Research Abstracts

PANEL 1 - Nutrition and Empowerment: Perspectives from Kinesiology, Public Health and Anthropology

The Impact of Total Caloric and Macronutrient Consumption on Strength and Power During an Off-Season Training Program in Collegiate Volleyball Players

By Yvette Figueroa, *Kineseology, University of Miami*

The purpose of this study was to determine 1) whether there were significant changes in weekly total caloric and macronutrient consumption, strength, and power, and 2) whether total caloric and macronutrient consumption significantly and positively influenced changes in strength and power across a controlled eight-week, off-season resistance training program. Eleven collegiate-level female volleyball players were examined on macronutrient consumption, strength, and power at two-week intervals using three-day food logs, 3-repetition maximum (RM) bench press and back squat, and vertical jump, respectively. Significant increases were seen only in lower body strength and power ($p<0.05$). Total caloric consumption and carbohydrate intake significantly influenced lower body power after an 8-week program ($p<0.05$). We believe this is related to the neuromuscular adaptations that occur early in training. Thus, a longer resistance training program is necessary for structural changes to take place and result in greater contributions to performance-related measures.

Decolonizing the Community Voice: How (Re)Constructing Empowerment Can Create Pathways to Improved Nutrition in Nepal

By Katie McNamara, *Public Health, University of Florida*

As researchers characterize the drivers of malnutrition as complex and multifactorial, global efforts to ameliorate malnutrition increasingly address its underlying determinants. Improving women's empowerment has been one strategy of development practice that addresses malnutrition through cultural, economic, and agricultural pathways. However, as these approaches assume a western feminist stance, the voices of men and the local community are rendered irrelevant. This case study seeks to better understand the intersection of nutrition and empowerment from the perspective of men and women across three communities in central Nepal. Our findings suggest that the communities' conceptualizations of empowerment bridge western and Nepali worldviews and reflect unique gender and cultural norms, religious and ethnic characteristics, and interaction with development organizations and the natural environment. This study suggests that community conceptualizations of empowerment are marginalized by mainstream development and calls for a radical reframing of empowerment from the perspective of local communities to reach nutrition goals.

The Maître Divas of Wynwood: Culinary Consumption and the Black Aesthetic in Hip, Haute, Cuisine

By Judith Williams, *Anthropology, Florida International University*

In Miami's Wynwood Arts District, fine dining restaurants often employ Afrocentric Black women, whom I refer to as "Maître Divas" to greet guests and manage their dining rooms. These "Maître Divas" and their cultural self-fashioning are visible markers of a Black aesthetic, which bell hooks asserts is "more than a philosophy or theory of art and beauty; it is a way of inhabiting space, a particular location, a way of looking and becoming." With an understanding that Blackness is not monolithic, but is in fact an expansive and variable concept, this paper explores the various ways in which the Maitre Divas' Black aesthetic is exploited by Wynwood's white restaurant owners to promote their spaces as racially inclusive, ethnically diverse, and culturally "cool". I also explore the ways in which the Black aesthetic is embraced by Maître Divas as a form of social capital and resistance to anti-Black discrimination.

PANEL 2 - Contemporary Research in the Biological Sciences: A Focus on Gene Therapy, Cancer Cell Detection and Phylogenetic Reconstruction

Gene Therapy for Ocular Herpes

By Enrico Barrozo, *Biological Sciences, University of Florida*

The majority of the population is latently infected by Herpes simplex virus 1 (HSV-1). During the lytic phase, the virus replicates in epithelial tissue before traveling to sensory neurons where it establishes latency. Periodically, HSV-1 reactivates, causing a common cold sore, and is the leading cause of infectious blindness in the United States, blinding 35,000 people each year. Therapies are limited or infeasible, including eye transplants, which fail to treat the latent reservoir of virus and are thus needed every three years. We aim instead to prevent the virus from reactivating by focusing on viral noncoding-RNAs, which studies have shown facilitate reactivation. Our approach utilizes ribozymes, which are RNA molecules that act as enzymes to cleave specific RNA sequences. One design has already shown a reduction in reactivation up to 50 percent *in vivo*. We are currently designing and testing new ribozymes *in vitro*, and eventually *in vivo*, to achieve even better efficiency, with the goal of preventing herpes reactivation.

Use of Ganglioside 2 and 3 as an Immunoaffinity Target for Circulating Osteosarcoma Cell Detection

By Dr. Henrietta Fasanya, *Biological Sciences, University of Florida*

Osteosarcoma (OS) is the most common primary bone tumor and the third leading cause of pediatric cancer deaths. At diagnosis, 80% of patients will present with metastasis, however only 20% of these cases are clinically detectable. Currently, diagnosis of tumor recurrence and metastasis are primarily dependent on imaging modalities such as computerized tomography or positron emission tomography scans. The detection of circulating tumor cells (CTCs) through passaging patient blood samples through a geometrically enhanced chip has the potential to be used clinically for earlier detection, monitoring the treatment of metastatic cancers and surveying the effect of therapeutic interventions on metastasis. Traditionally, Epithelial Cell Adhesion molecule (EpCAM) has been used as a cell surface marker. Our results demonstrate that OS cells have poor EpCAM expression (<10%). The use of Gangliosides 2 and 3 has strong potential to be used as a target for COC detection. Future studies will evaluate if this marker can be used to detect CTCs in patient samples.

Does Recoding Improve Phylogenetic Reconstruction?

By Alexandra Hernandez, *Biological Sciences, University of Florida*

Recoding in phylogenetics involves grouping amino acids into chemically-related categories and replacing each residue in an alignment with a numeric representation of its corresponding category. This typically reduces an alignment from 20 to 6 states. Recently, recoding has been proposed as a solution to challenges associated with substitution saturation and compositional heterogeneity in phylogenetics. However, recoding has never been empirically tested. To test if recoding is appropriate for the aforementioned challenges, we simulated 20,000 datasets with increasing saturation levels and 3,000 datasets with increasing heterogeneity levels. For each dataset, we produced trees using non-recoded and recoded models. The expectation was that as saturation or heterogeneity increased, strategies that incorporated recoding would outperform analyses of non-recoded datasets. However, in all of our simulations, trees from recoded alignments were suboptimal to those from non-recoded alignments. These results suggest that recoding does not improve the accuracy of phylogenetic reconstruction and that the many published results that have incorporated recoding should be reevaluated.

PANEL 2 - Contemporary Research in the Biological Sciences: A Focus on Gene Therapy, Cancer Cell Detection and Phylogenetic Reconstruction

The Role of USF1 in the Regulation of Lipogenesis and Breast Cancer Tumor Progression

By Jessica Lewis, *Biomedical Sciences, University of Florida*

Breast cancer accounts for nearly one-quarter of all cancer diagnoses and is the principal cause of cancer-related mortality in women worldwide. Triple negative breast cancer (TNBC) is a clinically aggressive subtype of breast cancer commonly resistant to therapeutics. As such, identifying factors that contribute to poor patient outcomes and mediate the growth and survival of TNBC cells remains an important area of investigation. USF1 (upstream stimulatory factor 1), a gene linked to drive lipogenesis and cellular proliferation, is over-expressed in human malignancies, yet its contribution to cancer remains unclear. We found that USF1 expression is significantly higher in TNBC tumor samples. Also, USF1 gene expression positively correlates with key lipogenic enzymes. Significantly, we found that high expression of USF1 in breast cancer correlates with decreased patient survival. We therefore hypothesize that USF1 promotes breast tumorigenesis and progression by activating lipogenic gene expression. Further studies are underway to determine the mechanisms by which USF1 promotes tumorigenesis and metastatic progression.

PANEL 3 - An Examination of Informal Entrepreneurial Firms, Intrinsic Bubbles in Stock Prices and Investor Reaction to Supplier Diversity

Intrinsic Bubbles in Stock Prices Under Persistent Dividend Growth Rates

By Faisal Awwal, *Finance, Florida International University*

This paper modifies an original, nonlinear price-dividend valuation model by accounting for a significant time-series property of historical dividends data not taken into consideration previously in the literature. The study estimates the modified model with two sets of annual U.S. stock prices and dividends data, namely the Dow Jones Industrial Average and the S&P 500, over the last century. The empirical study employs tests for the significance of the time-series property for dividends and significance of the modified model relative to the original model. Results show that the time-series property for dividends and the modified model are both statistically and economically significant. Further, as observed in the original model, the nonlinear component of the modified model provide a significant improvement in fit to observed stock prices as compared to the present value stock prices alone. The findings imply that adapting important information within time-series data of a variable can improve model fit.

PANEL 3 - An Examination of Informal Entrepreneurial Firms, Intrinsic Bubbles in Stock Prices and Investor Reaction to Supplier Diversity

Investors' Reactions to Supplier Diversity Disclosures

By Andria Hill, *Accounting, University of Central Florida*

Supplier diversity programs are based on both social and business considerations. While the concept of social accounting includes a variety of social topics, minimal research explores supplier diversity disclosures within the voluntary sustainability reporting literature. The purpose of this research is to provide a brief overview of how supplier diversity disclosures relate to the existing social environmental and accounting (SEA) literature. Content analysis is the method proposed to explore the content of supplier diversity and supply chain disclosures. Particularly, the content analysis will be performed in order to identity the type of language used (concrete abstract) and the types of information (quantitative and qualitative) included in these disclosures. A behavioral experiment is proposed to explore investor reactions to the voluntary disclosures.

Essays on Informal Entrepreneurial Firms

By Everlyne Misati, *Management, Florida International University*

Informal enterprises contribute significantly to the world economy. These enterprises represent over one-third and up to one-fifth of global output in developing and developed countries, respectively. Furthermore, these enterprises produce about 35 percent of gross domestic product (GDP) and employ about 70 percent of the labor force in a typical developing economy. Despite this evidence and researchers' efforts thus far, we still know relatively little about informal enterprises' internal structures and functioning. Considering the proliferation of informal entrepreneurial firms and researchers' acknowledgment that firms are not merely black boxes that mysteriously transform inputs into outputs, salient questions remain. For example, what are the strategies and processes of informal entrepreneurial firms, and what explains their growth and formalization? To address this overarching research question, I propose three self-contained yet related studies to (1) quantitatively explore their growth and formalization, (2) conceptually examine their legitimation strategy, and (3) qualitatively illuminate how informal entrepreneurs internationalize their firms' products through export intermediaries.

Research Abstracts

PANEL 4 - Frontiers in Environment Engineering: An Examination of Hydraulic Efficiency, Reusable Nutrient Recovery and PRO as an Efficient Means for Desalination

Modeling and Design of a Pressure Retarded Osmosis-Based Energy Recovery and Brine Management System for Desalination

By Joshua Benjamin, *Environmental Engineering, University of South Florida*

Reverse osmosis (RO) based desalination is a process that involves desalting saltwater to create drinking water. While hailed as a solution for drought-stricken regions, utilities have hesitated to adopt desalination due to its high energy costs and the potential environmental impacts from brine disposal. Pressure retarded osmosis (PRO) has been suggested as a potential technology to mitigate these issues. PRO works by capturing the potential energy that exists in the salinity gradient between brine and dilute (e.g., freshwater/wastewater) solutions. However, acquisition of a proper dilute solution can pose challenges, as energy is needed to transport and pretreat the solution before it can undergo PRO. In this study, we developed a Python-based model that simulates how a PRO system could function in preexisting utilities, with a specific focus on the Tampa Bay Desalination Plant. Initial estimates show that PRO can save 14-16% of the energy consumed by the plant. Future work will focus on the environmental/economic impact of the project.

Closing the Loop of Urban Agriculture: Integrating Nutrient Resource Recovery from Wastewater

By Jorge Calabria, *Environmental Engineering, University of South Florida*

This work proposes a reusable nutrient recovery system (RNRS) designed to passively remove nitrogen from a wastewater stream for use as fertilizer in an appropriate horticulture operation. A small-scale prototype demonstrated nitrogen recovery from synthetic wastewater and reuse *via* fertigation in a vertical hydroponics system cultivating lettuce (Lactuca sativa). Lettuce crops with RNRS intervention indicated better crop quality parameters (crop mass and pigment development) than control crops fertigated with synthetic wastewater without RNRS intervention. The RNRS demonstrated effective nitrogen removal from wastewater and subsequent crop fertigation with minimal material and energy inputs. Thus, implementation of resource recovery technologies like the proposed RNRS shows positive implications for enhancing sustainability by reducing the costs and environmental impacts associated with wastewater treatment. Additionally, results show that recovered nutrient fertilizers can enhance socio-economic conditions by supporting local agricultural practices and food security.

Residence Time Analysis and Unsteady Flow Effects in an Oxidation Ditch

By Kiesha Pierre, *Environmental Engineering, University of South Florida*

Unsteady flows resulting from time-dependent inflow and variable aerator speed in a full-scale oxidation ditch and implications on residence time are explored *via* computational fluid dynamics. Flow in the ditch is driven by one inflow and two surface aerators. It was discovered that unsteady flows are induced by varying aerator speed, not time-dependent inflow. To avoid expensive unsteady flow calculations, residence time analysis was performed for two steady flows representative of the maximum and minimum operating speeds of the aerators. Significant differences between the two computed mean residence times suggest that unsteady flow dynamics may have a significant impact on residence time. Traditionally, residence time analysis is conducted with a single steady flow representative of the average flow. Instead, following the results obtained here, residence time analysis should be conducted under unsteady flow conditions, or a series of steady flow simulations representative of the various operational stages of the system, to obtain a more realistic prediction of the hydraulic efficiency.

Research Abstracts

PANEL 5 - Significant Research in Elementary and Secondary Education

When We Know Better, We Do Better: Frameworks and Tools for Analyzing Preservice Teachers' Mathematics Knowledge for Teaching Students from Diverse Backgrounds

By Lakesia Dupree, *Education, University of South Florida*

Equipping teachers with knowledge and practices deemed necessary to work with students from diverse populations is a documented need that plagues teacher preparation. Furthermore, the influx of students from diverse backgrounds enrolled in U.S. schools intensifies the need to prepare the future generation of teachers to provide equitable learning opportunities for every student in their classrooms. This paper highlights ways to analyze the preparation of preservice teachers for teaching students from diverse backgrounds. Results highlight limited opportunities for preservice teachers to engage in teaching elementary students, so that opportunities to assess their teaching practices are also limited. With the recent release of The Association of Mathematics Teacher Educators' Standards for Preparing Teachers of Mathematics, mathematics teacher educators need additional valid measures to assess the preparation of preservice teachers.

The Perspectives of Black Church Leaders on Their Roles on the Empowerment of Black Male Students

By Deborah McEwan, *Education, Florida Atlantic University*

This research proposal is a qualitative, interpretive study of Black church leaders' perspectives of their roles in addressing Black male student educational concerns. The underlying theoretical framework draws from critical/social justice pedagogy contextualized in the transformative role of the Black church as advocated by scholars. The study will investigate critical reflections and praxis of 12 leaders who represent three generational eras, which include Baby Boomers, Generation X, and Generation Y. In a two-phase interview process, participants will respond and reflect on their roles in addressing systems of power and privilege that impair the academic performance of Black male students. An analysis of the critical reflections of these leaders seeks to re-kindle the potential role of the Black church in social justice advocacy and as a source of empowerment for Black male students in the U.S. public education system.

Reading Ready: The Effects of a Spanish Early Literacy Intervention on At-Risk Latino Preschoolers' School Readiness Skills

By Xigrid Soto, *Communication Science, University of South Florida*

Preschoolers' early literacy skills, particularly phonological awareness (PA) and alphabet knowledge (AK), set the foundation for reading. Many Latino preschoolers who are Dual Language Learners (DLL) enter Kindergarten with reduced early literacy skills, placing them at-risk for academic difficulties. Research focusing on Latino preschoolers' early literacy skills is scarce. Most interventions only target English PA and AK skills despite evidence that suggests providing Latino DLLs with Spanish instruction is beneficial. This study evaluates the effects of a Spanish early literacy intervention for Latino preschoolers. The aims of this study are to determine if this intervention yields Spanish early literacy gains and whether the skills taught transfer across languages. Six children will be recruited. A Multiple Probe Single Subject Experimental Design will be employed. It is expected children will make gains in Spanish early literacy skills following instruction and that they will apply skills learned from one language to another. This study could result in a timely, effective early literacy intervention for at-risk Latino preschoolers.

PANEL 6 - Psychology and Communication Sciences and Disorders: The Impact of Motor Skills on Language Growth, Vestibular Function and Cognitive Impairment, and Brain Training

Vestibular Function: An Early Indicator of Mild Cognitive Impairment?

By Karen Bell, *Communication Sciences and Disorders, University of South Florida*

Alzheimer's Disease (AD), the most common form of dementia, continues to lack a succinct, cost-effective, widely accessible approach to early detection. Evidence suggests there are declines in both sensory and motor systems several years before a formal diagnosis of dementia is made. Specifically, there are reports of a relationship between vestibular function and cognitive impairment, suggesting that vestibular impairment may be a risk factor for cognitive impairment. The purpose of this study is to: 1) compare differences in vestibular evoked myogenic potentials among young normal adults (YN), cognitively normal aging older adults (CNOA), and older adults with probable mild cognitive impairment (MCI); and 2) examine differences in vestibular sensory function, functional balance, and spatial cognition among YN, CNOA, and older adults with MCI.

The Role of Fine Motor Skills on Expressive Language Growth from 12 to 24 Months

By Sandy Gonzalez, *Psychology, Florida International University*

Research on the role of motor skills on language growth during the "vocabulary spurt" is limited. The current study investigated infant motor skills at 12 months as predictors of language growth from 12, 18 and 24 months (N=98; 46 female). Motor skills were assessed using the Mullen Scales of Early Learning (MSEL), which includes fine-motor (FM) and gross-motor (GM) subscales. Productive vocabulary size was collected using the MacArthur Bates Communicative Development Inventories (MCDI), with productive vocabulary growth determined using linear slopes per participant across 12 to 24 months. FM score at 12 months significantly predicted MCDI expressive growth from 12 to 24 months. GM score was not a significant predictor of MCDI expressive growth. Thus, greater fine motor skills at 12 months predicted faster language growth over the "vocabulary spurt" period. Infants with better fine motor skills at 12 months may experience more novel interactions with objects and caregivers, allowing for more language learning opportunities.

Is Brain Training Worth It? Exploring Individuals' Willingness to Engage in Brain Training

By Erin Harrell, *Psychology, Florida State University*

We aimed to assess how much time individuals would be willing to spend playing brain games to gain prolonged functional independence. In Study 1 (N = 294), participants completed a survey with questions assessing how much time they would be willing to invest in daily brain training to extend their functional independence by certain amounts of time using a slider response that ranged from 0 to 100 minutes. Participants also completed surveys that measured self-perceived health and cognitive functioning, personality, and other demographic variables. Even for relatively small gains, participants reported being willing to dedicate an average of 11 minutes every day to brain training, with some participants willing to engage for significantly longer. The best predictor of willingness to invest time in brain training was belief in brain training efficacy, followed by openness to experience, and participants' self-perceived cognitive deficit. Study 2 examined the same question in a sample of 120 older adults, this time allowing for open-ended responses.

PANEL 6 - Psychology and Communication Sciences and Disorders: The Impact of Motor Skills on Language Growth, Vestibular Function and Cognitive Impairment, and Brain Training

A Case Study: Programs for Black Males at Predominantly White Institutions

By Liana Mentor, *Psychology, University of Miami*

In response to prevailing evidence of Black male underperformance relative to their peers, certain predominantly white institutions (PWIs) have utilized successful programs to support Black males on college campuses. A multiple-case study approach examined three existing programs used at PWIs in the Southeastern United States to support the undergraduate academic and social experiences of Black males. This study describes how these best practice programs are instrumental in helping students develop interpersonal relationships that benefit their academic achievement and overall well-being while enhancing cross-campus collaborations for the institution. Findings from this study could help support aspects of programs that improve the undergraduate experiences of Black males on predominantly white campuses.

PANEL 7 - Research Frontiers in Physics: An Examination of Solid State Nuclear Magnetic Resonance and LAMIS Signal Analysis

Squid Protein Structure by Solid State Nuclear Magnetic Resonance

By Tommy Boykin, *Physics, University of Central Florida*

The production of current batteries (e.g., Lithium, Zinc) is expensive, wasteful, and uses non-renewable energy resources. The next generation of batteries will be based on inexpensive, renewable energy resources from naturally proton-conducting materials. One proton-conducting squid protein called reflectin is a possible solution, although researchers require additional information about its molecular structure in order to optimize reflectin for specific devices, including batteries. Applying recombinant protein techniques, we purified the reflectin protein to determine the molecular structure by solid-state nuclear magnetic resonance (NMR). Once we know the structure, we may be able to understand reflectin's natural electrical properties and determine whether it can be used to make the next generation of inexpensive, natural resources-based batteries.

PANEL 7 - Research Frontiers in Physics: An Examination of Solid State Nuclear Magnetic Resonance and LAMIS Signal Analysis

Partial Least Squares Calibration Modeling Towards the Multivariate Limit of Detection for Enriched Isotopic Mixtures *Via* Laser Ablation Molecular Isotopic Spectrometry

By Dr. Candace Harris, *Physics, Florida A&M University*

Signatures of isotopes are difficult to detect and therefore are limited by the detector's capability in optically resolving spectral attributes that appear from isotopic transitions. One enhancement method to distinguish isotopologues is Laser Ablation Molecular Isotopic Spectrometry (LAMIS), an extension of Laser Induced Breakdown Spectroscopy (LIBS). Benefits of such a laser based technique are rapid and direct in the molecular and isotopic characterization of condensed samples without extensive chemical dissolution procedures. The sample's isotopic composition along with its respective spectra *via* LAMIS is analyzed using chemometrics, therefore quantifying the detector's attributes. Using a Partial Least Squares Regression (PLSR) model where the predictors are the molecular isotopic spectra, the potential of LAMIS' capability for signal to analyze discrimination in trace isotopes is discussed. An International Union of Pure and Applied Chemistry (IUPAC) consistent approach for the multivariate Limit Of Detection (mLOD) interval for PLSR predictions will be applied and is the first of its kind used for LAMIS signal analysis.

PANEL 8 - Innovations in Electrical Engineering: An Examination of Ink Jet Sensing, Smart Grid Cyberattack Response, and SDN Infrastructures

Sensors in Agriculture: Achieving Novel Plant-Soil-On-A-Chip Sensing Frameworks for Fertilizer Screening and Crop Phenotyping

By Lamar Burton, *Electrical Engineering, Florida International University*

Understanding the many mysteries and dynamic heterogeneity of soil is limited by the lack of sensing technologies which could offer real-time monitoring on biochemical changes within soil. Here we present a facile approach to manufacturing sensors in soil seedling and rhizosphere chambers using soft lithography methods. This method embeds in house fabricated IoT inkjet printed sheets into the multilayer microfluidic (MM) plant-soil-root-on-a-chip structure to achieve real-time electrochemical sensing of nitrate, phosphate, and ammonium ions in seedling soil and rhizosphere chamber. The multiplexed, multianalyte, and multilayered microfluidic (MMMM) device features a seedling chamber containing spike soil for germination and a rhizosphere chamber for observing root growth and rhizobium nodule formation. The integration of the MMMM sensing device with both soil and root chambers appeals as a promising platform for real-time personalized plant fertilizer screening and crop phenomics in precision agriculture.

PANEL 8 - Innovations in Electrical Engineering: An Examination of Ink Jet Sensing, Smart Grid Cyberattack Response, and SDN Infrastructures

A Tri-Modular Framework to Improve Smart Grid Cyberattack Response in Command and Control Centers

By Asadullah Khalid, *Electrical Engineering, Florida International University*

The performance of a utility's security technologies such as intrusion detection systems, firewalls, and network infrastructure devices has been improving. However, the large volumes of data generated by these technologies are visualized non-contextually, which requires analysts and engineers to spend more time analyzing the information before coordinating an incident response. This increases their cognitive gap and decreases the likelihood of well-informed decisions that could defend against persistent attackers. To bridge this cognitive gap, this paper proposes to shift the information processing and contextualization from human users to intelligent learning algorithms using a tri-modular framework comprising Data Module (DM)- Kafka, Spark and R to process heterogeneous data streams; Classification Module- a Long Short-Term Memory model to classify processed data from DM; and Action Module- naturalistic and rational decision-making for time-critical and non-time-critical situations, respectively. This paper describes the framework's architecture and develops a proof for DM using partially synthesized streams of real network security data on a single-node cluster.

DoS and DDoS Attacks in Software-Defined Networking (SDN) Infrastructures

By Andrea Wright, *Electrical Engineering, University of South Florida*

Software-Defined Networking (SDN) technology is gaining strong traction with many network and datacenter operators. SDN setups deploy a centralized controller with a holistic view that manages flow routes for network switches. Their deployment lowers costs and improves the efficiency and flexibility of networking services. However, they also open up numerous security vulnerabilities, such as large-scale Denial of Service (DoS) and Distributed Denial of Service (DDoS) attacks. These attacks can target SDN controllers or disrupt switch-to-controller communication channels, severely impacting control operation. Conversely, SDN-based mechanisms and approaches also present novel avenues for tackling various attacks. While various strategies for DoS and DDoS detection and mitigation have been proposed, many challenges remain. This paper presents a detailed overview and taxonomy of DoS and DDoS threats in SDN settings and surveys a range of proposed detection and mitigation solutions. Subsequently, some key emerging research trends are also presented, along with a generalized architecture for improving the security and resiliency of SDN-based setups.

PANEL 9 - Innovation in Mechanical Engineering: Baffle Devices and Acoustic Dissipation, Improved Battery Performance, Power Grid Supply, and the Design of Detonation Based Engines

Acoustic Viscous Dissipation Effects of Injector Baffle Height Separation for Rocket Engine Chambers

By Wilmer Flores, *Mechanical Engineering, University of Central Florida*

Unstable acoustic frequencies reduce engine performance and damage engine structural integrity. Acoustic oscillations are created from flame combustion and behave as a constant feedback loop under engine conditions. Baffles are a passive device designed to suppress acoustic instabilities and aid in flame stabilization. The current study focused on acoustic viscous dissipation and the effects of staggered baffle heights to longitudinal, tangential, and combined modes. Analysis of modes structures began with the first longitudinal (1L) up to the third tangential second longitudinal combination mode (3T2L) to fully comprehend attenuation behavior. Acoustic pressure wave measurements were recorded to recreate and reconstruct intensity contour images. Decay rates trends were investigated to select an optimal baffle height that demonstrates rapid damping reductions. We believe that optimization of this technology can enhance flame stability and increase engine burn rate.

Characterization of a Tri-Layer System for Improved Li-O2 Battery Performance

By Marcus Herndon, *Mechanical Engineering, Florida International University*

Lithium–air (Li-O2) batteries (2Li + O2 ⇋ Li2O2) provide an open-circuit voltage (OCV) of around 3.0 V and exhibit a high theoretical specific energy density of 3500 to 5200 Wh/kg with oxygen contained in the battery 5 to 15 times higher than the commercial lithium-ion battery. The purpose of this work is to create a tri-layer system within a lithium-oxygen cell using a designer electrolyte composition at the anode, electrolyte, and the cathode. Charge/discharge cycling determined 143 full cycles with 1M gel polymer electrolyte (GPE)/ 0.1mg carbon nanotube carbon cloth (CNT CC)/ 40uL 0.05M lithium-iodide (Li-I), with a 0.3-1.2 V overpotential. 1M composite-GPE-1%/ 0.5mg CNT CC/ no Li-I (control conditions) cycled for 54 full cycles with an overpotential of 1.7 V. Therefore, the Li–O2 cell improved roundtrip cycle efficiency, revealing a preliminary opportunity to utilize tri-layer systems in Li–O2, and eventually ambient Li–air batteries, furthermore improving safety and evolving the lithium battery.

Determining Reserve Requirements for Energy Storage to Manage Demand-Supply Imbalance in Power Grids

By Kendall Parker, *Mechanical Engineering, University of Florida*

Renewable energy sources, such as solar and wind, are volatile due to their intermittent nature. Future power grids, therefore, need energy storage systems (ESS) to maintain power reliability. Since ESS are expensive, methods are necessary to determine the minimum size ESS required. Current methods tend to focus on micro-grids or individual sites with renewable generators, do not include reliability constraints, or are difficult to interpret since they are not based on industry parameters. This work proposes a probabilistic data-driven method to determine the minimum size ESS to satisfy a reliability requirement for a power grid with a high penetration of renewable sources. The method is based on prior algorithms to determine reserve requirements for transmission network planning; it differs, however, in the way it estimates the component of demand-supply imbalance that ESS must support and the probabilistic model fitting predictions. Results from application of the method to data from BPA showed a smaller ESS capacity requirement (and thus lower cost) than deterministic methods.

PANEL 9 - Innovation in Mechanical Engineering: Baffle Devices and Acoustic Dissipation, Improved Battery Performance, Power Grid Supply, and the Design of Detonation Based Engines

Characteristics of Premixed Reacting Supersonic Flows

By Jonathan Sosa, *Mechanical Engineering, University of Central Florida*

Detonation based propulsion concepts have been desired as a means to achieve revolutionary advancement in the performance of air-breathing (ramjets, scramjets) and rocket propulsion. Detonation based cycles have received serious consideration in the past decades due to their increased thermodynamic efficiency over constant pressure combustion cycles. Researchers have been unable to experimentally demonstrate a stable detonation wave in steady flow. This has been one of the main challenges of implementing pressure gain combustion cycles in advanced propulsion concepts. Detonation initiation and shock/flame supersonic reactions are studied using high speed optical diagnostics (OH chemiluminescence and schlieren/shadowgraph) recording at 30 kfps. The supersonic flow consists of premixed hydrogen-air mixture with equivalence ratios ranging from φ=0.25-0.95. Three distinct ignition modes are identified: 1) shock induced combustion (φ=0.70-0.80), 2) unsteady compressible flames (φ=0.80-0.90), and 3) deflagration to detonation transition (φ=0.90+). Future work will focus on the fundamental understanding of the influence of temperature on detonation wave stability enabling the design of detonation based engines.

PANEL 10 - The Problem of Race and Class in the American Criminal Justice System with a Specific Focus on Juvenile Delinquency and Drug-Related Arrest

Racial Differences in Adolescent Delinquency: Examining Peer Delinquency and the Conditioning Effect of Neighborhood Context

By Jorge Hernandez, *Criminology, Florida State University*

Some scholars have identified differential association theory as an explanation of racial differences in offending. Separate research argues that racialized processes have contributed to differences in neighborhood characteristics for black and white residents and that these differing contexts may explain racial differences in offending. Finally, others have shown that the influence of delinquent peers is conditioned by neighborhood characteristics. This study combines these three lines of thought to test several hypotheses using data from a sample of youth from the Project on Human Development in Chicago Neighborhoods. First, the variation in association with delinquent peers is expected to explain a significant amount of the disparity in delinquency between black and white juveniles. Second, the effect of peer delinquency is expected to be reduced in neighborhoods with high levels of informal and formal social control. Lastly, the moderating influence of both these variables on the effect of peer delinquency is expected to be stronger for black juveniles than for whites.

PANEL 10 - The Problem of Race and Class in the American Criminal Justice System with a Specific Focus on Juvenile Delinquency and Drug-Related Arrest

Same Problem, Different City: Racial Disparities in Drug-Related Arrests and Charging Decisions in Miami-Dade County

By Oshea Johnson, *Sociology, University of Miami*

Researchers have documented racial and ethnic disparities at various points in the criminal justice system from arrest to sentencing. While some research aims to understand the various points of a defendant's travels through the criminal justice system, much of the research focuses on one particular point in case processing. This research study uses six years of data (2010-2015) from the county clerk's office in Miami-Dade County to track defendants' interactions with the criminal justice system. It also adds to the literature by tracking a defendant who was arrested for a drug-related crime and the defendant's likelihood of being convicted based on race and ethnicity. Using multivariate logistic regression, our plan of analysis is to track defendants who were arrested and charged with a drug crime (possession, sale, or "other"), measure the probability that this type of drug crime will lead to a carceral sentence, and examine potential disparities by race/ethnicity based on charge upgrades or downgrades.

PANEL 11 - Crises in Public Health: The Impact of the Decline in Breast Feeding, Recreational and Medical Use of Marijuana, Cervical Cancer Prevention, and Health Crises in African American Rural Communities

Promoting and Supporting Breastfeeding in the Hospital: Factors Associated with Breastfeeding Cessation at One Month Among WIC Participants

By Alexis Barr, *Public Health, University of South Florida*

This study examines modifiable factors that affect 1-month breastfeeding outcomes among WIC participants and assesses differences by race/ethnicity. Data from WIC Infant and Toddler Feeding Practices Study II, a longitudinal study collected 2013 to 2015, were analyzed using multivariable logistic regression. Among 1,104 Black/African-American women, factors associated with 1-month breastfeeding cessation (1-MBC) include perception of delayed onset of Lactogenesis II (PDOL-II) and formula supplementation before hospital discharge. Among 2,566 White women, factors associated with1-MBC include PDOL-II, hospital gift packs including formula and formula supplementation before hospital discharge. Among 1,653 Hispanic/Latina women, factors associated with 1-MBC include breastfeeding problems in hospital and formula supplementation before hospital discharge. For all women, interventions should examine why breastfed infants receive formula before hospital discharge, which is crucial for Black/African-American women. Also, policies must be adopted to mandate that hospitals provide high quality and culturally-appropriate breastfeeding assistance to support continued breastfeeding.

PANEL 11 - Crises in Public Health: The Impact of the Decline in Breast Feeding, Recreational and Medical Use of Marijuana, Cervical Cancer Prevention, and Health Crises in African American Rural Communities

Gender Differences in Driving Under the Influence of Marijuana: The Role of Medical and Recreational Marijuana Use

By Shawnta Lloyd, *Public Health, University of Florida*

This study aims to assess gender heterogeneity in the association between the reason for marijuana use and driving under the influence of marijuana (DUIM). A sample of 8,494 past-year marijuana users (18+ years old) were analyzed from the 2016 National Survey on Drug Use and Health. Gender-specific multivariable logistic regression models were conducted to investigate the association between marijuana use (medical use, recreational use, and both medical and recreational use) and past 12-month DUIM. Among marijuana users, 8.3% used for medical reasons, 88.0% used for recreational reasons, and 3.7% used for both medical and recreational reasons. Approximately one-third (30.1%) of users reported DUIM; 25.3% of women and 33.5% of men reported DUIM. Among females, recreational users were almost twice as likely to DUIM compared to medical users (aOR: 1.90; CI: 1.17-3.10). The reason for marijuana use was not significantly associated with DUIM among males. This study highlights the need for gender-tailored strategies to decrease the impact of DUIM.

Cervical Cancer Prevention Behaviors and Human Papillomavirus Vaccination Intention: An Exploratory Study of Minority Women in the Big Bend Region of Florida

By Meardith Pooler-Burgess, *Public Health, Florida A&M University*

The purpose of this study is to explore the relationships between cervical cancer knowledge, attitude, Papanicolaou (Pap) screening behavior, and HPV vaccination intention. By employing a sequential, mixed-methods research design, this study will explore: (1) cervical cancer knowledge, attitudes and screening behavior, (2) HPV knowledge, attitudes, and HPV vaccine behavioral intention, (3) the association between cervical cancer prevention behaviors and HPV vaccination behavioral intention, and (4) perceived facilitators and barriers that may influence HPV vaccination behavioral intention. This study will recruit minority women between the ages of 21 and 45 who identify as Black or Hispanic and reside in the Big Bend region of Florida. Participants for this study will be recruited from Florida A&M University, County Health Departments, and community organizations in the Big Bend region of Florida. Findings from this exploratory study will lead to evidence-based strategies that will ultimately increase HPV vaccination rates among high-risk populations and decrease the cervical cancer burden among women of color.

Exploring the Influence of Family Health History in Rural African American Communities

By Calandra Whitted, *Public Health, Florida A&M University*

The Families SHARE workbook is a tool designed to encourage families to share information about genetically-based diseases. The goal of the Families SHARE Florida project is to determine the tool's efficacy in reducing disease in at-risk individuals within Southern, rural communities through knowledge of family health history. Surveys and focus groups will be used to assess the tool's effectiveness at calculating risk and providing health care recommendations for heart disease, Type 2 diabetes, and colon, prostate, and breast cancer, all diseases with high incidence and mortality rates in rural black populations. In addition, the study will explore Southern, rural participants' perceptions of the tool, which was initially validated with an urban population in the Northeastern United States. Study results should help elucidate the ways in which rurality, environment, and culture influence the delivery of family-centered interventions.

PANEL 12 - Psychology and New Technology: An Examination of the Impact of Technology on Employee Well-Being and Mobile Cognitive Assessment

The Impact of Technological Demands on Employee Well-Being and Performance

By Vanessa Quiroz, *Psychology, Florida International University*

In our current knowledge economy, the use of Information and Communication Technology (ICT) based communications has become increasingly pervasive within and across organizations. By using the Job Demands-Resources (JD-R) model as a lens, this paper examines the impact that technological demands (e-mail overload, interruptions, telepressure) can have on employee productivity and job satisfaction. Specifically, we argue that high technological job demands in the workplace are associated with reduced employee job satisfaction and productivity through the experience of psychological stressors specific to technology (i.e., technostrain). We also hypothesize that job resources, such as technological self-efficacy, voluntariness, and co-worker support can moderate the effects of technostrain on job satisfaction and productivity. No previous research has, to the author's knowledge, linked the everyday work experiences of stress through ICT-Use, e-mail overload and telepressure, as central constructs of job demands. This research contributes to the stress literature by identifying some of the factors that buffer the effects of technological job demands on employee well-being.

The Effect of Item Scrolling Requirements and Item Types on Mobile Cognitive Assessment

By Betsir Zemen, *Psychology, University of Central Florida*

The use of mobile assessment in personnel selection is an increasing trend that offers benefits to both job applicants and organizations, including increased efficiency and convenience of testing. This study of 440 undergraduate participants aims to determine if two specific item characteristics, item scrolling requirement and item type, have a negative impact on mobile cognitive ability test scores. It is predicted that item type will moderate the negative effect of item scrolling on test scores. Results will inform the development of mobile-optimized cognitive ability tests, and future research will examine additional item characteristics that may impact mobile cognitive assessment.

PANEL 13 - Chemical Analysis and Technological Innovation: Practical Applications of Identity Signatures, Semiconductor Fabrication, and Improved Hydrogen Production Techniques

The Enhancement of Human Scent Profiles as Forensic Evidence

By Alice Boone, *Chemistry, Florida International University*

Due to the novelty of human scent research, human scent evidence has been undervalued in the court of law. However, this type of evidence has significant value when physical evidence is not available at crime scenes. In order to demonstrate the individualization and differentiation of human scent evidence, this study aims to further investigate the identification of chemical signatures within the hands and axilla (armpit) of specific ethnicities and genders. During the study, the axilla odor of 60 participants were sampled. Upon collection, samples were extracted using both Headspace Solid Phase Micro extraction (HS-SPME) and Liquid Extraction (LE) and analyzed using Gas Chromatography-Mass Spectrometry (GC-MS). The study showed that using HS-SPME immediately followed by LE successfully extracted semi-volatile and non-volatile compounds, which previously could not be recovered using HS-SPME alone. This work will lead to the study of extracted compounds in an effort to better identify chemical signatures of specific ethnicities and genders.

Stability of Epitaxial Pseudocubic Group IV-V Semiconductors

By David Brown, *Chemical Engineering, University of Florida*

For the scaling of Moore's Law, new materials have to accommodate higher doping for lower contact resistance and higher tensile strain for improved electron mobility. In recent years, highly doped Si:P and Si:As films have been studied for providing high dopant activation and source-drain stressors for FinFET devices. The tensile epitaxial strain is believed to be caused by vacancy stabilized Si3P4 and Si3As4 phases. In this study, the epitaxial stability of these vacancy stabilized Si3P4, Si3As4, Ge3P4, and Ge3As4 phases is studied from first-principles using electronic-structure calculations at the level of density functional theory. The strain study is implemented locking lattices to a Ge and Si substrates. These phases are metastable as "free" bulk, but the epitaxial strain calculations have not been calculated. The pseudocubic phases were not found to be strain stabilized, so these phases cannot be present in these thin films.

1H NMR Characterizations of Hydrogen Generation Catalyst, Spillover, and Participation in Electrochemical Processes

By Alyssa Rose, *Chemistry, Florida State University*

This study focuses on the analysis of inorganic catalysts for hydrogen production, hydrogen spillover phenomenon, and organic cathodes for lithium-ion battery materials using Solid-State NMR. In situ and ex situ solid-state 1H NMR are used to study the role hydrogen plays in each system. Goals include the characterization of side products, cycling stability and the determination of reaction mechanisms and structural changes. Impacts on society and the chemistry field as a whole include a better understanding of the fundamental science involved in these types of reactions, which could lead to safer, cheaper, and more energy-efficient systems.

Research Abstracts

PANEL 14 - Significant Research in Post-Secondary Education

Analysis of the Impact of SB 1720 on Gateway Mathematics Courses

By Frank Conic, *Education, University of Florida*

Although many educators regard underprepared students as the most pressing problem in higher education today (Bailey & Cho, 2011), nationwide there has been increasing opposition to developmental education. One outcome of this mounting opposition in Florida is the passage of Senate Bill 1720 (SB 1720), which was signed into law in July 2013. The law mandates that students who graduate from a Florida public high school in 2007 or later cannot be required by higher education institutions to take placement tests or to enroll in developmental classes, although they can choose to enroll in developmental courses on the advice of their academic advisors. The goal of this study is to measure the impact of SB 1720 on student achievement by examining outcomes of students at a large community college enrolled in the gateway mathematics course (Mat 1033) from 2014 to 2017, who exercised their choice to opt in or opt out.

The TSIC Attainment Gap

By WillieMae (India) White, *Education, University of Florida*

Take Stock in Children (TSIC) is a non-profit organization that seeks to close generational gaps among learners in public schools. Currently, TSIC scholars graduate from high school at a 96% retention rate. However, once in college, this rate drops to 67%. The purpose of the study is to determine the factors that contribute to the attainment gap between TSIC high school scholars and TSIC college scholars. This work will be a mixed case study of quantitative standardized test data and qualitative data from surveys and interviews of students, teachers and administrators. The study examines participants' opinions about factors contributing to academic achievement of TSIC scholars. Participants include TSIC representatives, administrators and educational leaders from two districts. We expect the study to conclude that scholarships and mentors contribute to the academic achievement and college retention of TSIC scholars.

(Re)Presenting Socioscientific Issues (SSI) Curriculum to Address Equity and Social Justice

By Selene Willis, *Education, University of South Florida*

Socioscientific issues (SSI) curriculum aims to produce scientifically functional literate citizens through moral and ethical decision making. However, we argue that ethics pertaining to equity and social justice (SJ) should not be overlooked in the curriculum. Utilizing critical pedagogy, I assess opportunities provided by socioscientific issues (SSI) curricula for students to consider equity in relationship to controversial issues. Findings from content analysis of four empirical articles between 2009 to 2017 reveal equity and SJ are absent despite SSI's emphasis on ethical and moral reasoning. I advance a conceptual framework that promotes students' sociopolitical consciousness for the enactment of social action or activism.

PANEL 15 - Contemporary Advances in Computer Science: An Analysis of Histogram Layer, Cache Performance and Replacement Algorithms

IO Trace Analysis: Applications of Embeddings and Sequence Models to Storage Segment Prediction Towards Improving Caching Performance and Cache Replacement Algorithms

By Pedro Espina, *Computer Science, Florida International University*

The widening gap between CPU speeds and computer memory speeds is referred to as the memory wall. A modern operating system spends most of its time waiting for data to be retrieved from memory. The immediate solution is to have an intermediary memory, a cache memory, that is only a fraction of the size of the main memory but can deliver data to the CPU at faster speeds. This paper explores two important aspects of caches, cache replacement policies and cache prefetching. Recent advances in natural language processing, NLP, have made it possible to translate text corpora between languages by representing words as multi-dimensional vectors in order to learn semantic similarities between them. Empirical comparison based on the simulation of real system traces shows that this approach can be applied to sequences of data requests to improve cache replacement policies and to make predictions about future request sequences based on past ones, allowing for data to be pre-fetched into the cache.

Histogram Layer: A Novel Approach to Feature Engineering

By Joshua Peeples, *Computer Engineering, University of Florida*

Before the popularity of deep learning, feature engineering played a vital role in the fields of Computer Vision and Machine Learning. A few popular examples of engineered features include Histogram of Oriented Gradients (HoG), Local Binary Patterns (LBP), Scale Invariant Feature Transform (SIFT), and edge descriptors such as Canny and Sobel. Many of these engineered features were created through the use of histograms, but the process to select the best bin centers and widths to optimize performance can be difficult and time consuming. Deep learning architectures such as Convolutional Neural Networks (CNNs) have performed well in various applications such as facial recognition, semantic segmentation, object detection and image classification with features learned by the network. In this work, a new histogram layer is proposed to learn optimal “engineered” features and maximize the performance of a deep learning framework. The histogram layer can learn bin centers and widths through the backpropagation of errors. Preliminary results are presented on several datasets.

PANEL 16 - Environmental Engineering: An Examination of Resistant Genes in Greywater, Remediation of Water Pollutants, and the Mechanical Properties of Bamboo

Quantifying Antibiotic Resistant Genes from Bacteria in Greywater from Suburban Israel

By Michelle Henderson, *Environmental Engineering, University of South Florida*

Antibiotic-resistant genes (ARG) from bacteria are raising public health concerns worldwide. ARG are especially problematic because of their ability to be transported in the environment *via* wastewater. Wastewater such as greywater is frequently reused for non-potable activities such as crop irrigation, toilet flushing, and dust suppression. Antibiotic resistance in bacteria occurs naturally in the environment but can be exacerbated by the influence of wastewater with high concentrations of antibiotics. For this research, ARG from bacteria will be quantified and identified in greywater and soil in suburban Israel to determine its impact on the surrounding desert environment. Polymerase chain reaction (PCR) and quantitative polymerase chain reaction (qPCR) will be used to detect and quantify ARG presence.

Remediation of Water Pollutants and Pathogens Within Household Water in Rural South India

By David Perez, *Environmental Engineering, Florida A&M University*

Unsafe drinking water is recognized as a leading factor in diarrheal diseases, which are responsible for about 1.8 to 2.5 million annual child deaths globally, with six hundred thousand deaths in India alone. In a partnership with the Indian Social Service Institute (ISSI) and the FAMU-FAU College of Engineering, a field study was designed to assist in the development of techniques to construct low-cost filtration devices called bio-sand filters (BSFs) for the local rural community. A two-month pilot study was conducted in the Indian state of Tamil Nadu to evaluate the performance of the BSFs under various setups, to investigate long-term removal efficiencies, and to improve filter design. Water analysis did not indicate a growth of a biological layer, meaning the method for assembly of a BSF must be configured for greater efficacy. However, previous research indicates that BSFs, when constructed properly, are effective.

Effect of Bamboo's Mechanical Properties Due to Treatment, Type, Age, Moisture Content & More As Well As Discussion on Bamboo Pestilence and Standards: A Literature Review

By Lorena Sanchez, *Environmental Engineering, University of South Florida*

Bamboo is a highly renewable material used in some countries as a viable building construction material. It is not yet used in the United States, however, since it is not included in building code/safety standards. To develop standards, the mechanical properties of bamboo must be understood and documented. Although some studies have been conducted, most have been published in different languages and have not been aggregated. Here we translate and aggregate previously published information about the mechanical properties of bamboo. As much of the research on bamboo has been done in Asia (English) and Latin America (Portuguese and Spanish), we used a comprehensive search of articles in English, Spanish, and Portuguese and found 43 peer-reviewed publications that examine bamboo by age, species, density, moisture content, post-harvest treatment, and testing standard employed. This information allows us to better understand the material properties of bamboo in order to help develop standards for the use of this resource in the United States and beyond.

PANEL 17 - Cutting Edge Research in Biomedical Science and Biochemistry: A Focus on Human Papilloma Virus, Histone Variant in DNA Repair, Protein and Polymer Designs, and the Effects of Hormones on Neural Representation

Does HPV Inactive in Head and Neck Cancer Influences E6 and E7 Oncoproteins?

By Nella Delva, *Biomedical Sciences, Florida State University*

Human Papilloma Virus (HPV) is one of the most common sexually transmitted infections. Head and Neck Squamous Carcinoma (HNSCC) is the sixth most common cancer worldwide, and about 25% of all HNSCC cases involve tumors positive for HPV DNA. While studying these cancers, researchers have identified a gene expression signature of HPV-inactive tumors that is an "intermediate" between HPV-active cancers, which are positive for viral DNA, and HPV-negative cancers, where viral DNA is not present. Our hypothesis is that HPV-inactive tumors may have risen from HPV-active tumors, but have undergone genetic and/or molecular changes leading them to acquire their inactive status. This study focuses on the molecular characteristics of HPV-inactive tumors. Results will allow us to determine which mutations are associated with the HPV-inactive group, in comparison with HPV-active and HPV-negative cancers, which could lead to a complete revision of the role of HPV and the potential preventive value of HPV vaccines at other cancer sites.

Role of Histone Variant H3.3 in DNA Repair

By Ernest Phillips, *Biomedical Sciences, Florida State University*

DNA is packaged primarily with the help of canonical histone proteins H2A, H2B, H3 and H4 to form chromatin which in turn regulates access to the genetic information contained in the DNA. Chromatin structure is further modified by the incorporation of variant histones that differ slightly in sequence from the canonical histones and can have unique functions. Specific point mutations (K27M, K36M and G34R/W/V/L) in histone H3.3, a variant of canonical histone H3, have been shown to drive specific types of cancers, including lethal childhood glioblastomas. How these H3.3 mutations drive cancer is not fully understood. Since defects in DNA repair are intimately associated with cancer formation, a role for H3.3 in DNA repair needs to be investigated. Our objective is to determine the potential role of histone H3.3 in DNA repair. We hypothesize that histone H3.3 is recruited to DNA damage sites where it plays a crucial role in generating chromatin accessible to DNA repair factors.

PANEL 17 - Cutting Edge Research in Biomedical Science and Biochemistry: A Focus on Human Papilloma Virus, Histone Variant in DNA Repair, Protein and Polymer Designs, and the Effects of Hormones on Neural Representation

Gender Differences and Effects of Hormones on the Neural Representation of Anxiety in Rats

By Kristin Schoepfer, *Biochemistry, Florida State University*

Anxiety is an adaptive response to potential threat, and inappropriate overrepresentation of this response characterizes anxiety disorders. Women are ~60% likelier than men to be diagnosed with an anxiety disorder, yet possible neural correlates remain underexplored. To examine this phenomenon, we surgically implanted extracellular recording electrodes into four emotion-related brain regions of adult (8 weeks) male (n=3) and female (n=4) Sprague-Dawley rats and recorded their local field potentials during free exploration of neutral and anxiety-provoking environments. Using time-frequency analysis methods, we found few gender differences in neural connectivity while animals were in a neutral environment. However, in females, periods of high estradiol concentration selectively enhanced theta-band (4-12Hz) power correlations between brain regions. Exposure to the anxiety-provoking Elevated Plus Maze enhanced theta-band phase locking in selective regional connections, and this measure of connectivity was again enhanced for females in high-estradiol states. These preliminary findings suggest that estradiol may bias the female rodent brain to appraise the external environment in a threat-avoidant manner.

Incorporating a Functional Mutation Into a Symmetric Scaffold as Proxy for Functional Adaptation *via* Rearrangement of Its Folding Nucleus

By Connie Tenorio, *Biochemistry, Florida State University*

Proteins are remarkable biopolymers comprised of connected building blocks called amino acids, of which 20 common types are found. These blocks (residues) form chains and coalesce to form a folded structure known as a protein. Thus, for a protein that is 150 amino acids in length, there are 15,020 possible combinations. Of this staggering number, evolution has only sampled a few of the potential possibilities. The sequence in which amino acids are arranged determines the three dimensional shape proteins take. Understanding how the structural and functional properties that can arise in the folding triggered by this sequence is the main objective of protein design. This research focuses on traversing the world of de novo protein design by using the underlying axioms of physics that rule the molecular world of protein folding and stability. Thus far we have achieved the generation of a super stable scaffold that tolerates the energetic penalties incurred throughout the design process.

PANEL 18 - Ecology and Biological Sciences: An Examination of Environmental Policy and Efforts to Preserve the Florida Manatee and African Elephants

Habitat and Phorophyte Comparisons of the Mule-Ear Orchid, *Trichocentrum Undulatum* Between the Core and Edge Distribution: A Cuba and Southern Florida Story

By Haydee Borrero, *Ecology, Florida International University*

The Florida state-listed endangered mule-ear orchid, *Trichocentrum undulatum*, is an epiphytic orchid that is endemic to the Caribbean region. Southern Florida is the northern limit of the species distribution, with only one surviving population, in a habitat threatened by sea level rise due to its coastal proximity. We studied the species' ecology in neighboring Cuba and compared it to that in South Florida. We found a high density of T. *undulatum* throughout Cuba in various habitats, and we documented over 84 phorophyte species. With the continuing threats of habitat loss due to sea-level rise and detrimental plant-animal interactions, the future of the mule-ear orchid population found in the coastal regions of Florida is grim. It may be wise to implement reintroductions and artificially diversify the orchid's phorophyte hosts in South Florida. The knowledge gained by comparisons between core and edge distributions for the species may aid in future restoration and conservation activities by providing baseline information.

Simulation Modeling of African Elephant Movement

By Stephanie Diaz, *Ecology, University of Miami*

Understanding the spatiotemporal dynamics of elephant movement is critical for effective conservation of elephant populations. This study developed an individual-based model (IBM) to simulate elephant movement in Chobe National Park (CNP). Once validated, the model will be used to predict how elephant space use will be impacted by both anthropogenic changes (e.g. artificial water sources) to the landscape and potential changes associated with global climate change. The main features of the model are known external and internal drivers of elephant movement (including the temperature the elephant perceives and the time since the elephant last visited a water source). The movement of elephants within the model's environment thus results from the simulated elephants interacting with landscape attributes. To gauge the model's power and robustness, movement characteristics were derived from empirical data and compared with model outputs. These comparisons indicate that the model is relatively successful at reproducing elephant movement characteristics.

Mechanical Behavior of Vertebral Trabecular Bone Varies Regionally and Ontogenetically in the Florida Manatee (Trichechus Manatus Latirostris)

By Danielle Ingle, *Biological Sciences, Florida Atlantic University*

Trabecular bone forms a porous architecture that changes in vivo to support mechanical demands on the body and can reflect the degree of an animal's species-specific precociality; skeletons must be stronger and stiffer in animals that are mobile soon after birth. Previous studies have shown that aquatic mammals have vertebral microarchitecture that differ from their terrestrial counterparts. Here, we investigated the following in a precocial obligate swimmer: (1) mechanical property variation among regions of the vertebral column and ontogenetic development and (2) relationships between vertebral process lengths and bone properties. We investigated bone behavior in the Florida manatee (Trichechus manatus latirostris) at various regions along the vertebral column. Vertebrae were machined into three orientations for compressive tests, and stiffness, yield strength, and toughness were calculated. We found significant variation among column regions and age groups. Transverse process lengths had moderate positive correlations with bone mechanical properties, potentially providing greater surface area for muscle attachment and increasing force production on vertebrae.

PANEL 19 - Innovations in Pharmaceutical Sciences: Improving Treatments for Acute Myeloid Leukemia and Sickle Cell Diseases

Preliminary LASSO Regression Analysis Identifies DNA-Damage Gene Expression Signature Predictive of Clinical Outcomes in Patients Using Gemtuzumab Ozogamicin

By Mohammed Gbadomosi, *Pharmaceutical Sciences, University of Florida*

Acute myeloid leukemia (AML) is a complex heterogeneous disease characterized by a variety of genomic abnormalities. As a result of the heterogeneous nature, clinical outcomes surrounding AML remain abysmal, however, many efforts using personalized treatment approaches are currently underway, inspiring new hope. Among the premier treatment options are immunoconjugates such as gemtuzumab ozogamicin (GO), the first FDA-approved antibody-drug conjugate (ADC) for treating AML. Despite the targeted mechanism through GO-CD33 internalization and the potent apoptotic capabilities of covalently linked calicheamicin, GO is still subjected to interpatient variability in treatment response. In fact, initial approaches to improve GO therapy have all revealed key elements, such as dosing regimen, expression levels of CD33, and CD33 SNPs, governing response to GO.

Evaluating the Prevalence and Factors Associated with Hospital Readmissions in Patients with Sickle Cell Disease: A Review of Literature

By Motomori Lewis, *Pharmaceutical Sciences, University of Florida*

Since the 2012 Center for Medicare and Medicaid Services mandate to reduce hospital readmissions, readmission rates have been used as a quality of care metric to determine hospital reimbursements. In patients with sickle cell disease (SCD), healthcare utilization is extremely high, and hospital readmission rates consistently exceed national averages for more pervasive conditions. This literature review evaluated the prevalence and factors associated with hospital readmissions for patients with SCD in articles published from 2000 to 2018. Seventeen studies assessing both children and adults with SCD were selected from six databases including PubMed, Web of Science, and CINAHL. Rates of readmission within 30 days of discharge ranged from 16.7% to 40.0%. Key factors associated with readmissions include age in early adulthood, record of outpatient follow-up appointments, low opioid prescription dosage upon discharge, and insurance provider. There is a consensus that factors leading to SCD readmissions are multifactorial and further evidence is needed to improve readmission outcomes for this high-risk population.

PANEL 20 - Current Topics in Urban Planning, Public Affairs and Foreign Policy

Conceptualizing Action Early in the Collaborative Process: Driving Forces that Build Capacity for Collaboration Implementation

By Shanice Jones, *Urban Planning/Public Administration, Florida State University*

Over the last several decades, collaborative governance has grown in popularity and practice within the environmental and natural resource management fields. However, managing resources and carrying out plans generated in the collaborative process to achieve an agreed upon mission is difficult because of a number of barriers. The challenges around implementing the collaborative process into public land managers' work, action, and decisions are magnified at the landscape scale, particularly as authority and accountability overlap private land owners and public management. This research study explores how collaborative groups can navigate these tensions and support management across multiple ownership and management boundaries. The study will use a single case study, the Landscape Conservation Cooperative Network (LCC), to capture a more nuanced understanding of how and to what extent the collaborative process influences desired environmental outcomes. The study seeks to understand how landscape scale collaboration coordinates multiple governing jurisdictions to address challenges across boundaries.

Strengthens from Within: A Qualitative Study Examining Key Factors Which Strengthen African American Families

By Rachael Mack, *Public Affairs, University of Central Florida*

Research indicates that African American and low-income families increasingly experience disadvantages that affect them economically, educationally, socially, behaviorally and emotionally. Although existing literature highlights assets and protective factors within these families, research is limited in defining intrinsic strengths that aid in their resilience and ability to withstand common stressors in the face of concentrated disadvantage. Through the use of community-based participatory research methodology, this study utilized a convenience sample of African American and low-income parents (N=33) to conduct focus groups exploring their perspectives of existing internal and external factors that strengthen their families. Five themes and their accompanying sub-categories were identified: reciprocal communication (i.e., respect); intentional time (i.e., unity and support); solid foundations (i.e., structure, church, and expectations); planting a seed (i.e., support, extracurricular activities, and exposure); and "it takes a village" (i.e., support, community, and mentoring). Findings from this study suggest that low-income and African American families have an array of strengths moderated by external factors.

Domestic Constraints of American Foreign Policy: The Cases of Rwanda and Haiti

By Camara Silver, *Political Science, University of South Florida*

This study examines the constraints that shaped the Clinton administration's foreign policy decisions during two humanitarian crises in 1994: the genocide in Rwanda and the military Junta's removal of President Jean Aristide in Haiti. Specifically, we examine the reluctance exhibited by the United States to intervene in the Rwandan genocide as well as the domestic considerations that went into Clinton's decision to support United Nations Security Council Resolution 940, which authorized the United States to lead a peacekeeping operation to restore Jean Aristide as president of Haiti. These two case studies demonstrate the Clinton administration's foreign policy concerns involving humanitarian crises. Certain domestic factors, such as the public's outrage after 18 army rangers were killed in Somalia during a peacekeeping mission, as well as media attention, constrained the Clinton administration from sending out similar future missions, focusing only on strategic humanitarian cases.

PANEL 21 - Chronic Issues in the Health Sciences: New Strategies for Heart Failure and HIV Patients

A Circle of Gratitude: Testing a Model of Gratitude, Self-Efficacy, and Medication Adherence in Heart Failure Patients

By Lakeshia Cousin, *Health Sciences/Nursing, University of South Florida*

Although consistent self-care slows the progression of heart failure (HF) for the nearly 6.5 million Americans currently living with this disease, little is known about the actual relationships among gratitude, self-efficacy, and medication adherence in HF. A structural equation model was used to examine this association. Patient mean age was 66 years (SD = 11), 95% were male, 79% White, 12% Black, and 6% Asian. Gratitude exerted an indirect effect on medication adherence through self-efficacy ($b = 0.16$; $p < 0.05$): gratitude was positively related to self-efficacy ($b = 0.50$; $p < 0.05$), and self-efficacy was positively related to medication adherence ($b = 0.31$; $p < 0.05$). In addition, the model fit was acceptable (CFI = 0.92, TLI = 0.90, RMSEA = 0.08). This study provides evidence that self-efficacy was a mechanism through which gratitude was associated with medication adherence in HF patients, suggesting a way to advance self-care. Future work will examine whether a gratitude intervention results in improved self-care.

The Individual, Interactive, and Syndemic Effect of Substance Use, Depression, Education, and Ethnicity on Retention in HIV Care

By Kristopher Myers, *Public Health, Florida International University*

There are currently no studies assessing the individual, syndemic, and interactive associations of individual-level factors with retention in HIV care. The study assessed the effect of retention among 407 HIV positive persons from the Miami Adult Study on HIV/AIDS (MASH) cohort. Researchers conducted a logistic regression to determine the significance of all variables, conducted a backward regression, controlling for all main effects and eliminating all interactions with p-values>0.10; and assessed the syndemic associations of retention. They found that “Non-Hispanic Black,” “Black-Hispanic” and “Other” ethnic identities were associated with retention. Researchers also determined that the interaction between depression and alcoholism and the interaction between age and male gender were negatively associated with retention. Accordingly, African Americans, depressed persons prone to alcoholism, and older males may require improved efforts from clinicians to maintain retention in HIV care.

PANEL 22 - Frontiers in Geosciences: Land Conservation, Organic Matter Sequestration, and Sinkhole Prediction

Understanding Agricultural-Land Conservation from the Perspective of Landowners in Franklin County, Massachusetts

By Dr. Rocio Lalanda, *Geosciences, University of South Florida*

What motivates landowners to use conservation easements for the protection of their land against future development? While conservation easements have become a popular strategy for land conservation in the United States, a growing body of literature is examining how and why landowners decide to participate in conservation easements. This research project seeks to expand knowledge about this issue in environmental, geographical and rural land development literatures through a qualitative fieldwork study of landowners associated with the Franklin Land Trust, a nonprofit conservation organization in western Massachusetts. More specifically, the study examines the key features that shape landowners' decisions to grant conservation easements for agricultural land, and the benefits and drawbacks of these legal tools as perceived by the actual landowners involved. Overall, this study seeks to contribute to land conservation studies through an analysis of individual motivations and experiences that shape the decisions of agricultural-land owners to grant conservation easements.

Controls on Organic Matter Sequestration During Cretaceous Oceanic Anoxic Event 2 in the Western North Atlantic

By Vanessa Londono, *Geosciences, Florida International University*

Cretaceous Oceanic Anoxic Events (OAEs) are intervals of the past in which perturbations in the carbon cycle resulted in the increased global deposition of organic matter (OM), anoxia, and extinctions. The most prominent and widespread is OAE 2 (~94 million years ago) which was possibly triggered by long-term changes in atmospheric CO2 from intense volcanic activity. The mechanisms that promoted the widespread accumulation of OM during OAE 2 are not clearly defined but focus on the relative roles of paleoproductivity and preservation. I will test the hypothesis that increased paleoproductivity led to the deposition of the OM-rich sediments at my site in the North Atlantic using these paleoproductivity proxies: benthic foraminifera, stable isotopes of carbon and nitrogen, total organic carbon (TOC), total inorganic carbon (TIC), major and trace elements, and biomarkers. Ultimately, determining the cause of enhanced burial at this site will provide further insight into the long-term response of the carbon cycle to increased CO2 and enhanced greenhouse conditions.

A Correlation of Interferometric Synthetic Aperture Radar (InSAR)-Derived Subsidence Velocities With Ground-Based Estimates of Sinkhole Activity, West-Central Florida, USA

By Tonian Robinson, *Geosciences, University of South Florida*

Sinkholes are one of the leading natural disasters in West Florida; therefore, precursory detection is crucial to alleviate the risks of property damage. Detection of surface subsidence caused by sinkholes is possible using Interferometric Synthetic Aperture Radar (InSAR). We hypothesize that the degree of subsidence will correlate with both the raveling index (RI) and sinkhole resistance ratio (SRR) of the location, where the higher the RI and lower SRR, the faster the subsidence velocity. The RI is a measure of the lengths of zones of low standard penetration test (SPT) blow count N-values. Low N-values are indicators of loose soil or voids and may be associated with past or present sinkhole activity. The SRR is an advancement of the RI, in that, it includes both RI values and soil strength parameters from cone penetrations tests (CPT). This hypothesis will be tested by statistically analyzing the correlation of local RI's and SRR's to nearby InSAR-derived velocities.

PANEL 23 - Significant Discoveries in Materials Science and Electrical and Mechanical Engineering

Enabling Technobiology with Magnetoelectric Nanoparticles

By Krystine Pimentel, *Electrical Engineering, Florida International University*

Current patient care lacks highly localized therapies with adequate treatment specificity to substantially reduce or entirely eliminate side effects. The low specificity is the main stumbling block in the development of cancer therapeutics. Independently, neurodegenerative diseases (Parkinson's disease, Epilepsy, Alzheimer's disease, and many others) have treatment strategies that require macroscale brain stimulation using invasive direct-contact electrodes. However, to date, there is no treatment that can provide such highly localized electric stimulation in any region of the brain on demand, non-invasively. To address these important shortcomings, this research engineers magnetoelectric nanoparticle (MENs) based systems for personalized patient care. Unlike any other nanoparticles known to date, MENs have a non-zero magnetoelectric (ME) effect that is capable of wirelessly controlling electric fields at the sub-cellular level. As a result, MENs enable a new dimension to wirelessly control intrinsic biological mechanisms for unprecedented treatment and diagnostic capabilities. This prominent technique of molecular-level control of biological processes wirelessly is afforded by an approach called technobiology.

Corrosion Mechanisms of External Coatings on Aluminum Alloys Using Atmospheric and Accelerated Corrosion Test Methods for Service Life Prediction

By Michelle Pierre, *Materials Science and Engineering, Florida International University*

Aluminum plays a major role in material components for military, commercial aircraft, and spaceflight engineering. Improving the performance of aluminum against corrosion is significant to NASA's space operation missions. Coatings performance are qualified at NASA Kennedy Space Center's (KSC) beachside atmospheric corrosion site for 18 months and 5 year final qualification. Accelerated corrosion tests in the field and laboratory increase the severity of degradation in materials to ascertain material performance. However, an accelerated method as a tool for predicting long-term service is not universally accepted. There is a need for a protocol that can correlate corrosion products from accelerated testbeds to the timescale of NASA KSC. Alternating seawater spray system (ASST) is a new accelerated method that involves a cyclic wet-dry spraying of seawater directly onto coated samples while they are simultaneously exposed to natural atmospheric conditions. This research will correlate the corrosion mechanisms and pore size/concentration of coated aluminum alloy exposed to ASST to NASA KSC's marine test site.

Characterization and Modeling of Glass/Epoxy Composites: Scale-Up Effects on the Fiber/Matrix Interface

By Raul Vidal, *Mechanical Engineering, Florida Atlantic University*

Composite materials (such as glass/epoxy) are cheaper/easier to manufacture than traditional materials for electrical, mechanical and marine applications. Before use, we need to model expected behavior to validate functionality, and models vary by type of polymer, fibers and orientation. Extensive testing has been done for composites containing a fiber content (volume fraction) of 30 percent or more, but no one has been able to study lower fiber volume fractions, as traditional manufacturing does not allow enough control. To place fibers at controlled distances, a more novel approach to manufacturing is necessary. We have found that semiconductor fabrication techniques can control the placement of fiber and thus we used photolithographic techniques to create microchannel guides for fiber placement. We have created a successful proof-of-concept using 3D printing (additive manufacturing) and are about to gather data to build new models of composite behavior.

PANEL 24 - Innovations in Electrical Engineering: In-Stream Hydrokinetic Energy and Battery Life Cycle

FAST-Based In-Stream Hydrokinetic Generation System Modeling for MCM and PHM

By Brittny Freeman, *Electrical Engineering, Florida Atlantic University*

In-stream hydrokinetic electricity production, that is, electricity production from moving currents without the use of dams, has a technically feasible average U.S. electricity production output estimated at 14 gigawatts from rivers, 50 gigawatts from tides, and 19 gigawatts from ocean currents. This combined power potential is equivalent to 17% of the total 2011 U.S. power production. For both environmental and economic reasons, research and development is currently underway related to efficiently harnessing these renewable resources and reducing the levelized cost of energy (LCOE). Towards this goal, we have developed an intelligent and online Machine Condition Monitoring (MCM) and Prognostic Health Monitoring (PHM) simulation platform based on the National Renewable Energy Laboratory's (NREL) Fatigue, Aerodynamics, Structures, and Turbulence (FAST) simulation suite. FAST is a design tool that dynamically simulates wind turbines; however, we have re-parameterized it to produce simulations more representative of a 20-kW in-stream hydrokinetic turbine housed within a holistic Matlab/Simulink platform for incipient fault detection and prognosis schemes.

Life Cycle Prediction of Sealed Lead Acid Batteries Based on a Weibull Model

By Yemeserach Mekonnen, *Electrical Engineering, University of South Florida*

Sealed Lead Acid (SLA) batteries are used as backup batteries in Access Points (APs) and Relays in smart power grids, which are critical in routing energy metering data to utility companies. Reliability of backup batteries is crucial in order for the AP to carry out continuous and dependable data transmission during power outages. However, utilities do not know how long these batteries can remain functional. To estimate their life cycle, we collected experimental data on new batteries undergoing cyclic tests with a discharging and charging profile similar to the AP field operational conditions. Failure data was then modeled to extrapolate reliability parameters. The Mean Time to Failure (MTTF) under 100% depth of discharge is 74 cycles and 2 years under 37°C temperature. Results from this study are already being used to improve system reliability and maintenance in smart grid infrastructure. Furthermore, the methods developed in this work can now be used to predict the life cycle of other types of batteries.