

15<sup>th</sup> Annual  
Undergraduate Student  
Symposium

Undergraduate  
Student  
Symposium



Friday, April 8, 2016

Alvin Sherman Library, Research, and Information Technology Center



NOVA SOUTHEASTERN  
UNIVERSITY

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**Farquhar Honors College**

## **Undergraduate Student Symposium 2016**

The Undergraduate Student Symposium, sponsored by the Farquhar Honors College, presents student projects through presentations, papers, films, and poster displays. The event serves as a “showcase” demonstrating the outstanding scholarship of undergraduate students at NSU. The symposium is open to undergraduate students from all disciplines. Projects cover areas of student scholarship ranging from the experimental and the applied to the computational, theoretical, artistic, and literary. They are taken from class assignments and independent projects. Project presentations can represent any stage in a concept’s evolution, from proposal and literature review to fully completed and realized scholarly work. As in past symposia, the definition of scholarship will be sufficiently broad to include work presented in the biological and physical sciences, the social and behavioral sciences, computer science and engineering, mathematics, arts and humanities, nursing and health care, education, and business. This is the fifteenth annual Undergraduate Student Symposium.

### **USS 2016 Keynote Speaker**

Robert C. Speth, Ph.D., professor of Pharmaceutical Sciences in the College of Pharmacy, has taught at Nova Southeastern University for nearly seven years since retiring from the University of Mississippi where he was Chair of the Pharmacology Department in the School of Pharmacy. After obtaining his Ph.D. in the Neuropsychopharmacology program at Vanderbilt University in 1976 he served a post-doctoral appointment in the laboratory of Dr. Henry “Hank” Yamamura. Speth praises Yamamura as a life-changing influence on his life and credits him for the successes he has obtained in his career. Aside from Speth’s dedication to the betterment of human and animal health through biomedical research, his greatest goal is to provide training to students he encounters commensurate with that which he received from Yamamura. To his pleasant surprise, Speth discovered that his students offer him even more than he has offered them - more than thirty of his peer-reviewed publications have been coauthored by undergraduate students, including seven papers coauthored by undergraduate students from Nova Southeastern University.

### **USS 2016 Steering Committee**

Christopher Blonar, Ph.D.; Steven Hecht, Ph.D.; Jose Ramos, Ph.D.; Jaime Tartar, Ph.D.; Kathleen Waites, Ph.D.; Vanessa Mezquia, Don Rosenblum, Ph.D.

**15<sup>th</sup> Annual  
Undergraduate Student Symposium**

**April 8, 2016**

**Abstract Proceedings**

**Farquhar Honors College  
Nova Southeastern University**

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## **A Novel Approach to Gait Retraining in Competitive Runners**

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### **Abstract**

Running is a popular fitness activity with health benefits. However, running related injuries are common and reoccurring. These injuries are linked to faulty biomechanics such as excessive hip adduction (HADD), hip internal rotation (HIR), knee valgus (KVAL), and contralateral pelvis drop (CPD). Therapists attempt to retrain gait using biofeedback and muscle strengthening with mixed results. Functional movement pattern (FMP) training is a novel intervention that corrects underlying FMPs (stepping, squatting). The purpose of this study was to evaluate the effectiveness of a 6-week FMP corrective program to retrain running gait. We used paired t-tests to evaluate changes in peak motion in degrees for HADD, HIR, KVAL, and CPD; and total Functional Movement Screen (FMS) scores out of 21. 26 volunteers who ran  $\geq 20$  miles per week were screened using the FMS; those scoring  $\leq 14/21$  or having left/right asymmetries qualified for the study. 12 healthy runners ( $26.4 \pm 9.6$  yrs,  $1.75 \pm 0.78$  m,  $64.2 \pm 9.8$  kg) underwent 3D motion analysis of running biomechanics and received a 6-week supervised corrective exercise program based on their FMS results. Participants were post-tested on FMS and 3D motion analysis. Significant improvements were shown in FMS scores (pre  $13 \pm 1.2$  vs post  $16 \pm 1.2$ ,  $p < .001$ ) and KVAL (pre  $17.5^\circ \pm 8.7^\circ$  vs post  $8.8^\circ \pm 9.3^\circ$ ,  $p = .05$ ). Although not statistically significant, HIR improved by  $9.4^\circ$ ,  $p = .08$ . There were no significant changes in HADD or CPD,  $p > .05$ . Results show that correcting underlying FMPs shows promise to retrain gait in runners.

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## A Novel Method To Screen Drugs That Target Bacterial Type III Secretion Systems

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### Abstract

Antibiotic resistant strains of bacteria pose a global health threat. Several pathogenic bacteria utilize a type III secretion system (T3SS) to infect their host. T3SSs are needle-like appendages on the bacteria, used to inject the host cell with toxins, which disrupts the cell's defense. Hence, the T3SS would be a good target for new antibiotic drugs. The goal of this study was to develop a novel method to screen for compounds that inhibit bacterial T3SSs. *Yersinia pestis* uses a T3SS to cause the bubonic plague and was utilized as the test organism. A disk diffusion assay on Magnesium Oxalate Agar (MOX) was developed to detect inhibitors of T3S. In *Yersinia* species, low levels of  $\text{Ca}^{2+}$  trigger T3S, which simultaneously restricts bacterial growth at 37°C. Therefore, bacteria will grow in smaller, white colonies, which indicate that they are secreting the toxins. In contrast, inhibition of T3S will be indicated by growth of larger, white colonies around the inoculated disk. Disks inoculated with 25µL of dipropionate, a known *Y. pestis* T3S inhibitor, with concentrations ranging from 0.3µm to 80µm and 25µL water were placed onto MOX agar plates containing 100-200 bacteria and incubated for 48h at 37°C. Cytotoxicity was observed at higher concentrations of dipropionate. However, inhibition of T3S was detected by growth of larger, white colonies around the disks with lower concentrations of dipropionate. Therefore, this method is a simple and inexpensive way to screen for possible compounds that may inhibit T3S secretion.

## **Above the Skyline**

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College of Arts, Humanities, and Social Sciences

Faculty Sponsor: **Cathleen Dean**

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College of Psychology

### **Abstract**

“Above the Skyline” is a short down-and-dirty rock-and-roll documentary about an independent rock band. The film details the band’s struggles to get through the music industry, from dealing with crooked film producers and music producers to the fight for gigs. The film is directed by Ricardo Lugo. Other crew members include Lauren McGarrett, Jordan McGarrett, and Steven McGarrett.

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## **Adenosine Deaminase Associates with Self-Reported State Anxiety and Evening Melatonin Levels**

**Franklin Hiffernan**

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Halmos College of Natural Sciences and Oceanography

Faculty Sponsor: **Dr. Jaime L. Tartar**  
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College of Psychology

### **Abstract**

Increased adenosine levels throughout the day promote sleepiness; this chemical is broken down by the enzyme adenosine deaminase (ADA). A single nucleotide polymorphism (SNP) in the ADA gene (rs73598374) has been shown to affect sleep regulation. This ADA SNP substitutes a G allele with an A allele, thus reducing ADA enzymatic activity and resulting in higher adenosine levels. Consistent with the idea that adenosine promotes sleepiness, carriers of the A allele show elevated sleep pressure and increased EEG measures of deep (delta) sleep. Aside from these findings, the extent to which lower ADA enzymatic activity is associated with the homeostatic sleep factor, melatonin, is uncertain. This association is a distinct possibility, however, because adenosine has been shown to increase melatonin production in rat pineal glands. In order to test this possibility, we examined the extent to which the ADA polymorphism is associated with evening melatonin levels, along with several measures of self-reported sleep and mood behaviors. Our findings support the idea that adenosine can enhance melatonin levels. Relative to the GG group (Mean= 19.80, SD =8.61), the AG group (Mean= 27.27, SD = 16.63) had significantly increased melatonin levels,  $F(1, 83) = 7.27$   $p=0.008$ . However, differences in self-reported sleep behavior between the GG group and the AG group were not significant. Interestingly, however, AG carriers reported significantly higher state anxiety ( $p=0.046$ ) with a trend for increased trait anxiety and moodiness. These findings advanced our understanding of the biochemistry of sleep and uncovered a relationship between ADA gene expression and anxiety.

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## **Analyzing South Florida's Waterways for Lead Contamination**

**Megan Bruce**

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Halmos College of Natural Sciences and Oceanography

Faculty Sponsor: **Dr. Maria Ballester**

Department of Chemistry and Physics  
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### **Abstract**

Periodic testing and analysis for lead contamination in surface waters is important to better prevent tragedies like the one currently happening in Flint, Michigan. For this project, water samples will be taken from various locations in South Florida, and the locations will be recorded using GPS coordinates listed as degrees, minutes, and seconds. The samples will then be analyzed for lead concentration using an Atomic Absorption Flame Spectrometer; the values will be recorded in ppm. Finally, the concentrations of lead from environments that have little to no development will be compared to that of urban and rural locations. This type of comparison can be used to assess the safety of future water sources by determining areas with higher lead concentrations and by quantifying the effect of humans on the different types of environments.

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## **Assessing Migration Ability and Behavior of Small Fish in the Everglades**

### **Chelsea Jeffers**

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### **Abstract**

Small fish are important to the Everglades as a food source for wading birds. Fish migrate to and from wetlands that dry annually, where predation is greatest. It is unclear what factors induce this migration. Our goals are to understand what influences migration, including the fishes' personality and parasite infection. Our hypotheses test whether personality and parasite load differ among species, by region, or between the dry and wet seasons. We sampled the fish communities at sites that dry annually and sites that do not to identify relative abundances. The most abundant fishes were brought to the lab. We filmed them in artificial habitats to quantify behaviors related to migration and exploration. Fish were dissected to identify parasites. Some parasites may lower fitness, reducing migratory ability. Others alter behavior increasing vulnerability to predators.

Mosquitofish were dominant at all sites, followed by Bluefin killifish. Golden topminnows were more abundant in the flooded sites. Sailfin mollies were more abundant in sites that dry. Mosquitofish were the boldest and most likely to migrate. Golden topminnows were less bold and less willing to explore. This explains their low abundance in sites that dry. When water levels fell, Sailfin mollies explored more, increasing likelihood of escaping dry-downs. The majority of fish were parasitized, some heavily. Some of the parasites were from groups known to modify host behavior. Our results support our hypotheses that behaviors vary among species, regions and seasons. This data can assist in Everglades restoration and support species of interest, like wading birds.

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## **Bacterial Analysis of Skin Flora on Hands Throughout the Day**

**Leonor Sarria**

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Halmos College of Natural Sciences and Oceanography

Faculty Sponsor: **Dr. Julie Torruellas Garcia**

Department of Biological Sciences  
Halmos College of Natural Sciences and Oceanography

### **Abstract**

This project was part of an investigative report for Al Rojo Vivo's "Amenaza Escondida" ("Hidden Threats") on Telemundo. The television network's team followed an individual as he carried on his daily activities. A sterile swab was used to test the objects being touched by the individual, as well as the individual's hands after touching that object. The samples were placed on a nutrient agar plate and brought to us for incubation at 37 °C overnight. The goal of this study was to identify the bacterial changes on the hands of an individual as he goes about his daily activities. A few bacteria from each nutrient agar plate were picked for analysis, based on their colony morphology. The bacteria that were chosen for the experiment were grown in patches on nutrient agar plates, Mannitol Salt Agar (MSA) plates (to detect *Staphylococcus aureus*) and Eosin Methylene Blue Agar (EMB) plates (to detect *E. coli*). Colony PCR was used to amplify the 16s rDNA for sequencing. To ensure that the DNA segment was replicated, gel electrophoresis was performed. The DNA was sent to Genewiz for sequencing. Sequences were input into BLAST to compare them to previously identified bacteria. A variety of bacteria like *Bacillus cereus* (from soil), *S. aureus* (normal flora of the skin/nose) and *E. coli* (fecal matter) were identified on the hands, which were not initially present. This shows that these bacteria were acquired as the individual came into contact with more objects. The segment aired on 11/25/15.



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## **Biosorption of Metal Ions by *Neochloris Minuta* and *Neochloris Alveolaris* Alga Grown in Regular and Nitrogen Depleted Media**

**Sara Rodriguez**

Department of Chemistry and Physics  
Department of Biological Sciences  
Halmos College of Natural Sciences and Oceanography

Faculty Sponsor: **Dr. Dimitrios Giarikos**

Department of Chemistry and Physics  
Halmos College of Natural Sciences and Oceanography

### **Abstract**

Heavy metals are the most hazardous pollutants present in industrial and domestic waste water. The conventional methods for metal ions removal from wastewater are limited by technical and economical barriers, especially when concentration of metals in the wastewater is low (<100 ppm). Therefore the search and development of efficient and low-cost metal removal processes is of great importance. In this research project, two strains of algae *Neochloris minuta* and *Neochloris alveolaris* were grown in two different growth media: one with high nitrogen content (+N) and the other which was completely nitrogen depleted (-N). Nitrogen depletion increases the algal lipid content whereas a +N media would allow for the algae to synthesize more proteins. The dried algae strains were then mixed for 1 hour with metal solutions and examined for their biosorption abilities in the uptake of lead, nickel, chromium, copper, cadmium, and cobalt from aqueous solutions. A wide range of adsorption capacities between the strains, the conditions, and the metals were observed using Atomic Absorption Spectroscopy.

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## **Blood Flow Modeling in the Human Carotid Artery Bifurcation**

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Halmos College of Natural Sciences and Oceanography

Faculty Sponsor: **Dr. Iuliana Stanculescu**

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Halmos College of Natural Sciences and Oceanography

### **Abstract**

This study focuses on the behavior of the blood flow in the human carotid artery bifurcation, such as blood velocity and pressure. This provides a deeper insight into how blood flow impacts the development of the common arterial disease, atherosclerosis. The blood flow is modeled by the continuity and Navier-Stokes equations. With the assumption that blood is Newtonian fluid, the Carreau model is applied. The commercial computational fluid dynamic code called FLUENT performs the simulations in this study. The arterial bifurcation geometries are examined and analyzed in both two-dimensional and three-dimensional systems. Finally, the comparison between the dimensions is expected to give compatible results in both velocity and pressure profiles.

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## **Bromelain Induces Osteogenic Differentiation in Human Gingiva Derived Stem Cells**

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**Sheena Jain**

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Faculty Sponsor: **Dr. Umadevi Kandalam**

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College of Dental Medicine

### **Abstract**

**Objective:** The aim of this study was to investigate the effect of bromelain on osteogenic differentiation of human gingiva derived mesenchymal stem cells (HGMSCs). **Background:** HGMSCs are highly proliferative with the ability to differentiate into osteogenic precursor cells. While dexamethasone is a traditional inducer of osteogenic differentiation, many antioxidants play a vital role in enhancing osteogenic differentiation and offer a potential alternative to dexamethasone. Bromelain, an antioxidant derived from pineapple extract is an antioxidant and anti-inflammatory agent. Studies have shown that bromelain inhibits adipogenic differentiation. **Methodology:** Cryopreserved HGMSCs were used for the study. The cells obtained from passage 4 were used for the study. The cells were treated with various concentrations (1, 2.5 and 5  $\mu\text{g/ml}$ ) of bromelain. Cells treated with dexamethasone was used as control. Two weeks after post induction, osteopontin (which is a osteogenic marker protein) expression was investigated. **Results:** The western blotting results demonstrated 50% upregulation in osteopontin protein expression in that the cells induced with bromelain at 1, 2.5  $\mu\text{g/ml}$  for 2 weeks when compared with cells treated with dexamethasone. **Conclusion:** The findings from the study demonstrated that bromelain treatment induced osteogenic differentiation of HGMSCs. **Funding:** HPD grant

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**Changes in Coral (*Pocillopora damicornis*) Population Structure in Concha de Perla Lagoon,  
Isabela Island, Galápagos Islands, Ecuador**

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**Abstract**

Elevated sea surface temperatures associated with El Niño-Southern Oscillation (ENSO) can severely impact coral populations in the Galápagos Islands, Ecuador. During the 1982-83 event, 95-99% of reef-building corals bleached and died. This study examines if the onset of the 2015-2016 ENSO affected the important reef-building coral *Pocillopora damicornis*. The largest known population of this species in the Islands is found in the Concha de Perla lagoon on Isabela Island. It was first surveyed in 2012 and was visited again in 2015 to determine if colony size and coral condition (bleaching, paling, or mortality) changed. Underwater photographs were quantified for these attributes using the Coral Point Count with Excel Extensions (CPCe) program. In 2012 1,617 colonies were surveyed compared to 370 in 2015. There was a significant increase in live mean colony size from 2012 ( $249.8 \pm 305.3$ ) to 2015 ( $327.8 \pm 257.4$ ), ( $p < 0.001$ , t-Test), suggesting that corals continue to grow. Live colony sizes were skewed right in both surveys, typical of coral population structure for most species. However, the mode shifted from the smallest size classes in 2012 to slightly larger size classes in 2015. This indicates that colonies grew in size, but there was a reduction in new recruits, suggesting a decline in successful reproduction. Coral bleaching and paling were not observed. Because this population is monoclonal with no genetic variability, it is more susceptible to the types of environmental change associated with ENSO and continued monitoring of this persistent population is warranted until regional conditions normalize.

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## Comparison of Living and Dead Populations of the Fungiid Coral *Cycloseris curvata* in the Galápagos Islands, Ecuador

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### Abstract

This study compares living and dead populations of the rare fungiid coral, *Cycloseris curvata*, from two locations at opposite ends of the Galápagos Archipelago. *Cycloseris* is one of only two fungiid coral species in the Eastern Pacific, and occurs in isolated, patchy populations. The only known live population of this species in the Galápagos Islands is found at Devil's Crown, Floreana Island at the southern end of the Archipelago. Additionally, dead skeletons were first observed in 2012 at Darwin Reef, 364 km north-northwest of the living population. Skeleton size was quantified from digital photographs using the program Coral Point Count with Excel Extensions (CPCe). Living *Cycloseris curvata* individuals at Devil's Crown were significantly larger on average than dead skeletons observed at Darwin Reef ( $28.2 \pm 11.9 \text{ cm}^2$  vs.  $18.4 \pm 0.9 \text{ cm}^2$ ,  $p < 0.001$ , t-Test). This suggests that *Cycloseris* at Darwin Reef was either limited in size by habitat constraints or environmental stress, or did not live as long as those at Devil's Crown. *Cycloseris* is commonly found on rubble and sand bottom, and there is a greater area of this type of habitat at Devil's Crown compared to Darwin Reef. Additionally, the Devil's Crown site is shallower than the site at Darwin Reef (15m vs. 28m respectively), and larger size may be associated with increased light and consequent increased energy production by the mutualistic dinoflagellate coral symbiont (zooxanthellae). Continuing efforts seek to discover additional populations of this coral to better understand their unusual niche in benthic ecosystems.

## **Damsel to Super Hero**

**Liz Burbano**

Department of Writing and Communication  
College of Arts, Humanities, and Social Sciences

Faculty Sponsor: **Cathleen Dean**

Department of Writing and Communication  
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Faculty Sponsor: **Dr. Weylin Sternglanz**

Department of Psychology and Neuroscience  
College of Psychology

### **Abstract**

“Damsel to Super Hero” is a short documentary film that explores how women are portrayed in comics. This documentary will also view how the messages within comics affect society as a whole. The film is directed by Liz Burbano. This documentary includes interviews with NSU professor and gender studies expert Dr. Kathleen Waites.

## **Dead Air**

**Adam DeRoss**

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College of Psychology

### **Abstract**

“Dead Air” is a short murder mystery film taking place mostly in and around a local college radio station. The protagonist, a young disc jockey, finds the corpse of his co-worker after coming in for a shift late one night. The young disc jockey is forced into a situation where there is no way for him to contact help and he must solve the mystery on his own, but the solution is a sickening discovery. The film is directed by and starring Adam DeRoss. Other crew members include Ryan Dahm, Mykella Mitchell, and Stephen Rafferty.

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## **Defining Success: Developing an effective Grassroots Mobilization strategy**

### **Nucleus Shelton**

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### **Abstract**

The ability of citizens to petition elected officials for the purpose of redressing grievances are essential tenets to any functioning democracy. This research focuses on examining the divergent political outcomes of the Taxed Enough Already (TEA) Party and the Occupy Wall Street movement. The research seeks to understand why was one able to produce viable political candidates and gain considerable influence over the American political system, while the other withered away into the history of American politics. The researcher emphasizes different aspects of grassroots politics including framing, organizational structure, and resource mobilization. The research is conducted as a qualitative empirical study and examines how each social movement framed their core demands, their organizational structure, and how each organization utilized its resources. The research found that the TEA Party effectively integrated images and symbols that are highly salient in the movement's culture. Additionally, the TEA party was able to frame their demands in a way that could be translated into concrete legislative policies. Conversely, the Occupy movement coded their demands in language that ran contrary to the establishment and its institutional arrangement. Thus, the 'TEA Party' model has become a template for grassroots movements, while the 'Occupy Movement' is more successful in countries that have different relationships between the state and its institutions.



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## Detection of *Lagenidium giganteum* in plant axil metagenomes

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### Abstract

The entomopathogenic oomycete *Lagenidium giganteum* is known to infect and kill mosquito larvae and therefore has been seen as a potential biological control agent against disease vector mosquitoes. Phylogenetic analyses have consistently demonstrated that *L. giganteum* is a close relative to plant pathogens (*Phytophthora* and *Pythium* spp.). In addition, a recent transcriptome analysis showed that *L. giganteum* expresses oomycete genes that have been associated with plant infection. These observations suggest that *L. giganteum* might have evolved from a plant pathogen to an invertebrate pathogen, and have retained the ability to establish symbiotic or pathogenic interactions with plant tissues. To test this hypothesis, a metagenomic survey of plant material has been initiated. Specifically, water samples collected from plant axils were processed for metagenomic DNA extraction, and Polymerase Chain Reactions (PCR) were performed in an effort to detect *L. giganteum*. These PCR reactions used a *L. giganteum*-specific primer set that was designed to selectively amplify a fragment of the cytochrome c oxidase subunit one (cox1) gene. The cox1 gene sequence has been previously used to barcode oomycetes, and is the default DNA barcode approved by the Consortium for the Barcode of Life (CBOL). Preliminary results indicated that the *L. giganteum* cox1 gene can be readily amplified and sequenced from metagenomic DNA isolated from plant axil water samples, suggesting that this oomycete is able to colonize environments that are consistent with a close relationship to plant tissues. These results provide a basis to explain a proposed evolution from plant pathogen to entomopathogen.

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## **Development of a Library of Synthetic Compounds with Multiple Pharmacophores**

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**Zachary Galloway**

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### **Abstract**

It is known that chalcones and pyrazolines possess antibacterial and antifungal activity; the overall goal of this project was the development of a library by synthesizing novel hybrids containing both chalcones and pyrazolines. The hybrids may show antibacterial efficiency against *S. aureus*, *E. coli*, and *Candida albicans*. Oxindole derivatives have shown previous biological activity in combating bacteria such as *S. aureus* and *E. coli*, but using N-alkylation, the novel derivative may be further reacted using various aldehydes yielding a library of hybrids that may have antimalarial, antitubercular, and cytotoxic effects.

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## **Development of a Method to Analyze Electronic Cigarette Liquid Solutions**

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**Rebecca Nosal**

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### **Abstract**

Electronic cigarettes have become increasingly popular in the last decade although there is minimal evidence to support their safety. The goal of this study is to develop a method to separate and analyze the contents of electronic cigarette liquid solutions. Various solutions of different nicotine concentrations were obtained from a commercial distributor. The e-liquid solutions were diluted to optimize analysis and separation. A method was established to separate the components of the solutions, and multiple chemical analysis tools were employed to collect and analyze the data.

## **Digit Recognition through Machine Learning**

**Patrick Alexis**

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College of Engineering and Computing

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College of Engineering and Computing

### **Abstract**

Handwriting recognition finds itself in many domains. Developing improved methods for handwriting recognition is an open research challenge. I will focus on the sub problem of digit recognition. By using the MNIST dataset provided by Kaggle, I will use the Random Forest approach to train and test a digit recognition system. Random Forest is a learning technique that uses an ensemble of decision trees. An ensemble of classifiers has better classification performance than individual classifiers and is more resilient to noise. Thereafter, I shall compare the results with the Random Forest approach with those obtained using Support Vector Machines. Through this research, I hope to build a good understanding of machine learning algorithms and their practical applications.

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## **Does canine interaction impact a college students' stress and anxiety levels during exam time?**

**Caitlin McCoy**

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Faculty Sponsor: **Dr. Jonathan Banks**  
Department of Psychology and Neuroscience  
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### **Abstract**

The use of therapy dogs on college campuses has increased dramatically in the last decade. The current study will examine the impact of interaction between canines and college students during an exam period to determine any impact on perceived stress and cognitive functioning. It was hypothesized that following a brief interaction with a canine, participants would report lower levels of state anxiety and higher levels of sustained attention than participants in a control condition. Fifty-six students from Nova Southeastern University participated in exchange for course credit or a gift card. Participants were randomly assigned to a canine interaction or control group. Participants in the canine interaction condition interacted with a therapy dog for approximately ten minutes. Multiple regression analysis suggested that both condition and having a dog at home were significant predictors of perceived stress ( $R^2 = .15$ ,  $F(2, 51) = 4.53$ ,  $p < .05$ ) and state anxiety ( $R^2 = .14$ ,  $F(2, 48) = 3.98$ ,  $p < .05$ ). Specifically, interaction between participants and canines, either during the study or at participant's homes predicted lower levels of perceived stress and state anxiety. However, interaction with a canine did not appear to predict higher levels of sustained attention or speed of processing in the current study. This study provides the first empirical evidence for a beneficial effect of interaction between canines and college students as a method to reduced perceived stress and anxiety during examination periods.

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## **Does Fidgeting Affect Cognition?**

**Ashley Lonergan**

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### **Abstract**

Fidgeting is defined as small movements particularly in the hands and feet. It includes tapping feet and fingernails, shaking legs, readjusting one's position, or one's clothing. Fidgeting can arise in individuals for various reasons like boredom, stress, or anxiety. It may be that fidgeting behavior can be helpful with increasing attention span. However, inhibiting fidgeting may also lead individuals to pay attention to nothing else but the inhibition of fidgeting. This study was conducted to see if fidgeting, while performing vigilant oriented tasks, lead to better performances on such tasks. All participants wore pedometers on both of their wrists and ankles in order to record their movements for the duration of the study. Participants began the study by completing both an *easy* and *hard visual search task* and finished by completing a *vigilance task*. Each participant was unknowingly assigned to either a *move* or *suppress* condition for the *vigilance task*, in which they were told to play with a toy or to hold a toy steady. The results indicated that there was greater accuracy and faster response times in the *easy visual search* condition, as was expected. The results for *the vigilance task* suggested that participants assigned to the *move* condition moved five times as much as participants assigned to the *suppress* condition. In addition, participants were more vigilant when they were allowed to move. Overall, our results provide evidence for the hypothesis that people pay more attention when they are instructed to move and detriments in performance are seen when people are instructed to inhibit movement.

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## **Effects and Success of the Americans with Disabilities Act of 1990 (ADA)**

**Emily Lowry**

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Faculty Sponsor: **Charlie Harrington**

Department of Finance and Economics  
H. Wayne Huizenga College of Business and Entrepreneurship

### **Abstract**

On July 26, 1990, the Americans with Disabilities Act was signed by George H.W. Bush with the intent of prohibiting discrimination based on disability. It affects access to employment, state and local government programs and services; access to places of public accommodation such as businesses, transportation, and non-profit service providers, and telecommunications. This act was implemented to protect the rights and equality of the vast amount of disabled citizens in America. According to the Census Bureau, About 56.7 million people — 19 percent of the population — had a disability in 2010, according to a broad definition of disability. During the 1970-90 time period, before the ADA was introduced, only 26% of disabled individuals were employed. While the ADA undoubtedly protects the civil rights of the disabled, it has been argued that it has inflicted additional costs on employers and may therefore be counterproductive. Although the costs imposed by this legislation may be unfavorable to employers, many benefits regarding the civil and natural rights of the disabled have resulted as well. Therefore, while the perception of costs and benefits of the act may be left to the discretion of the individual, it may be concluded from multiple viewpoints that the ADA has been overall sufficient in achieving its purpose of prohibiting discrimination based on disability.

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## **Efficacy of nematicidal engineered bacteria against diverse nematode species.**

**Chelsey Thachettu**

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Department of Biological Sciences  
Halmos College of Natural Sciences and Oceanography

### **Abstract**

Infections with parasitic nematodes remain a significant global health problem particularly in developing nations. Despite their widespread occurrence and high rate of morbidity, few strategies have been developed to prevent and treat such infections. With the growing incidence of resistance to anthelmintic drugs, there is a dire need to develop novel approaches to preventing infection by nematodes. Recent studies confirm that engineered bacteria, designed to simultaneously attract and intoxicate the model nematode *Caenorhabditis elegans*, may be effective novel biocontrol agents. However, the efficacy of these engineered bacteria against additional nematode species remains unknown. In this study, we tested the ability of these engineered bacteria to attract and intoxicate two nematodes, *Panagrellus redivivus* (a common free-living model) and *Pelodera strongyloides* (a facultative parasite found in moist soil and leaf litter). Using standard intoxication assays, we observed that *P. redivivus* was significantly intoxicated by the engineered bacteria. Intoxication of *P. strongyloides* remains unclear likely due to interspecific differences in morphological features that are indicative of intoxication. In contrast, using standard attraction assays, we observed that *P. strongyloides* was attracted to the engineered bacteria but not *P. redivivus*. Our results indicate that individual nematode species have unique intoxication and attraction requirements, suggesting that effective biocontrol may require that bacteria be engineered to target individual nematode species.



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## **Efficiency of an Electrostatic Sprayer in the Application of Disinfectant**

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### **Abstract**

Continuing research and development has led to new advancements in sanitation technology which allows for better preventative techniques against disease and illnesses. A total solutions company, ByoPlanet, developed an electrostatic sprayer that applies a negative charge to a disinfectant. This permits a stronger attraction to the environment as objects are naturally positively charged. Our goal was to determine if the electrostatic sprayer was able to treat objects that are not in the direct line of contact with the spray. The treatment was Clorox Hydrogen Peroxide and water was used as a control. The electrostatic sprayer was placed three feet from a cylindrical beaker that had two cover slips attached in direct opposite sides from each other. Each cover slip contained either  $10^6$  *Escherichia coli*. In each trial, the electrostatic sprayer was sprayed for three seconds. The disinfectant was allowed to interact with the bacteria for three minutes. The cover slips were removed from the beaker, diluted and plated on Nutrient Agar, and incubated overnight at 37°C. Next, colonies were counted to determine the percent reduction and the log reduction of bacteria. As a control, the same procedure was performed with a traditional spray bottle, except it was sprayed five times in three seconds. A comparison of the percent reduction and log reduction between both cover slips was done to determine if the electrostatic sprayer could deliver disinfectant to areas not in the direct line of contact of the spray.

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## **Evaluation of the Cytotoxic Profile of Metformin and Y15 in Platinum Resistance Ovarian Cancer Cells**

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### **Abstract**

Metformin, an antidiabetic drug, has been previously shown to induce cytotoxicity in platinum resistant ovarian cancer cells and increase phosphorylation of Focal Adhesion Kinase (FAK), a tyrosine kinase implicated in the development of this platinum resistance. Therefore, we evaluated the combined cytotoxic efficacy of Metformin and the focal adhesion kinase inhibitor 1,2,4,5-Benzene Tetra amine tetra hydrochloride (Y15) in platinum resistant OVCAR 3 ovarian cancer cells. The cells were treated with concentrations of Y15 and Metformin to determine IC<sub>50</sub> values, which were then used to treat cells with Y15 and Metformin separately and in combination. DNA fragmentation and poly ADP ribose polymerase (PARP) cleavage assays were performed to evaluate mechanisms of cell death. We further utilized a western blot to evaluate the expression of phosphorylated FAK, p53, p21, and pAKT in response to the treatments. The results showed that in combination, Y15 significantly increased efficacy of metformin compared to the metformin only treatment. Cell death by apoptosis was confirmed by PARP cleavage and presence of DNA fragments in treatment groups. The combination treatment of metformin and Y15 significantly downregulated phosphorylated FAK expression, confirming reduced FAK activity. This reduced FAK auto phosphorylation correlated with increased p53 and p21 expression. Therefore, Y15 significantly enhances the cytotoxic profile of metformin in platinum resistant OVCAR 3 cells. This study is the first to report a FAK dependent cytotoxic mechanism of metformin in ovarian cancer, leading to the understanding of the cooperation between metformin and Y15 to inhibit FAK activity in platinum resistant ovarian cancer cells.

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## **Fighting Antibiotic Resistance by Encouraging Bacteria to Cheat**

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### **Abstract**

Antibiotic resistance in bacteria is a significant public health concern. Some bacteria degrade penicillin-derived antibiotics by expressing the enzyme beta-lactamase. This provides protection for the entire colony, creating an incentive for other bacteria to “cheat” by benefiting from the enzyme without incurring the resource costs associated with producing it. It may seem that this free-rider problem would prevent cooperation from arising within an evolutionary framework, but many instances have been described in nature. Previous research has shown that the expected outcome is a coexistence between cooperators and cheaters, with the group becoming increasingly susceptible to eradication as the fraction of cheaters increases. We are simulating this system using an Intraspecific Competitive Lotka-Volterra model and predicting the growth of normal and resistant bacteria under various initial populations and antibiotic concentrations. This reveals the critical points associated with colony collapse. The strongly non-linear nature of the equations leads to a pronounced Allee effect, in which the final population is very sensitive to the initial conditions. Thinking in terms of group selection at the colony level, “prosocial” behavior may be found to be evolutionarily adaptive, despite the fact that, at the individual level, invasion by cheaters is possible. Experimentally, we have genetically engineered bacteria to either express beta-lactamase internally (“cooperators”), or not (“cheaters”). The final ratio of cooperators to cheaters after being incubated for 12 hours depends on the initial ratio and the amount of antibiotic present. The results of this study may inform efforts to design antibiotic treatment regimens that minimize the risk of resistance.

## **Fighting Thyroid Cancer**

**Rosie Khachatryan**

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College of Art, Humanities, and Social Sciences

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College of Arts, Humanities, and Social Sciences

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Department of Psychology and Neuroscience  
College of Psychology

### **Abstract**

“Fighting Thyroid Cancer” is a short film about my experience with thyroid cancer. The film was created to raise awareness regarding this kind of cancer, because it can go unnoticed for many years. With the use of my real life experience, as well as interviews from people close to me that have gone through the same things, I hope to help people with this disease know that it can get better. I want to encourage others to ask their doctor to see if they might have this disease, because I had no idea. The film is directed by Rosie Khachatryan.

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## **Frozen Brain Atlas: Individualized Brain Mapping for Receptor Autoradiography Analysis**

**Samantha Bergoine**

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### **Abstract**

The Frozen Brain Atlas provides students, educators, and scientists with a tool to further explore the architecture of the brain. Current brain atlases allow users to navigate sectioned brain tissue using histological staining; however, they fail to capture naturally visible structures post sectioning. Through immediate post sectioning image collection, the natural contrast of the brain reveals unique structural details that are rarely seen by traditional staining procedures. By utilizing indexing and interactive labeling, the Nova Southeastern University Frozen Brain Atlas will allow identification of brain regions when used as a correlative tool for modalities including receptor autoradiography, immunofluorescence, and other anatomical methods.

## **How to Get the Word Out**

**Kathleen Bowman**

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Sponsor: **Allison Foster**

Division of Student Affairs

### **Abstract**

The survey, “How to get the Word Out”, was taken by 185 students of the NSU community at the end of April 2015. This survey was handed out as well as taken online. Thirty-six students took the online survey, while the other 149 students took the handout version. The surveys were collected from Parker, the UC, Flight Deck, and the Library Deli. The goal was to make sure to get a variety of different people represented in this data.

The purpose of this survey was to figure out a better way for student organizations to advertise on campus. The questions on the survey were: If you are a commuter, where do you go in between classes? What are your top three places you look to find information about events happening on campus? Where do you see information about events on campus? How far in advance do you like to know about events on campus?

The second part of this research will be collected during Winter 2016 to see if the results have changed or not. The survey from April 2015 will be given to undergraduate students again to see if the results are similar.

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## Identification and Quantification of Lipid Content in Oysters Using GC Mass Spectrometry

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### Abstract

The purpose of this research was to identify and quantify lipids in the eastern oyster, *Crassostrea virginica*. Gas chromatography was used to separate the lipids found in the oyster samples, while mass spectrometry was used for analysis. Retention times of the sample were compared to known lipid standard retention times in order to identify the lipids. The lipids were quantified utilizing a lipid standard that is not present in the oyster. Using this same technique, oysters from various locations can be analyzed to see if there are any differences in the types of lipids or the quantity of lipid. It is hypothesized that oysters under stress may have lower lipid content. By comparing oysters from outside the Gulf of Mexico to oysters from that region, during and after the BP oil spill, it can be determined whether or not this event had an effect on the lipids of the eastern oyster.

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## **Improving mental fitness: The impact of mindfulness meditation training on sustained attention and working memory**

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### **Abstract**

Mindfulness meditation has received a great deal of scientific interest in recent years. Of interest to the current study, mindfulness meditation training has been shown to improve sustained attention (Morrison, Gooldarran, Rogers, & Jha, 2014), decision making (Hafenbrack, Kinias, & Barsade, 2014), working memory (Mzarek, Franklin, Phillips, Baird, & Schooler, 2013) and reduce the impact of stress on working memory performance (Banks, Welhaf, & Srour, 2015; Jha, Stanley, Kiyonaga, Wong, & Gelfand, 2010). The improvement in working memory performance is important due to the relationship between working memory and fluid intelligence (Conway, Kane, & Engle, 2003), reasoning (Kyllonen & Christal, 1990), and reading comprehension (Daneman & Merikle, 1996). In this study, one hundred undergraduates from NSU were randomly assigned either to a mindfulness training condition, relaxation training condition, or a control condition. Participants in the meditation and relaxation conditions completed a 2-week at home training in meditation or relaxation, respectively. Following the 2-week intervention, differences between the conditions were observed on a sustained attention task,  $F(2, 73) = 5.40, p < .01$ , such that individuals in the mindfulness meditation condition demonstrated higher sustained attention task performance than individuals in the control condition,  $t = -3.29873, p < .01$ , but not individuals in the relaxation condition,  $p > .05$ . However, no differences were observed on working memory task performance or rates of mind wandering. These findings suggest that a brief, at-home mindfulness meditation practice may improve performance on tasks requiring sustained attention.



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## **Isolation of antibiotic producing microorganisms from various Soil: The Everglades, Davie, and West Palm Beach**

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Halmos College of Natural Sciences and Oceanography

### **Abstract**

The Small World Initiative is combating the decrease in antibiotic effectiveness. The majority of antibiotics in current use originate from soil dwelling bacteria. The soil samples were obtained from The Everglades, West Palm Beach, and Davie. After these soil samples were collected, they were serially diluted and plated to isolate bacteria. Isolated bacteria from the diluted plates were tested against tester strains to determine if a zone of inhibition was present. Isolates that presented of zone of inhibition were further characterized via Basic Local Alignment Search Tool (BLAST) Analysis to identify the genus of the bacteria. We have also identified bacteria producing active compounds with activity against the tester strains. The microorganisms from the Davie area showed to have antibiotic production against the safe relatives: *S. epidermidis*, *E. aerogenes*, and *E. coli*. The samples from the Everglades showed antibiotic production against: *S. epidermidis*, *B. subtilis*, *E. aerogenes*, and *P. putida*. The active compounds have been extracted from the organisms. The extracted organic compounds were subjected to Ultraviolet/Visible spectroscopy. Results indicated that compounds isolated from Davie samples absorbed UV rays at varied wavelengths. This activity in the UV spectrum wavelengths is distinct from the agar control. This indicates there may be active organic compounds isolated from the organisms. Chemical analyses of the extracted active compound are being performed to determine the chemical composition of the compound.

## **J.U.L.E.S.**

### **Juliet Romeo**

Department of Writing and Communication  
College of Arts, Humanities, and Social Sciences

Faculty Sponsor: **Cathleen Dean**

Department of Writing and Communication  
College of Arts, Humanities, and Social Sciences

Faculty Sponsor: **Dr. Weylin Sternglanz**

Department of Psychology and Neuroscience  
College of Psychology

### **Abstract**

J.U.L.E.S. is a documentary about people with sickle cell disease. Sickle cell is a hereditary, debilitating illness that affects millions of people on a global scale. Along with medical research, the film J.U.L.E.S. highlights the trials, crisis, and pain that sickle cell warriors like myself experience and triumph over on a daily basis. This film is directed by Juliet Romeo. Other crew members include Ricardo Lugo, Liz Burbano, and Aaron Abelto.

## **Jurassic Dark**

**Ian Bates**

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Department of Literature and Modern Languages  
College of Arts, Humanities, and Social Sciences

### **Abstract**

This presentation focuses on the tonal differences between Jurassic Park, the novel by Michael Crichton, and Jurassic Park, the film directed by Steven Spielberg. The novel contains scenes of explicit violence only alluded to in the film, while all sense of childlike wonder derived from the dinosaurs is absent. This sort of change at first seems without importance due to the frequency of directors altering source material beyond recognition. Evidence gathered from interviews with Michael Crichton and additions made to his own sequel novel, The Lost World, suggest that Spielberg's film comes closer to the vision Crichton had for the Jurassic Park than the novel itself.

## **Late**

**Stephen Rafferty**

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Department of Performing and Visual Arts  
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Department of Psychology and Neuroscience  
College of Psychology

## **Abstract**

“Late” is a short comedic film about a day in the life of college student Curtis Randolph, an obsessive-compulsive perfectionist turned bumbling klutz, as the wrong setting on his alarm clock causes Curtis to oversleep on the day of his final class presentation. It is up to Curtis to get to the class before he fails his presentation. The film is directed by Stephen Rafferty.

## **Life In Verse: Historical Figures Reimagined**

**Qaas Shoukat**

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College of Arts, Humanities, and Social Sciences

### **Abstract**

This presentation will revolve around the discussion of the lives of several historical figures (e.g. Rene Descartes, William Shakespeare, and John Lennon), and the reading of first-person autobiographical spoken word pieces in which the presenter assumes the roles of the historical figures. Through the use of the spoken word format, the stories of these individuals will be brought to life, shedding light on their ideas, their bodies of work, and their lasting legacies. The goal is to provoke interest in history and biographical research, and to showcase the impact and effectiveness of presenting information through new, creative means.

## **Love Another Day**

**Emalee Shrewsbury**

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Department of Psychology and Neuroscience  
College of Psychology

### **Abstract**

“Love Another Day” is a short dramatic film about Tucker, who shuns love after a series of blind dates go wrong, all in an attempt to lead a life he feels is more suitable and happy. The film is directed by Emalee Shrewsbury. Other crew members and actors include Sandra Badrous, Kirin Kaur, Gabby McCue, Ashley Rivera, Shannon Alivio, and Joshua Haeffner.

## **Love Yourself**

**Jackie Garcia**

Department of Writing and Communication  
College of Arts, Humanities, and Social Sciences

Faculty Sponsor: **Cathleen Dean**

Department of Writing and Communication  
College of Arts, Humanities, and Social Sciences

Faculty Sponsor: **Dr. Weylin Sternglanz**

Department of Psychology and Neuroscience  
College of Psychology

### **Abstract**

“Love Yourself” is a short film about a young girl named Sydney who is struggling to feel confident during her first semester as a college student. She wants to fit in with a particular sorority on campus. After being invited by one of the sisters to an ANAD banquet, Sydney realizes her inner beauty and builds enough self-confidence to rush the sorority she had wanted to join since the start of the semester. The film is directed by Jackie Garcia. Other crew members and actors include Janette Garcia and Tatiana Munoz.

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## Measuring the Time Diffusion of a Colored Gas in a Small Enclosed Container

**Fernando Reachy–Guadarrama**

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Halmos College of Natural Sciences and Oceanography

Faculty Sponsor: **Dr. Maria Ballester**

Department of Chemistry and Physics  
Halmos College of Natural Sciences and Oceanography

Faculty Sponsor: **Dr. Victor Castro**

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Halmos College of Natural Sciences and Oceanography

### Abstract

The diffusion time measurement of colored gases in closed containers is extremely important for many experiments in chemistry. For example, we used the diffusion time ( $\Delta t$ ) of iodine in air –inside a closed container– to calculate the free mean path ( $\lambda$ ) of molecules by using the relation  $\lambda = (S_{\text{rms}})^2 / (\langle v \rangle \Delta t)$ ; here,  $\langle v \rangle$  is the average molecular speed of the gas, and  $S_{\text{rms}}$  can be reasonably estimated to be one-half of the predetermine height that the gas has to reach. The usual method to measure  $\Delta t$  for a vertically upward diffusing gas is by visually estimating its presence at a pre-established height ( $2S_{\text{rms}}$ ). In order to minimize mistakes associated with this method, we designed and built a device around a micro controller (Arduino) to automatically measure  $\Delta t$ . The presence of the gas at a pre-established height is tracked every 0.5 s by automatically measuring the voltage of a light sensor, and the temperature inside the container. This approach minimizes the experimental errors associated with the current methods to measure  $\Delta t$  and the temperature at which diffusion occurs. The device was tested as part of a physical–chemistry experiment that calculates Avogadro’s number. We believe the system is robust enough to be able to measure the diffusion time of other colored gases, by simply applying a few programming changes to the micro controller device.



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## Molecular Chlorination of Sucrose and Possible Growth Effects on Human Gut Microbiota

**Kristi Njaravelil**

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### Abstract

Bacteria in our gut, are responsible for facilitating a variety of functions from metabolism to maintaining immunological homeostasis. The gut microbiota have also been shown to be affected by diet. Sucralose, a minimally metabolized, non-nutritive, and non-caloric sweetener, is found in a variety of food and drinks marketed to diabetics and health conscious individuals. Sucralose is chlorinated sucrose (common table sugar). Indicators suggest that sucralose may have a deleterious effect on gut microbiota, possibly leading to health conditions such as Crohn's disease. Although there are likely several mechanisms involved, the purpose of this experiment is to focus on the effects of the molecular chlorination of sucralose on bacterial growth. Two species were used as test organisms (*Escherichia coli* and *Enterobacter aerogenes*). Initially, both species of bacteria were grown in distilled water, sucrose, sucralose, chlorine and combinations of these treatments. The standard disk diffusion assay was used to measure the zones of inhibition (of bacterial growth) in each treatment. Upon finding small zones of inhibition in most cases and not much difference among treatments, especially compared to distilled water, a more focused experiment to address the effect of concentration of sucralose in bacterial inhibition was conducted. Again, the standard disk diffusion assay was used with concentrations of sucralose ranging from 0-2.0 M for both bacterial species. Sucralose concentrations of 0.25 M and higher consistently showed zones of growth inhibition. These results suggest that microbial growth effects may likely occur with a chronic use of sucralose.

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## **Organizational Diversity Audit of Teachers and Staff in Broward County School Board**

**Ashley Allahand**

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H. Wayne Huizenga College of Business and Entrepreneurship

Faculty Sponsor: **Bahaudin Mujtaba**

Department of Management

H. Wayne Huizenga College of Business and Entrepreneurship

### **Abstract**

Today's teachers and students in Broward County and other regions in and outside of Florida are growing to become more diverse than ever before. As such, organizations and managers must be prepared to make changes to accompany diversity within the workplace and understand the needs, wants, and changing values of teachers and students throughout. This paper discusses the diversity within Broward County and administers an audit of the cultural, ethnic, and background differences of teachers in the area. Methodology and findings are recorded and the diversity auditing literature is thoroughly discussed. Finally, relevant implementation and recommendations are provided for the creation and maintenance of a diverse education board.

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## **Phycocyanin enhances the cytotoxic profile of Cisplatin in platinum resistant ovarian cancer cells by a mechanism that is Focal Adhesion Kinase dependent**

**Syed Hussain**

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**Shona Joseph**

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### **Abstract**

A major treatment approach in ovarian cancer is platinum based therapy. Initially more than 80% of cancer patients with advanced stage ovarian cancer achieve remission with platinum therapy. However, the majority of these patients relapse and develop drug-resistant disease over time. The overexpression of the tyrosine kinase, focal adhesion kinase (FAK) causes this resistance, which can promote cancer cell survival and metastasis. Prior experiments report that Phycocyanin (C-PC), an accessory pigment in the *Cyanobacteria spirulina*, demonstrates cytotoxicity towards multiple cancer cell lines and enhances cisplatin activity in lung cancer. This study evaluated the ability of C-PC to sensitize the platinum resistant OVCAR-3 cells to cisplatin treatment. Cells were treated with C-PC and cisplatin, and a combination of C-PC and cisplatin. A MTT assay and DNA fragmentation were used to confirm apoptotic cell death. Western blot procedures were used to confirm expression of phosphorylated FAK (pFAK), total FAK, and the key apoptotic proteins p21 and p53 in response to the treatment. The results of the study confirm that C-PC significantly (>50%) enhances the cytotoxic profile of cisplatin in OVCAR-3 cells. The expression of activated pFAK was also significantly reduced in the CPC and CPC+cisplatin treatment groups and this corresponded with increased p53 and p21 expression. These results confirm a role for FAK in mediating cytotoxic effects of CPC in platinum resistant ovarian cancer treatment which can be explored through further study.

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## **Porphyrin basicity competition studies of octa alkyl substituted porphyrins with H<sub>2</sub>TPP**

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### **Abstract**

Competition studies of the free base octa alkyl substituted porphyrins for the protons were carried out using H<sub>2</sub>TPP. The reaction with H<sub>2</sub>OEP produces the free base H<sub>2</sub>OEP, the dication H<sub>4</sub>OEP<sup>+2</sup>, and the monocation H<sub>3</sub>OEP<sup>+1</sup>. Although the monocation is easily seen in the solution, it is difficult to isolate. The cause appears to be a type of disproportionation reaction taking place upon crystallization, where the dication is formed at the expense of the monocation. In each experiment, an equimolar solution of two free-bases was made. Since H<sub>2</sub>TPP has a large absorption for the dication at 650 nm, it was always used as one of the free-bases. By adjusting the ratios of dications and free-bases, we concluded that H<sub>2</sub>TPP was again preferentially protonated and hence more basic than the octa alkyl substituted porphyrins (H<sub>2</sub>OEP, H<sub>2</sub>OMP H<sub>2</sub>etio1). Computations studies using MM+ and semiempirical methods were used to validate the porphyrin basicity.

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## **Quantitative Measurement of Learning and Memory in *Caenorhabditis elegans* in Response to an Engineered Nematicidal Bacterium**

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### **Abstract**

Despite their global prevalence, there are very few strategies to prevent infections due to parasitic nematodes. Recent studies have shown that bacteria engineered using the principles of synthetic biology may serve as an alternative approach to intoxicating nematodes. While these engineered bacteria were initially shown to be relatively efficacious in intoxicating the model nematode *Caenorhabditis elegans*, the nematodes quickly learned to avoid the engineered bacteria through aversive associative learning, rendering them less effective as biocontrols. In this study, we sought to quantify the rate at which *C. elegans* learns to avoid the engineered nematicidal bacteria. Using nematode learning assays, we observed that *C. elegans* can learn to avoid the engineered bacteria in as little as five hours and that this behavior remains stable in the worm in the long term. Furthermore, we observed that periods of starvation subsequently reduced aversive associative learning in the worm. Our results are among the first comprehensive studies of learning and memory in *C. elegans* in response to a nematicidal protein, and may allow for optimization of treatment regimens when using nematicidal bacteria as a biocontrol or therapeutic agent.

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## **Quick Contrast Sensitivity Function Testing in Adults without Ocular Disease and Patients with Retinitis Pigmentosa**

**Manonmani Murugappan**

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Faculty Sponsor: **Dr. Mark Jaffe**  
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### **Abstract**

The objective was to determine the reliability and range of results for area under the log contrast sensitivity function (AULCSF) measures obtained with the quick contrast sensitivity function (qCSF) test in adults without eye disease and those with retinitis pigmentosa (RP). Nineteen RP patients and 39 adults with normal visual acuity (VA better than 20/25) and no ocular disease repeated qCSF testing at two sessions within ~1 week binocularly and monocularly, as well as with a NoIR 4% transmission filter to simulate low illumination in the eye with better VA for normals and binocularly for RP patients. Compared to younger subjects aged 20-59 years (mean AULCSF 1.84, 1.56 or 0.97 for qCSF testing binocularly, with the better eye or filter, respectively), participants between the ages of 60-89 had highly statistically significantly reduced AULCSF measures (mean 1.56, 1.24 or 0.71; all  $p \leq 0.001$ ). When evaluating the difference in monocular AULCSF with versus without the filter, normals aged 70-89 years had a significantly greater reduction by 23% than subjects aged 20-49 years (95% CI: 11-34%;  $p < 0.001$ ), likely mediated by natural rod sensitivity loss with aging. Mean coefficients of variation (CoV) for AULCSF were 3-10% and 7-12%, for normals and RP patients, respectively. We measured an age-related decline in qCSF, along with significant declines in low illumination among people in their 70's. The qCSF test provides reliable results across younger and older adults with normal vision, as well as in RP patients, and may be used as a precise outcome measure during clinical trials.

## **R&R**

### **Nathalie Moreau**

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Department of Psychology and Neuroscience  
College of Psychology

### **Abstract**

“R&R” is a music video that has been entered in the Undergraduate Film Festival. The video brings up the topic of this generation’s current views on relationships, using one dancer as the main character. The video focuses on the new norm of non-commitment-based relationships, but also shows the other side – i.e., monogamous relationships. Using music and commentary, we tell the story of what it means to be in a relationship in the year 2016. The video is directed by Nathalie Moreau. Other crew members and actors include Alonzo Williams and Grisel Vazquez.

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## **Reactive Oxygen Species Production during Oxidative Stress in Lymphoblastoid Cell Lines from Autistic Children**

**Hannah Mathew**

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Halmos College of Natural Sciences and Oceanography

Faculty Sponsor: **Dr. Ana Castejon**  
College of Pharmacy

### **Abstract**

Autism is a neurodevelopmental disorder that is characterized by deficits in social interaction, communication and repetitive behaviors. As the prevalence of the disorder increases, the need to understand the cause to account for its treatment increases. Besides the genetic factors that attribute to the cause, studies have examined other environmental factors that may lead to a diagnosis of autism. Children with autism are thought to be more susceptible to oxidative stress, which may contribute to the pathological nature of the disorder. Studies have shown nearly 35% of autistic children have low glutathione levels. Glutathione is an antioxidant that the body creates to reduce oxidative stress; which could lead to oxidative damage to the brain and periphery. The purpose of this study will be to examine whether lymphoblastoid cells(LCLs) from autistic patients are more vulnerable to oxidative stress than cells of neurotypical controls. The study will investigate the effects of 2,3-dimethoxy-1,4-naphthoquinone(DMNQ), a mitochondrial oxidized stressor, on the LCLs. Very few studies have been conducted to understand how DMNQ induces cytotoxicity and its effects. Levels of intracellular reactive oxygen species(ROS) will be quantified via the use of dichlorofluorescein(DCF) assays in LCLs from both autistic and neurotypical children using a plate reader. We hypothesize that children with autism will have higher ROS levels at baseline and after treatment with the DMNQ. The findings of this study will advance our understanding of how LCLs from autistic patients respond to oxidative insult, which will contribute to future studies to reduce oxidative stress-induced cytotoxicity.



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## **Recovery of Larval Strongylid Nematodes From Raccoon, *Procyon lotor***

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### **Abstract**

A major challenge in the development of biocontrol methods targeting intestinal helminths is the lack of readily available strongylid experimental models that are also noninfective to humans. Noninfectivity to humans (and other nontarget organisms) is an important criterion for such models as this allows them to be used experimentally with minimal biosecurity measures, in standard laboratory settings. Preliminary laboratory work on raccoon feces in the context of an undergraduate parasitology course indicated that local raccoons are host to a specialist strongylid, *Arthrocephalus lotoris*, which only infects raccoons and skunks. *Arthrocephalus* does not directly penetrate into its host, but must be eaten to be transmitted. Previously published studies indicate that this is one of the most abundant and commonly-occurring parasites in raccoons. The objectives of this project were to a) identify the prevalence of *A. lotoris* larvae from different latrine sites on NSU's main campus; and b) develop a methodology for isolating live larvae from samples of raccoon feces collected at those sites. Fecal samples were examined from six sites, all of which were found to contain *A. lotoris* larvae. Infection intensities were estimated to range between 10 and 1,600 larvae per sample. Three recovery methods were tested: direct collection from rehydrated samples, collection after passage through graded sieves (35-235 mesh), and using a combination of centrifugation and flotation. Maximal recovery was obtained using direct collection and sieving. Ongoing work on this project will establish a timeline of viability for recovered *A. lotoris* larvae during which they can be used experimentally.

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## **Role of Chinese Foreign Aid upon Educational Infrastructure Development in Africa**

**Afrin Naz**

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Department of Economics and Finance  
H. Wayne Huizenga College of Business and Entrepreneurship

### **Abstract**

The purpose of this research is to investigate the role of Chinese foreign aid upon educational infrastructure development in Africa. This study will discuss the origin of Sino-African relations, the current framework of cooperation between the two nations, and the overall effect this collaborative effort has on the hierarchy of education development in Africa and its other outcomes. The basis to Sino-African relations along with other developing nations are founded upon mutual respect, noninterference, equality, and sovereignty. The education plan directed under the Forum of China-Africa Cooperation (FOCAC) focuses on human resource training, student and teacher exchange programs, higher education development, rural school construction, vocational training, and cultural diffusion. Outside of the FOCAC framework, the research comments on the role that Confucius Institutes (CI) play in reinforcing their relations and the dynamic the institutes offer in its approach to education. The bulk of the research is obtained from case studies in Cameroon, Kenya, and South Africa which will assist in assessing whether Chinese educational aid has actually been helpful or it is merely a soft power strategy.

## **Science and Activism: Overcoming Stereotypes**

**Alexis Good**

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**Kathleen Taylor**

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### **Abstract**

There is a rift between environmentalists and environmental scientists brought on by societal stereotypes (Sissenwine). Environmentalists strive to advocate for environmental change; however, when they are defined by their stereotypes, their political movements are minimized by society so that they are no longer effective (Bashir). Environmental scientists often disengage from environmentalists because they do not want to obtain the associated stereotypes of these activists (Bashir). This is problematic because it prevents knowledgeable individuals from coming together in order to address the larger environmental problems in society (Castano, Paladino, et al). Therefore we will provide solutions that will allow environmentalists to become an accepted part of a larger conversation that effectively undertakes the environmental concerns that face our world today. We will achieve this by first establishing the societal stereotypes of environmentalists through surveys, then we will conduct a series of interviews to identify and complicate the rift caused by these stereotypes. Ultimately we will reveal different ways for environmentalists to improve their image and become more productive in societal change. At the end of this project, we hope to promote the cooperation between environmentalists and environmental scientists to establish a united front that will facilitate effective environmental change.

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## **Selective Stimulation of AT<sub>2</sub> Angiotensin II Receptor Subtype Increases Neural Stem Cell Proliferation**

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Department of Biological Sciences  
Halmos College of Natural Sciences and Oceanography

**Brigitte Blanco**

High school researcher

**Leena Couling**

College of Pharmacy researcher

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### **Abstract**

Angiotensin II is a potent hormone in the renin-angiotensin system that regulates blood pressure through vasoconstriction. Altered levels of angiotensin II has been linked to several diseases, such as kidney disease and stroke. The angiotensin II receptors, AT<sub>1</sub> and AT<sub>2</sub>, have a similar affinity for angiotensin II. The AT<sub>1</sub> receptor is found in heart, blood vessels, kidneys, lungs, and brain. The AT<sub>2</sub> receptor is abundant in the fetus and neonate, but has a controversial role in the adult. Recently, the AT<sub>1</sub> and AT<sub>2</sub> receptors were found to be expressed in neural stem cells. As neural stem cells have a demonstrated role in learning and memory and disorders of the central nervous system, we investigated how selective activation of the angiotensin II system through either the AT<sub>1</sub> or AT<sub>2</sub> receptor would affect human neural stem cell (hNSC) proliferation and differentiation. Experimental groups included hNSCs grown in either proliferation or differentiation media (controls) and in the presence of either AT<sub>1</sub> receptor agonists, AT<sub>2</sub> receptor agonists, or drug control (PD). Methods used included immunofluorescence, microscopy and N.I.H. ImageJ analysis. Statistical evaluation included ANOVA and post-hoc comparisons. Preliminary results suggest agonism of the AT<sub>2</sub> receptor significantly increased proliferation of hNSCs compared to controls in both proliferation and differentiation conditions. Since altered angiotensin signaling has been implicated in several peripheral and central nervous system diseases, the angiotensin system may serve as a novel target to regulate neural stem cell function.

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## Shedding Light on Banana Spiders in Urban Habitats

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### Abstract

The Banana Spider, *Nephila clavipes*, is the largest non-tarantula spider species and commonly colonizes urban habitats. This species is an orb weaver, relying on trapping aerial prey in its large vertically oriented webs. Many nocturnally active insects are attracted to light sources found throughout urbanized areas. I hypothesize *N. clavipes* exposed to higher light levels in urban areas will be larger than individuals in darker natural areas. Forty nine spiders were observed and recorded; twenty four in natural areas and twenty-five in urban areas. For each spider the following was recorded: GPS coordinates, web height and diameter, size of female, lumen exposure and distance to the light source and the number of males and kleptoparasites on each web. All data was collected an hour after sunset to ensure that natural sunlight would not confound the data collection. The urban sites include Nova Southeastern University, Broward College, and a highly populated street parallel to Hollywood Beach. The natural sites included: Fern Forest Natural Area, Tree Tops Park and John U. Lloyd State Park. The results show there is a highly significant statistical difference in mean spider size ( $p=0.000001089$ ). *N. clavipes* found in urban environments had a mean size of  $2.93 \pm 0.11$  inches, while in natural environments they had a mean size of  $1.91 \pm 0.15$  inches. There was a weak correlation between spider size and distance to light source, as well as lumen exposure, indicating other factors may be contributing to the size differences noted in addition to light.

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## **Synthesis and Characterization of Bipyridine Bridged Iron–Ruthenium Photosensitizing Complexes**

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### **Abstract**

New bimetallic and polymetallic ruthenium and iron complexes with bridging bipyridines have been synthesized and characterized by NMR, IR, electrochemistry, and UV-Vis spectroscopy. These complexes are:  $Rc(bipy)_2Rc$ ,  $Fc(bipy)_2Fc$ , and  $Ru(bipy-Fc)_3$ , where  $Rc$  = ruthenocene,  $Fc$  = ferrocene, and  $bipy$  = 2,2'-bipyridine. The electrochemical behavior of the complexes reveal strong electronic communication between ruthenium and iron transmitted through the bipyridine bridges. These can be used as building blocks for the design of luminescent and redox-reactive species containing a higher number of metal centers. The complexes as well as analogs can prove useful as antenna components for photosensitization processes (including electron or hole ejection on semiconductors), luminescence probes, and multi-electron photocatalysis.

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## **The ‘Triangle’ Formula: A role and play option analysis of the triple-post offense**

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Department of Mathematics  
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### **Abstract**

The triple-post offense, widely known as the triangle offense, has been accredited for producing 11 NBA championships, but has vanished from the league since the absence of all-time winningest coach, Phil Jackson, pre ‘14-‘15 season. With his return, there has been much interest in the offensive system and its functionality. However, there are more questions than answers surrounding the triangle offense when validating the reason for its success. Excluding the Golden State Warriors and New York Knicks in the current league season (‘15-’16), the offense stands untouched by many teams due to the confusion in how it operates. This research bridges the aforementioned gap, presenting the makeup of the triangle offense in order to eliminate misperception and aid in the understanding from the everyday fan and future use of the offense across front offices. Through multivariate analysis methodology, results uncover a pattern of certain player roles utilized in the triangle offense by championship winning teams over 13 seasons, further accrediting the success of the offense to the 2-3 role combination of these players and unique play options. Results further demonstrate that these combinations do not have the same rate of success when utilized by teams who do not run the triple-post offense.

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## **The Effect of Financial Hardships on Mental Health**

**Nekoro Reid**

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Faculty Sponsor: **Charlie Harrington**

Department of Finance and Economics  
H. Wayne Huizenga College of Business and Entrepreneurship

### **Abstract**

This paper will explore the role of financial resources, or lack thereof, on mental health. Specifically, it will examine the relationship between family structure (single parent and two parent homes) and financial resources on parental mental health. The results of this paper will provide a better understanding of the impact of financial strain and hardship on single parents, especially single mothers. It will also assist in informing the relevant national agencies that strategies for debt resolution need to be implemented on a national level in order to provide single parents with the resources that they need to thrive financially. This may lead to improved social and mental health of single parents struggling with financial difficulties.



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## **The Effect of Y15 and Curcumin on the Ovarian Cancer cell line OVCAR3**

**Nicole Coelho**

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**Amanda Ramnot**

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Faculty Sponsor: **Dr. Appu Rathinavelu**  
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### **Abstract**

Curcumin gives turmeric, a spice derived from *Curcuma longa*, its yellow color. Previous studies have reported that curcumin inhibits the proliferation of multiple cancer cell types, including ovarian, pulmonary, brain, and breast cancer through various pro-apoptotic mechanisms. In advanced ovarian cancer, focal adhesion kinase (FAK), a tyrosine kinase, is overexpressed and contributes to cancer aggression and resistance. 1,2,4,5-benzene tetraamine tetrahydrochloride (Y15) is an inhibitor of FAK and combining it with curcumin shows promise in reducing the FAK activity in ovarian cancer. Therefore, in the current study, the cytotoxic effect of Y15 and curcumin in combination and alone on the platinum-resistant OVCAR3 cancer cell line were investigated. The cells were treated with either Y15 or curcumin at increasing concentrations to determine the IC<sub>50</sub> values; those values were then used to treat new cells with Y15, curcumin, and a combination of the Y15 and curcumin. Expression levels of phosphorylated FAK, p21, and p53 were measured through completing western blots. The combination of Y15 and curcumin on the OVCAR3 cells show a decrease of phosphorylated FAK expression and an increase in p21 and p53 expression. Furthermore, DNA fragmentation assay was completed to determine if the treated cells were undergoing apoptosis. The treatment group results showed fragmented DNA while the control group cells did not. Since DNA fragmentation assay confirmed apoptosis of the cells, further experiments are necessary to explore the mechanism of the treatments.

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## **The Impact of Gender Inequality on Earnings of Women in STEM Fields: Historical Evidence and Possible Solutions**

**Matthew Hoy**

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Halmos College Natural Sciences and Oceanography

**Teodora Suci**

Department of Computer Science  
College of Engineering and Computing

Faculty Sponsor: **Charlie Harrington**

Department of Finance and Economics  
H. Wayne Huizenga College of Business and Entrepreneurship

### **Abstract**

This study examines the current gender inequality in STEM fields, as well as its causes and some possible solutions. STEM—also known as the areas of science, technology, engineering, and math—are heavily male-dominated fields. The matter of gender inequality in these fields begins with gender separation during childhood and continues to the issue of the pay gap during adulthood. It is proven that currently women generate less capital than males in the same position in STEM fields, leading to a harsh divide between genders. Recent and relevant studies describing the statistics and explaining the reasons behind these gender and pay gaps are enclosed in this review. Additionally, the impact of the pay gap on the economy is examined and analyzed. Although women have gained many rights in recent years, there is still much discrimination and stereotyping keeping them from entering STEM fields. This leads to the fact that the topic of gender inequality has many ethical implications, especially since many girls are discouraged from STEM courses. In order to promote future changes, young girls must be encouraged to take science courses and be given adequate women role models to inspire them.

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## **The Impact of Social Media on Small and Medium Businesses**

**Albert Baldoni**

Department of Engineering and Technology  
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Faculty Sponsor: **Charlie Harrington**

Department of Finance and Economics  
H. Wayne Huizenga College of Business and Entrepreneurship

### **Abstract**

In the past few years, social media's popularity has increased exponentially. Its fundamental uses were for entertainment, but as it evolved, it became a greater part of everyone's lives; including businesses. This analysis takes a look at the impact of social media and networking on small and medium enterprises (SMEs). First the characteristics of businesses adopting social media will be analyzed to see what factors promote its adoption. These aspects are grouped into the three main categories of organizational, manager, and environmental. Then, the impact of social media adding value to a company through branding will be looked at. This is accomplished using five different components that, when combined, give a prime representation of employer attractiveness. Finally, this review will examine the effects that social media has on a business's success. One study investigates small companies in the western region of Maine, which is considered underserved by tourism and economic development. The findings from these company's improvements can provide insight for future studies; while also showing other small and medium businesses the real impact of social media.

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## **The Impact of The Patient Protection and Affordable Care Act on Businesses and the American Workforce**

**Shona Joseph**

Department of Biological Sciences  
Halmos College of Natural Sciences and Oceanography

Faculty Sponsor: **Charlie Harrington**

Department of Finance and Economics  
H. Wayne Huizenga College of Business and Entrepreneurship

### **Abstract**

The Patient Protection and Affordable Care Act or PPACA has caused many changes that have affected both businesses and employees. Many businesses have lost profits because they had to provide insurance for their workers. Thus, some businesses have changed their organization structures in order to combat mandates from the PPACA. First, businesses have cut down the number of employees working for their firm in order to have fewer than fifty workers. When a business is under fifty employees, it is considered a small business allowing it the right to legally not have to provide health insurance for its workers. Secondly, many firms have reduced the number of full time workers that they are hiring because the PPACA requires that full time employees receive such health insurance benefits. With the rise of part time employees, many people have had to pick up multiple jobs in order to earn a substantial income. Although the PPACA has allowed greater access for everyone in America to have health insurance, it has caused many businesses to make changes that have harmed many in the American workforce.

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## **The Linguistics of Terrorism**

**Leigh-Ana Mumford**

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College of Arts, Humanities, and Social Sciences

Faculty Sponsor: **Dr. G. Nelson Bass**

Department of History and Political Science  
College of Arts, Humanities, and Social Sciences

### **Abstract**

With the inequities present around the world, the nature of terrorism is both puzzling and ruinous. What remains irrefutable about terrorism is how its connotation translates into its accepted definition. Political rhetoric often utilizes “terrorism” to create a narrative, often to justify the use of state violence to preserve “national security.” This research investigates to what extent the definition of terrorism has been altered to serve as a mask for naked self-interest by the US state and political elites. Emphasis will be placed on spikes of anti-terrorism rhetoric in US foreign policy since the 1980’s. Three case studies display the evolving “definition” of terrorism – the administrations of Ronald Reagan, George W. Bush, and Barack Obama. To understand the evolutionary process, explanations analyze whether they were influenced by personal motivations, mindsets, or whether it was the perpetuation of preexisting institutions. The importance of this study surrounds the relationship between the changing linguistics of terrorism, those who engage in it, and how it fuels conflict. With rhetorical manipulation as a key part of U.S. foreign policy, there may be evidence of its use to reconstruct America’s identity and also to strengthen global democratic practices. This may further political policies in the short-term, this does not benefit the state in the long-term. Without cohesive comprehension when it comes to terrorism, there is limited success that counter-terrorism operations will have. Without acknowledging a concrete definition of terrorism, there is a limit to the success that military force will have in dealing with foreign threats.

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## **The Loss of Modernism in Nazi Germany**

**Taylor Duggan**

Department of Performing and Visual Arts  
College of Arts, Humanities, and Social Sciences

Faculty Sponsor: **Veronique Cote**

Department of Performing and Visual Arts  
College of Arts, Humanities, and Social Sciences

### **Abstract**

Modernism in Germany was ultimately detested, ridiculed, and outlawed by Adolf Hitler in Nazi Germany but in turn was the movement that assured his position in power. In the year 1929, an opportunist and German Art Society organizer, Feistal-Rohmedar, designed the artistic revolution within Germany and first introduced the thought regarding the extermination of modern artwork. Between the years of 1933 and 1937, the Third Reich and the German Art Society were also on a mission to rid Germany of Modernism and it wasn't until 1936 that Modernism was completely ruled out. The Third Reich believed that artistic manifestation and political goals would become one and that political messages and statements would be presented through different art forms. Hitler believed that life was interconnected with art and believed that modern art was a disgrace to Germany. In 1937, two separate art exhibits, "The Degenerate Art Exhibit," and "The Great Exhibition of German Art" were created and opened to the public to showcase the artwork that Hitler approved of and disapproved of. As these pieces were displayed, many modern works became a means of mockery to the German people. These pieces were mainly used as a means of propaganda and manipulation to change the attitudes of the German society regarding individuals of the Jewish community. Art within Nazi Germany was initially the source that brought ultimate power to Adolf Hitler, who became the leader of one of the most horrendous massacres in all of history.

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## **The Role of Cheating Behavior and Personality Traits in Deception Detection Ability**

**Joshua Braverman**

Department of Psychology and Neuroscience  
College of Psychology

Faculty Sponsor: **Dr. Weylin Sternglanz**  
Department of Psychology and Neuroscience  
College of Psychology

### **Abstract**

In this study we examined the relationship that propensity for cheating, as well as several other personality traits, have with deception detection ability. Participants were first administered a behavioral measure of their tendency to cheat on a short mathematics exam, as well as a measure of anger toward hypothetical cheaters. Second, participants viewed a series of video clips of NSU students making truthful and deceptive statements; participants attempted to discriminate between truthful and deceptive statements, and also rated the personality traits of the NSU students. Third, participants attempted to discriminate between truthful and deceptive statements in 8 media clips of people who were either innocent or guilty of a serious crime. Finally, participants completed a battery of personality measures, including measures of social anxiety, narcissism, victim justice sensitivity, Machiavellianism, and the Big Five traits (openness to experience, conscientiousness, extraversion, agreeableness, and neuroticism). Contrary to popular belief, participants were unable to detect deception of people who were guilty of committing serious crimes. In addition, participants who were more easily angered by cheaters were more neurotic, as well as more likely to see all communications as truthful. Conscientious people were also more likely to see communications as truthful. The role of personality traits in detecting and punishing deceptive behavior is discussed.

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**The Role of the Brain Atlas in Research and Education with a specific focus on the Allen Brain Atlas and a Novel Fresh Brain Atlas**

**Rebecca Nosal**

Department of Biological Sciences  
Halmos College of Natural Sciences and Oceanography

Faculty Sponsor: **Dr. Mark Jaffe**

Department of Biological Sciences  
Halmos College of Natural Sciences and Oceanography

**Abstract**

In the post-genomic era, brain atlases are key resources in education and research. They are critical to establishing a foundation to further the understanding of gene expression, neural connectivity, and development. This review focuses on the development of a model brain atlas, the Allen Brain Atlas, and the current construction of a novel brain atlas, the Frozen Brain Atlas. The Allen Brain Atlas, specifically the mouse atlas, was created in an effort to map the distribution pattern of mRNAs expressing the entire mouse genome in the brain. The goal is to use the mapped connectivity as a basis for future research in gene expression. The Frozen Brain Atlas, will be available as an educational resource for students and as a simple reference for researchers.



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## Urbanization Effects on Size and Fecundity of *Nephila clavipes*

**Jake Ripp**

Department of Biological Sciences  
Department of Marine and Environmental Sciences  
Halmos College of Natural Sciences and Oceanography

Faculty Sponsor: **Dr. Paul Arena**

Department of Marine and Environmental Sciences  
Halmos College of Natural Sciences and Oceanography

### Abstract

Typically, urbanization leads to habitat destruction and negative effects on the success of native species, however generalist predators like spiders may be exploiting these areas. Urban habitats tend to be warmer (due to the heat island effect), harbor an abundance of light attracted prey species and contain reduced densities of large native predators (bats and birds) when compared to natural areas. These attributes may provide *Nephila clavipes*, the Golden Orb Weaver, with an optimal habitat which enhances their overall productivity. I examined the effects of increasing levels of urbanization on body size and fecundity of *N. clavipes*. I hypothesized this species may be an urban exploiter and that individuals would be larger and more fecund in urban areas when compared to natural areas. Sample sites were categorized under three different location classifications based on magnitude of urbanization: Urban, Urban Parks and Rural. Morphological and physical data were collected and lipid concentration was determined using a bioassay as a measurement of fecundity. Overall, urban spiders were significantly larger ( $p < 0.05$ ) than both park and rural spiders, supporting the notion that this species benefits from urban habitats. Lipid analyses were inconclusive, likely attributed to the effect of egg-laying on female lipid content. Previous research has generally focused on the negative aspects of urbanization on animal welfare, however, this study provides evidence suggesting that some species might benefit from these environmental changes.

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## Using engineered bacteria to explore biological invasions

**Josue Conde**

Department of Marine and Environment Sciences  
Halmos College of Natural Sciences and Oceanography

**Neil Thackar**

Department of Biological Sciences  
Halmos College of Natural Sciences and Oceanography

Faculty Sponsor: **Dr. Robert Smith**

Department of Biological Sciences  
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### Abstract

One critical ecological challenge is to circumvent invasion from non-indigenous organisms. Studying the factors that affect the ability of a non-indigenous species to colonize and spread-into a new territory is very challenging due to multiple confounding factors. Synthetic biology is often not subject to these confounds, and thus we utilize it to explore factors that allow invasive species to successfully invade a new area. Specifically, we use engineered bacteria that are programmed to have an Allee effect, a fundamental growth dynamic that is observed in most invasive species. Using these bacteria, we take a two-pronged approach. First, we examine how the engineered bacteria spread in a continuously connected environment. Here, the bacteria were inoculated into a defined location of a microplate well and allowed to spread, the rate at which was controlled by the density of agar in nutrient medium. We used high resolution OD600 measurement to quantify growth at various area of the well. From this, we discovered unique growth patterns that may help to predict how fast an invasive species travels in a new environment. Second, we examined the effect of repeated introduction of the engineered bacteria into a novel environment. Here, we grew the bacteria in medium with different agar densities, which controlled their spread rate. At various intervals, we reintroduced a defined amount of bacteria and examined growth using colony forming units. Our results may indicate a unique principle that dictates survival and extinction for an invasive species with an Allee effect.

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## **Working Memory Capacity and the Benefits of Mental Imagery Practice on a Ring Toss Game**

**Kavan Thompson**

Department of Biological Sciences  
Halmos College of Natural Sciences and Oceanography

Faculty Sponsor: **Dr. W. Matthew Collins**  
Department of Psychology and Neuroscience  
College of Psychology

### **Abstract**

The goal of this experiment was to investigate how individual differences in working memory capacity affected an individual's ability to benefit from mental imaging. The main hypothesis for the experiment was that individuals with higher working memory capacity would benefit more from mental practice than individuals with lower working memory capacity. Subjects were placed in either a mental and physical practice group or a physical practice only group. The mental/physical practice group practiced a ring toss game for three minutes, then had five minutes of mentally visualizing a 25-point toss, followed by another two minutes of physical practice. The physical practice group practiced physically tossing the rings for ten minutes. Subjects' performance on the ring toss game was compared between their first day and their second day after they had completed the appropriate practice. Subject's working memory capacity was measured using the AOSPAN. Furthermore, subjects also completed the Mental Imagery Questionnaire (MIQ), an image maintenance task, a visual short term memory task, and a mental chronometry task. Results showed that individuals in the combination practice group scored 15 points higher on day 2 than on day 1. Those in the physical practice scored only 9 points higher on day 2 than on day 1. There was also a strong correlation between AOSPAN performance and image maintenance scores. Improvements in the practice conditions (either combination or physical only) were not influenced by working memory capacity.

## **Yoga - Beyond the Asana**

**Christa Barone**

Department of Writing and Communication  
College of Arts, Humanities, and Social Sciences

Faculty Sponsor: **Cathleen Dean**

Department of Writing and Communication  
College of Arts, Humanities, and Social Sciences

Faculty Sponsor: **Dr. Weylin Sternglanz**

Department of Psychology and Neuroscience  
College of Psychology

### **Abstract**

“Yoga - Beyond the Asana” is a documentary that explores the yoga lifestyle, demonstrating that yoga is for everyone. This documentary shatters preconceived notions, one yoga class at a time. The documentary is directed by Christa Barone.

## USS 2016 Student Contributors

Tom Abraham	Matthew Hoy*	Rebecca Nosal*
Patrick Alexis	Syed Hussain*	Dominique Olesen
Ashley Allahand	Sheena Jain*	Isabel Olivera
Albert Baldoni*	Chelsea Jeffers	Elisa Palmer
Christa Barone*	Shona Joseph*	Karan Patel
Ian Bates*	Tiffany Kelly*	Krunal Patel
Sam Batko*	Rosie Khachatryan	Alexander Pich*
Samantha Bergoine	Zara Khan*	Stephen Rafferty
Kathleen Bowman	Taura Khorramshahi	Amanda Ramnot
Joshua Braverman*	Alexis Koob	Deoraj Ramsaran
Megan Bruce*	Kourtney Kostzer	Fernando Reachy Guadarrama
Brandon Brule	Alfredo Lam*	Nekoro Reid
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Elizabeth Burbano	Paula Leoro Garzon	Sara Rodriguez*
Brittany Calaluca	Ashley Lonergan	Juliet Romeo
Yuri Castro Flach	Emily Lowry*	Leonor Sarria
Khadija Chowdhury*	Ricardo Lugo	Nucleus Shelton
Nicole Coelho	Hannah Mathew	Poorandai Shivbaran
Josue Conde	Caitlin McCoy*	Qaas Shoukat*
Adam DeRoss	Uzair Mohammed*	Emalee Shrewsbury
Taylor Duggan	Nathalie Moreau	Nadia Siddiqi*
Gregory Edwards	Nicholas Morgan	Rebekah St. Godard*
Zachary Galloway	Safiyah Muhammad*	Bendik Stenersen*
Jacqueline Garcia	Leigh-Ana Mumford	Teodora Suci*
Avidor Gerstenfeld*	Manonmani Murugappan*	Alissa Svedberg
Lauren Gispert	Akshay Naraine	Kathleen Taylor*
Andrew Gonedes	Hema Narlapati*	Chelsey Thachettu*
Alexis Good*	Afrin Naz*	Neil Thackar*
Emily Harrington*	Natalie Neves*	Keerthi Thallapureddy*
Haley Hickey	Ly Nguyen*	Kavan Thompson
Franklin Hiffernan*	Kristi Njaravelil*	Rachel Tonia

\* Honors College Students

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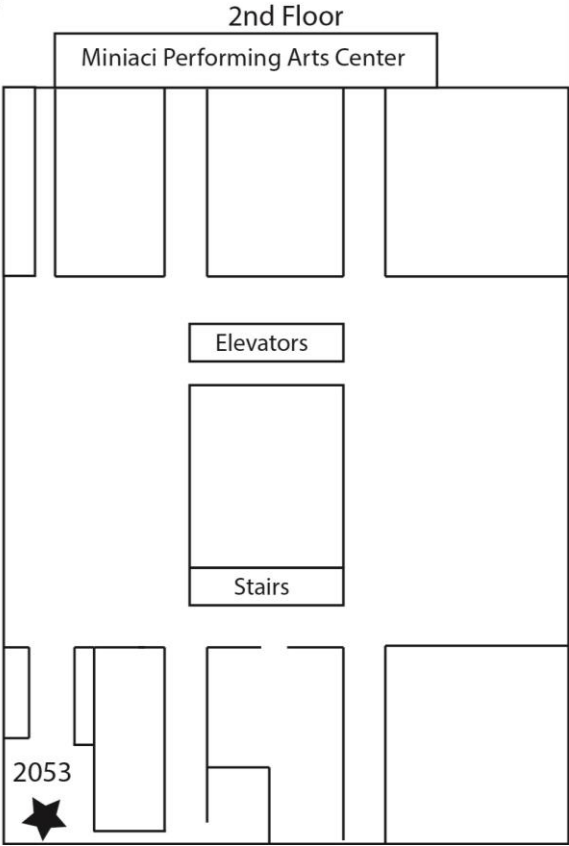
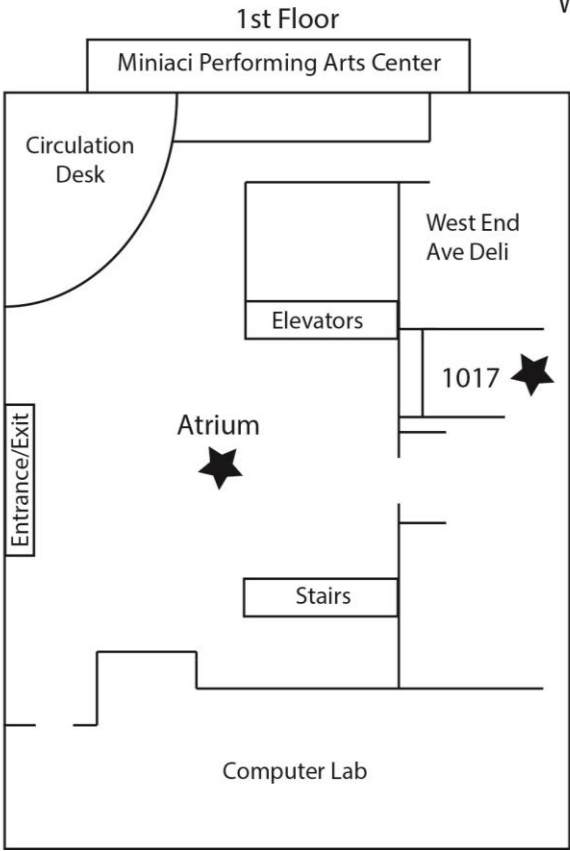
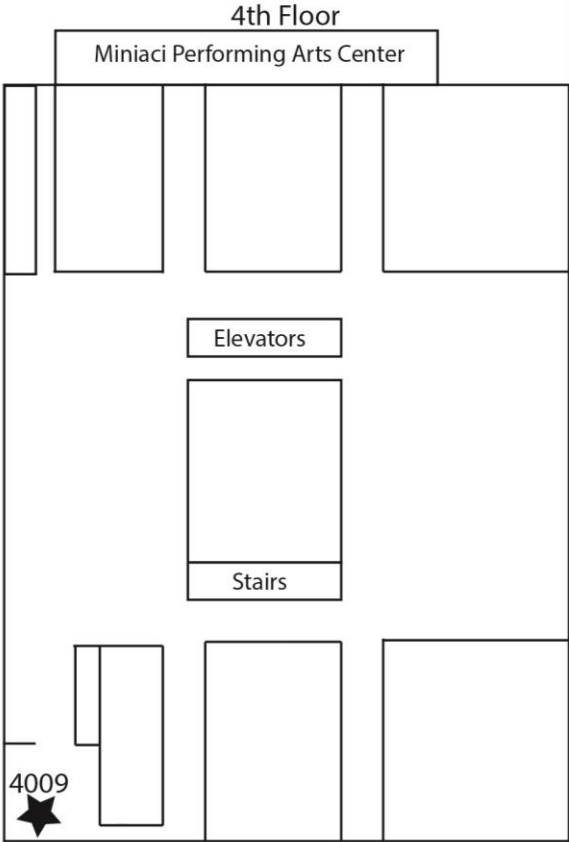
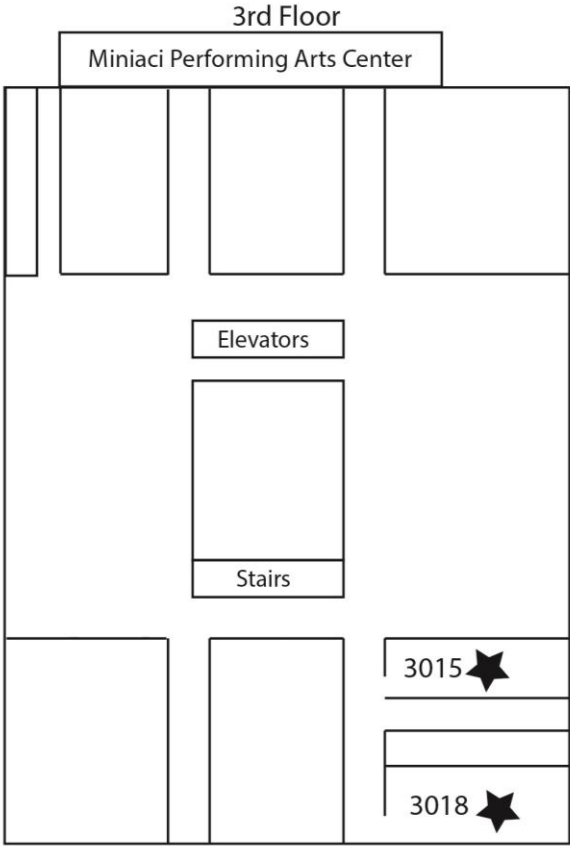
## USS 2016 Judges

Emilola Abayomi  
Trudy Abramson  
Steven Alford  
Bertha Amisi  
Paul Arena  
Beatrix Aukszi  
Maria Ballester  
Jonathan Banks  
Christopher A. Blonar  
Abdel Bourouihiya  
James Brecher  
Jessica Brown  
Mance Buttram  
Marcelo Castro  
Victor Castro  
Rose Colon  
Kelly Concannon  
Veronique Cote  
Judith Coughlin

Jeffrey Doeringer  
Chetachi Egwu  
Suzanne Ferriss  
Kendra Gentry  
Gary Gershman  
Lethesha Harris  
Steven Hecht  
Darren Hibbs  
Amy Hirons  
J. Matthew Hoch  
Mark Jaffe  
Stefan Kautsch  
Jeffrey Lyons  
Mindy Ma  
Daniel Markarian  
Eric Mason  
Monique Mokha  
Darshana Palkar  
Pedro Pellet  
Jason Piccone

Joanne Pol Urréchaga  
Sarah Ransdell  
Reza Razeghifard  
Michael Reiter  
Deanne Roopnarine  
Mir Saleem  
Emily Schmitt Lavin  
Mary Hope Schwoebel  
Belay Seyoum  
Venkatesh Shanbhag  
Andrea Shaw Nevins  
Aya Shigeto  
Robert Smith  
Raisa Szabo  
Jaime L. Tartar  
Julie Torruellas Garcia  
Star Vanguri  
Michael Voltaire  
Kathleen Waites

# Alvin Sherman Library, Research, and Information Technology Center



# UNDERGRADUATE STUDENT SYMPOSIUM

## 2016 Program Schedule

TIME	EVENT AND LOCATION		
1:00–1:45 p.m.	<b>Welcome and Introduction</b> – Don Rosenblum, Ph.D. <b>Keynote Speaker</b> – Robert C. Speth, Ph.D. <div style="text-align: right;"> <b>Performance Theatre      Don Taft University Center</b> </div>		
1:45–3:00 p.m.*	<b>Poster Presentations</b>	<b>First Floor Atrium</b>	<b>Alvin Sherman Library</b>
1:45–4:00 p.m.*	<b>Film Presentations</b>	<b>Youth Program Room 1017</b>	<b>Alvin Sherman Library</b>
3:00–4:00 p.m.*	<b>Oral Presentations</b>	<b>Room 2053</b>	<b>Alvin Sherman Library</b>
	<b>Oral Presentations</b>	<b>Room 3015</b>	<b>Alvin Sherman Library</b>
	<b>Oral Presentations</b>	<b>Room 3018</b>	<b>Alvin Sherman Library</b>
	<b>Oral Presentations</b>	<b>Room 4009</b>	<b>Alvin Sherman Library</b>
4:30–5:30 p.m.	<b>Awards Ceremony</b>	<b>Performance Theatre</b>	<b>Don Taft University Center</b>

\*See separate detailed schedule for poster easel numbers, specific film showing times, and oral presentation room assignments.