hour food records, I hypothesize that the average intake will be less than the recommended intake of the World Health Organization (1-2% of energy/day). By the end of this study, participants will have gained knowledge on a healthy level of omega-3 intake, enabling them to make adjustments to their lifestyle and diet to better meet this standard.

Presenter: Yanik, Jeremy

Authors: Jeremy Yanik, Hala ElAarag

Research Mentor: Hala ElAarag

Department of Computer Science, Stetson University

Mobile Color Barcode Streaming Framework

In this paper we present the Mobile Color Barcode (MoCoBar) Streaming Framework, a foundation for visible light communications for mobile devices. The framework encodes information into a high-density 2D barcode specifically designed to be decoded easily by mobile phones with cameras. Various image processing techniques are used in both the encoding and decoding processes in order to achieve higher transfer rates with fewer decoding errors. The framework is designed to decode barcodes in real time to allow for streaming up to 15 frames per second. The framework was developed and tested on the Android operating system, allowing for widespread adaptation.

Presenter: Yen, Alicia

Authors: Alicia Yen, Dr. John Bako

Research Mentor: John Banko

Finance Department, University of Florida

Monetary Policy in the New Millennium

As the US economy has been mired in a very clear business cycle over the past decade, it is just as important to understand how the cycle started as it is to figure a way out of the cycle. In the very early part of the last decade, the US economy tanked after the Dot Com Bubble burst. Through the application of the Austrian Business Cycle Theory it is evident that the low-interest rate policy then Federal Reserve Chairman Alan Greenspan put in place to combat the Dot Com Bubble led to the formation of the housing bubble. The objective of this research is to proof time-preference theory of value and observe how the artificial changes in time preference that artificially low interest rates cause have effected the US economy. In addition to this, this research will also look to the future to see what effects might take place if current monetary policy is not changed.

Presenter: Young, Erika

Authors: Erika Young, Jenene Case Pease

Research Mentor: Jenene Case Pease

UCF Marriage and Family Research Institute, University of Central Florida

An Examination of Pre-Intervention Gender Differences in Underemployed and Unemployed Couples

Studies have shown how unemployment and a low-income status affect parent-child interactions; few studies have observed the gender differences of these interactions. The Becoming Parents Program (BPP) is a research-based program that has been proven successful in increasing relationship satisfaction and improving parenting behaviors. This study will explore gender differences in parenting and child rearing attitudes before the BPP intervention, within a specific population of unemployed and underemployed parents, as measured by the Adult-Adolescent Parenting Inventory (AAPI-II). The AAPI-II is a forty-question assessment that measures parents' and soon to be parents' attitudes toward raising children and consist of five constructs. These constructs indicate at-risk behaviors and tendencies and include expectations of children, parental empathy towards children's needs, use of corporal punishment, parent-child family roles, and children's power and independence. The results of this study will demonstrate the pre-intervention gender differences, in regards to parenting attitudes, with the use of the AAPI-II.

Presenter: Yu, Jisu

Authors: Jisu Yu, Wei Li

Research Mentor: Wei Li

Department of Ophthalmology, University of Miami

Cald1 is a New Mer-TK Phagocytosis Ligand in Age-Related Macular Degeneration

Age related macular degeneration (AMD) is the leading cause of blindness that affects individuals over 65 years of age. It occurs when the central vision, located in the macula is lost, while the peripheral vision remains the same. The cause of AMD has been linked to the defects in the clearance of apoptotic cells and leftover cellular debris, an important phagocytic process that maintains tissue homeostasis. One of the phagocyte's receptor of interest, Mer-Fc, triggers phagocytosis of the retina when bound to one of its multiple ligands. We hypothesized that Abcf1 and Cald1 are two of Mer-Fc's ligands. First, HEK293T cells were transfected with Calcium phosphate with plasmids of interest. The expressed proteins were co-immunoprecipitated with Mer-Fc, and analyzed through Western Blot to check for protein expression in the cell and their interactions with Mer-Fc. Cald1 and positive control, FLAG-Tulp1, co-immunoprecipitated with Mer-Fc, confirming that Cald1 is a signal for retinal phagocytosis.

Presenter: Yu, Sarah

Authors: Nathan Goldfarb, Daniil Shabashvilli, Maria Georgieva, Ranjna Madan-Lala, Jacqueline Naffin-Olivos, Gregory Petsko, Jyothi Rengarajan, and Ben M. Dunn

Research Mentor: Ben Dunn

Department of Biochemistry and Molecular Biology, University of Florida

Expression, Refolding, and Purification of Hip1, a Mycobacterium tuberculosis Drug Target

Hip1 is a cell-envelope predicted protease that is a virulence factor for Mycobacterium tuberculosis (Mtb), a bacterium that is a causative agent for tuberculosis (TB). It has been seen that absence of Hip1 results in compromised intracellular survival of Mtb in macrophages.¹ It is annotated as a tripeptidyl peptidase in the MEROPS peptidase database, and the evidence shows that Hip1 promotes processing of the Mycobacterium protein GroEL2. However, an inconclusive study reported that refolded recombinant Hip1 is not a peptidase but rather an esterase.² As a result, the exact function of this protein is still subject to debate. Here we report on the expression, refolding, and purification of recombinant Hip1. We show purification of refolded Hip1 to homogeneity and show that it is catalytically active with both ester and peptide substrates. This work will enable our future efforts to discover novel lead compounds that may serve as possible tuberculosis therapeutics.

Presenter: Zahir, Haaris

Authors: Haaris Zahir, Judith D. Ochrietor, Paul Gambon, Nicolas Thiebaud, and Debra Ann Fadoo

Research Mentor: Judith Ochrietor

Department of Biological Sciences, Department of Biological Sciences, Program in Neuroscience and Molecular Biophysics, University of North Florida

Characterization of Basigin and Monocarboxylate Transporter Gene Expression in the Mouse Olfactory System

Basigin, a member of the immunoglobulin superfamily, associates with monocarboxylate transporters (MCTs) forming a complex necessary for photoreceptor function. Basigin null mice do not express MCT1 or MCT4 at the photoreceptor or Müller cell plasma membrane, resulting in blindness. These mice possess olfactory deficits, where they are anosmic to odors like acetic acid. Therefore, the purpose of this study was to examine Basigin, MCT1, MCT2, and MCT4 expression in the olfactory system of normal and Basigin null mice to determine if metabolic defects, seen in the retina, underlie the olfactory deficiencies of Basigin null animals. Immunohistochemical techniques were performed on the olfactory bulb (OB) and main epithelium (MOE) of normal and Basigin null mice, using antibodies for Basigin, MCT1, MCT2, and MCT4. The data indicate that MCT1, MCT2, and MCT4 expression is robust in the MOE. Conversely, MCT2 expression predominates in the OB while, MCT1 and MCT4 expression in the OB is limited to blood vessel endothelial cells. Basigin expression does not overlap with MCT1 or MCT4 in the MOE, but does in the OB. The data suggest that a metabolic deficiency seen in the retina of Basigin null mice does not account for the acetic acid-specific anosmia in those animals.

Presenter: Zaila, Vivianna

Authors: Vivianna Zaila, Jeremy W. Chambers

Research Mentor: Jeremy Chambers

Department of Cellular Biology and Pharmacology, Florida International University

Over-expression of a Kinase Anchoring Protein 1 on the Mitochondria Affects Cell Signaling and Metabolic Pathways Promoting Cell Viability and Growth in HeLa Cells.

Mitochondria are one of the most important organelles in the cell since they produce most of the energy needed to survive making them crucial elements for controlling cell life and death. The A-kinase anchor protein 1 (AKAP1) is a protein scaffold on the mitochondria that may promote cytoprotective signaling or initiate cell growth. To investigate these proposed signaling outcomes, we will over-express AKAP1 on the mitochondria of HeLa cells and verify over-expression using fluorescent microscopy and quantitative western blotting. We will then evaluate the impact of increased AKAP1 concentration on cellular metabolism, mitochondrial function, and physiology utilizing the Seahorse Biosciences XF-96 extracellular flux analyzer. We expect that over-expressing AKAP1 levels will enhance prosurvival signaling specifically at the mitochondria, which may be able to counter the cytotoxic signaling. Understanding cancer mitochondrial metabolism will contribute to our knowledge of the mechanisms influencing metabolism and growth of cancer cells; ultimately, leading to the production of better and safer drugs for cancer treatment.

Presenter: Zych, Kristen

Authors: Kristen Zych, Tarek Saab

Research Mentor: Tarek Saab

Physics, University of Florida

Noise Analysis in DCRC Board

This project is a piece of the greater nation wide collaboration known as the Cryogenic Dark Matter Search (CDMS) whose goal is to detect dark matter particles. Any device used to read the output signal from an experiment is subject to many unwanted electrical influences, these influences fall under the broader term 'noise.' The Detector Control and Readout Card (DCRC) board is the communication link between the dark matter detectors and the experimenters and because the signals are sensitive the background, noise must be well understood and ultimately kept low despite being immersed a lab full of functioning equipment. Over an

arbitrary period of time it is possible to determine the strength of the signal distributed over a frequency spectrum, this is known as the power spectral density of a times series. This paper presents the method that was used to analyze the effects that different sources of background noise had a DCRC board.

