

WIU Graduate Research Conference

Friday March 3, 2017.

Poster Presentations

1. **Title: Discovery of Internal Standards for the Determination of Limonene in Sweet Orange (*Citrus Sinensis*) Oil by Gas Chromatography**

Principal presenter: Ravi Kiran Lella

Major: Chemistry

Other presenters or co-authors: Wei Chean Chuah, Taylor N. Windbiel, Angle Perez, Shaozong Zhang and Ligu Song

Faculty mentor: Dr. Ligu Song

Abstract: Limonene content is used to classify oil of citrus rinds into different grades. The determination of limonene from industrial process streams requires a method to be fast, sensitive, precise, accurate, and specific. Gas chromatographic methods for the determination of limonene are abundant throughout the literature. Both external and internal standards are used in the determination. A method with internal standard calibration is preferred due to its better precision and accuracy. The components of sweet orange (*Citrus sinensis*) oil include a wide variety of hydrocarbons, aldehydes, alcohols, esters, ketones, and some miscellaneous compounds. Anisole was previously used as the internal standard. However, our experimental results showed that it coeluted with impurities in sweet orange oil. Therefore, other alternative compounds including chlorobenzene, p-xylene, bromobenzene and acetophenone, which have never been detected in sweet orange oil, have been studied as potential internal standards in the current report. Our results showed that while bromobenzene coeluted with impurities in sweet orange oil, p-xylene and chlorobenzene eluted before all the components in sweet orange oil and acetophenone eluted after limonene without overlapping with impurities in sweet orange oil. Chlorobenzene and p-xylene were better choices than acetophenone because the developed methods were able to achieve required separation within two minutes. Validation of the

method with both chlorobenzene and p-xylene showed that the methods were linear, precise, accurate, specific and stable. A forced-degradation experiment showed that sweet orange oil was degraded by heat and the limonene content could be readily determined by the validated method.

2. **Title: Acceptance of HIV Screening Test among International Graduate Students at Western Illinois University**

Principal presenter: Oluwasola Ayosanmi

Major: Public Health

Other presenters or co-authors: Robert Klaver, U.S. Geological Survey, Iowa Cooperative Fish and Wildlife Research Unit, Iowa State

Faculty mentor: Dr. Lorette Oden

Abstract: Western Illinois University is an international student friendly institution. Students are offered admission from various part of the world including countries with high HIV sero-prevalence. Week long orientation programs are usually prepared to welcome international students into the school environment. The university health center also reviews the immunization status of the students. HIV screening is not routinely provided during the orientation program. A review of the acceptance of this screening among international students may be necessary to contribute to the screening exercise that may be done during medical assessments of foreign students. The knowledge of the HIV status of the student will help to educate the students about HIV prevention and treatment. Brief description HIV screening tests are one of the strategies used to increase awareness of HIV and detect those that are positive. Determination of those who will opt in for screening tests and those who will opt out will enhance an objective review of the perception of students about the need for a screening test. Some international graduate students may not want such screening because of several factors including fear of discrimination as an aftermath of being positive, while some will accept the test because they may see this as an avenue to know their HIV status before living in a new environment. List of learning objectives 1. Demonstrate the importance of HIV screening request for new international students. 2 Explain the role HIV screening among international students will play in providing health education for students about prevention and treatment of HIV.

3. **Title: Differential Gene Expression of Helicoverpa zea in Response to Rearing on Different Types of Tomato Plant Tissues**

Principal presenter: Ammar Al-furaiji

Major: Biology

Other presenters or co-authors: Donald Bath, Sue Hum-Musser, and Richard Musser

Faculty mentor: Dr. Richard Musser

Abstract: Plants can evolve defenses to caterpillar feeding. As a response to these defenses, the herbivore evolves counter-defenses. Most previous studies have focused on the gene expression of tomato plant leaf defenses in relation to caterpillar herbivory. Here we

investigate the response of *Helicoverpa zea* (tomato fruitworm) gene expression after feeding on leaves and fruits of the tomato plants (*Solanum lycopersicum*). Our bioassay confirmed that caterpillars grow faster on tomato fruits than the leaves suggesting the fruits are a more optimal food source for the caterpillars. When then looked at the transcriptomic changes in gene expression for caterpillars that fed on tomato leaves and fruit in comparison to an artificial diet. Microarray revealed over 4,000 genes that were significantly altered due to herbivory on the tomato plant tissue. The transcriptomic expression for compensatory gene expression for caterpillars that fed on leaves in comparison to fruits was particularly dramatic for digestive genes such as proteases, lipases and stress related genes. This is likely due to tomato leaves having higher levels of plant defenses and lower well nutritive available than fruits.

4. **Title: Ionization of Polar Compounds by Nitrogen Direct Analysis in Real Time**

Principal presenter: Wei Chean Chuah

Major: Chemistry

Other presenters or co-authors: Zhenqian Zhu, Edward Remsen, John E. Bartmess and Ligu Song

Faculty mentor: Dr. Ligu Song

Abstract: N₂ has been used as a standby gas in the DART ion source. It has been rarely used for the DART analysis because the detailed ionization mechanisms of N₂ DART still remain unclear. In the present work, the detailed ionization mechanisms of N₂ DART for the analysis of polar compounds were investigated for the first time. The results showed that common solvents such as acetonitrile, methanol and ethanol could not be ionized by N₂ DART efficiently. To achieve the best sensitivity, solvent was air dried before the ionization of analytes by N₂ DART. Therefore, the dominant ionization mechanism of N₂ DART is likely the direct Penning ionization and followed by self-protonation of the analytes which result in the generation of protonated ions. In the analysis of polar compounds with various representative functional groups, N₂ DART demonstrated good sensitivity. Besides, N₂ DART was able to generate abundant ammonium adducts at low orifice 1 voltage, which is 15 eV or lower, without aid from dopants. The ammonium ions are easily generated from the ammonia in ambient air because of the less competition with other atmospheric gas species.

5. **Title: Marsh Bird Use of Wetlands Manged for Waterfowl in Illinios**

Principal presenter: Therin Bradshaw

Major: Biology

Faculty mentor: Dr. Chris Jacques

Abstract: Wetland management in the Midwest is often used to increase energetic carrying capacity for waterfowl, primarily dabbling ducks. Other conservation initiatives encourage multi-species design and management, but often waterfowl are a primary focal group. It is

widely assumed that waterfowl management activities benefit other birds, but few studies have quantified those benefits or evaluated trade-offs among management strategies for multiple species. A key assumption of several conservation planning documents is that waterbird (e.g., shorebird, secretive marsh bird) habitat and population objectives can be accomplished by fulfilling waterfowl habitat objectives (e.g., shorebirds, waterbirds). However, few researchers have examined the relationship between wetlands managed for waterfowl and the provision of habitat for other migratory birds, especially in the breeding season. In fact, the Illinois Department of Natural Resources Wetlands Campaign identifies the "contribution of moist-soil management to wildlife objectives" as an important information gap which requires additional research. Overall, marsh birds are an understudied guild of wetland-associated species that can be valuable indicators of wetland health and condition. As wetlands have declined in Illinois, likely so have marsh birds due to habitat loss. Wetlands managed for other species (e.g., dabbling ducks) have the potential to provide benefits to marsh birds collectively or a subset of species (e.g., rails). For this project, we determined marsh bird use across a wide range of wetland types (e.g., emergent, non-vegetated, riparian), hydrologic regimes (e.g., temporary, seasonal, semi-permanent), management practices (e.g., active, passive, unmanaged), and past disturbance regimes (e.g., natural and restored, impounded and unimpounded) in Illinois during late spring and early summer of 2015, 2016 and now 2017. Our objectives are to 1) compare marsh bird use of wetland impoundments managed for waterfowl across a continuum of management intensities and strategies to predict how these actions can increase use by both groups, 2) compare marsh bird use of restored and natural wetlands, and 3) determine characteristics of wetlands and the surrounding landscape that influence marsh bird use of restored wetlands. Additionally, we surveyed marsh birds using the standard protocols on wetlands concurrently surveyed within the Illinois Critical Trends Assessment Program (CTAP) for comparison of methodologies.

6. ***Title: The Effects of System Justification and Reminders of Ingroup Disadvantage on Just World Beliefs***

Principal presenter: Lukas K. Sotola

Major: General Experimental Psychology

Other presenters or co-authors: Dr. Anna Newheiser, Assistant Professor of Psychology, University at Albany, State University of New York, and Tina C. DeMarco, Graduate Student, University at Albany, State University of New York

Faculty mentor: Dr. Eugene Mathes

Abstract: Problem: Just world beliefs (JWBs) are the tendency to believe that people get what they deserve. They are a pervasive phenomenon associated with acceptance of the suffering of others or even outright victim blaming (Hafer & Bègue, 2005). The purpose of this research was to investigate whether two variables affect people's level of JWBs: the motivation to believe that the social order is fair and just—termed system justifying tendencies—and a reminder of ingroup disadvantage for a low-status group—in this case,

women. Procedure: Two hundred and ninety-four participants completed the study. Participants read either a brief essay criticizing the United States' political and economic system (system threat) or a brief essay praising the United States' political and economic system (system affirmation). Prior work has shown that threatening the status quo will increase people's motivation to justify the system (Wakslak, Jost, & Bauer, 2011). After receiving the system justification manipulation, all participants took a gender Implicit Association Test (IAT). The IAT measures how fast participants categorize a pair of concepts to measure their implicit, or unconscious, association between the two categories. In this case, they took the gender IAT, which asked them to pair words traditionally associated with women (e.g., woman, lady) and men (e.g., man, husband) with positive (e.g., love, pleasure) and negative (e.g., death, evil) words. Following the IAT, all participants were given false feedback telling them that they had an unconscious preference for the "opposite" gender (men were told that they favored women and women were told that they favored men). For female participants, this IAT feedback was intended to serve as a subtle reminder of the continuing disadvantage women face in today's society. Finally, participants completed an individual difference measure of JWBs. Also, they read and rated two jokes that derided women on how offensive, funny, and appropriate they were; this was meant to act as a secondary, indirect measure of JWBs. Results and Conclusions: The system justification manipulation did not significantly affect JWBs. It did, however, marginally affect participants' ratings of the sexist jokes: Specifically, participants in the system threat condition were somewhat more approving of sexist humor than were participants in the system affirmation condition on the combined favorability ratings (the mean of their ratings of how offensive, funny, and appropriate they were), and on the dimension of funniness this effect was statistically significant. These results suggest that system justifying tendencies predict acceptance of the derision of disadvantaged groups. It is possible that this means that when people are more likely to want to rationalize the status quo they do not take disadvantaged groups' condition seriously and would therefore not be as inclined to work to make society more equal.

7. **Title: The Effects of High Intensity Interval Training in Highly Trained Athletes**

Principal presenter: Kisha Kucharek

Major: Kinesiology

Faculty mentor: Dr. Cynthia Piletic

Abstract: High intensity interval training (HIIT) has become increasingly popular as a way to do with continuous training. This type of training involves short repeated exercise bouts near maximal to supra maximal work rates with brief interspersed recovery periods. In sedentary and recreationally trained individuals HIIT has been shown to improve maximal oxygen consumption ($VO_2\text{max}$), anaerobic threshold, oxidative muscle enzyme activity, and running economy. However, in the highly trained athlete these adaptations remain unclear and little research has examined the effects of HIIT in these athletes. This study aims to investigate, for 12 weeks, the effects of high intensity interval training on 42 highly

trained endurance athletes using a pretest-posttest control group experimental design. The anticipated outcome of this study is that HIIT will have an effect on anaerobic threshold, running economy, and oxidative muscle enzyme activity. However, HIIT may not have an (or have little) effect on maximal oxygen consumption in highly trained endurance athletes.

8. **Title: The Effect of Deceptive Feedback on Performance and Motivation of Division I College Swimmers**

Principal presenter: Julia Rasmussen

Major: Kinesiology

Faculty mentor: Dr. Steve Radlo

Abstract: A handful of studies have used deceptive feedback to see whether it will aid in the performance enhancement of continuous motor tasks such as bicycling and running (Albertus et al., 2004; Eston, Stansfield, Westoby, & Parfitt, 2012; Hampson et al., 2004), but none have reported any significant results. Swimming has never been used to test the effectiveness of deception as a coaching strategy. What is unique about swimming is that feedback cannot be given during but rather after the event is over. Furthermore, no study has used a coach and his or her own athletes to study the effects of deception in swimmers. Motivation to go faster, coming from the subjects' actual coach, may provide the athletes with realistic motivation to improve performance. Convincing swimmers that their times are a little slower than their actual time may push them to excel in their timed performance. Conducting the study in a normal training setting and in the presence of the coach may help reduce any doubt of false feedback time. Therefore, the purpose of this study is to investigate the influence of deceptive feedback on the speed and motivation of Division I College swimmers. Nine heats of 50-yard sprint times will be tested using the participants' main stroke. Participants will be organized by the head coach into heats and lanes according to their times, main stroke type, and gender. Swimmers will be randomly placed into either a deceptive feedback (treatment) group or a no deceptive feedback (control) group. A deceptive feedback time of .5 seconds will be added to the treatment group's trial times. During the set of 9x50's, deception will be applied to the treatment group while the control group will receive no deception to any of their race times. Deception will be applied to 7 males and 7 females out of 28 members of the team. Deception will not occur during the first and last 3 trials of the 9 heats. Deception will be implemented during trials 4-6. All times will be shown privately to each swimmer after their trial. All participants will be asked to complete the Behavioral Regulation in Sport Questionnaire (BRSQ) and a demographic questionnaire at the completion of swim practice. The BRSQ tests the degree of internal and external motivation of the participant. Results from the BRSQ will be used to lend insight into any significant performance changes due to the deceptive feedback. To test for any significant interactions and main effects for the effect of deceptive feedback on swimming performance, a 2 (Groups) x 3 (Tests) Analysis of Variance (ANOVA) will be conducted. Alpha will be set a $p < .05$. Any significant main effects for the Time factor will be subjected to a Tukey's Honestly Significant Differences (HSD) post-hoc test. Data

collection for this experiment has been collected but results have yet to be determined.

9. **Title: Reducing Stereotypic Pacing in Polar Bears (*Ursus maritimus*) and Brown Bears (*U. arctos*) by Erecting Visual Barriers between Neighboring Individuals**

Principal presenter: Sierra Semel

Major: Biology

Faculty mentor: Dr. Susan Meiers

Abstract: One behavior in zoo animals that can be indicative of a welfare concern is the stereotypic behavior of pacing, a highly repetitive and invariant behavior that lacks an obvious goal. Captive polar bears (*Ursus maritimus*) and brown bears (*U. arctos*), as well as a majority of other large carnivores are well known to exhibit classic stereotypies even under professional care. For this study, continuous sampling will be used to record the duration of pacing and species-specific behaviors during a six-week study period.

Statistically significant differences in duration between baseline and treatment periods of pacing and species-specific behaviors will be evaluated to identify whether species-specific behaviors replace pacing behavior, and if so, which behaviors in particular. Although stereotypic behavior does not necessarily imply poor welfare, it often has been linked to the presence of stress or frustration for the animal. Indeed, some animals living in a zoological setting may be motivated to perform a behavior, but are unable to do so for various reasons, thus resulting in frustration, and these situations tend to result in displacement or re-directed activities. If the problem continues or is repeated, stereotypies such as pacing may develop. It is suggested that if singly housed individuals, such as the polar bears at the Chicago Zoological Society's Brookfield Zoo, can see other bears, but are not allowed direct interaction, they may become frustrated because natural social behavior cannot be exhibited, and over time, could result in stereotypic pacing. For this study, we hypothesize that the ability of the bears to see other bears in adjoining exhibits potentially leads to frustration, which is displaced in the form of pacing observed in the bears. Therefore, we predict that if the presence of visual barriers can decrease the frustration of seeing other bears without the ability to interact, the duration of pacing bouts will significantly decrease, while the duration of species-specific behaviors will increase.

10. **Title: Role of AXL Protein in the Infection of Innate Immune Cells by Dengue Virus**

Principal presenter: Samson Olaitan Omole

Major: Biology

Faculty mentor: Dr. Catherine Miller-Hunt

Abstract: Dengue virus (DENV), is among the Flaviviridae family and is transmitted by *Aedes aegypti* and *Aedes Albopictus* mosquitoes. The virus has been reported to be one of the major causes of illness and mortality in the tropical and subtropical regions. Despite the efforts to know and determine the molecules that are responsible for the interaction between DENV and host cells, no such molecule(s) have been identified. Studies have shown that DENV and Zika virus (ZIKV) are closely related, resulting in substantial antigenic overlap.

Additionally, it has been shown that the AXL protein is involved in endocytosis of Zika virus. This study is designed to determine if AXL protein is also required for DENV entry into host cells. The DENV titer will be determined via plaque ELISA assay. The immunoprecipitation of the virus with recombinant human AXL protein will determine if they bind to each other. Monocytes will then be extracted from human blood and differentiated into Macrophage subsets I and II in the presence of cytokines after 6 days of incubation. The Macrophages will then be used to determine the subsets preferred by DENV for infection. If DENV binds to the AXL protein, this will help us to understand more about Dengue virus entry and its pathogenesis. Identifying the mechanism(s) behind DENV cellular receptor usage may open the door to one or more ways that DENV infection can be manipulated therapeutically.

11. **Title: Aquatic Fungi Associated with a Low Order Stream in West Central Illinois**

Principal presenter: Terri Tobias

Major: Environmental Studies

Faculty mentor: Dr. Andrea Porras-Alfaro

Abstract: Anthropogenic impacts are creating tremendous pressure on global aquatic ecosystems. Rivers and streams account for only 1% of the earth's freshwater, but they are the most important source of water for human use. The study of microbial ecology in freshwater river ecosystems has become increasingly important. Microbes play a pivotal role in the uptake, storage, and cycling of carbon, nitrogen, and phosphorus in aquatic ecosystems and are an important component in water purification. Fungal traps containing apples, pears, and cherries were placed in a low order stream with a mixed urban and agriculture landscape in Macomb, Illinois. Dilutions of the fruit (10^{-1} - 10^{-5}) were plated on four types of media (MEA, EYSA, YG, SDA) supplemented with antibiotics, and incubated at 25° C for 30 days. Pure cultures were obtained and DNA was extracted and amplified using ITS rRNA primers. Two hundred and thirty fungal isolates were cultured and preliminary results indicate eight classes of fungi and 11 orders. Saccharomycetes (70%) was the most frequent fungal class represented in the culture collection with seven genera (*Meyerozyma*, *Candida*, *Geotrichum*, *Pichia*, *Kazachstania*, *Cyberlindnera*, and *Cystofilobasidium*), followed by Sordariomycetes (22%) with nine genera (*Purpureocillium*, *Fusarium*, *Fusicolla*, *Trichoderma*, *Colletotrichum*, *Simplicillium*, *Clonostachys*, *Striaticonidium*, and *Plectosphaerellai*). Seven genera of yeasts were isolated from the freshwater stream; the abundance of yeasts within aquatic systems could be a potential predictor of water quality. In addition, understanding microbial community variation within local environments with varying conditions may provide some insight into microbial diversity and function.

12. **Title: Yellow Fever Virus Infectivity of the Innate Immune System using AXL Receptor**

Principal presenter: Abiola A. Oladapo

Major: Biology

Faculty mentor: Dr. Catherine Miller-Hunt

Abstract: Arboviruses are known to utilize members of the tyrosine kinases receptors especially of the TAM family for their mechanism of viral entry and subsequent cell infection. Some Arboviruses are known to interact with the N-terminal immunoglobulin-like portion of the Axl-receptor resulting in tyrosine phosphorylation of the Axl receptor which then enhances viral infection. This research project is aimed at understanding the infectivity and cell tropism mechanism of Yellow fever virus (YFV) through Axl receptor and Macrophage 1 and Macrophage 2 (M1 and M2)-Axl dependent entry. I will first conduct virus cultivation to propagate the virus and demonstrate western blotting for viral protein expression, Enzyme Linked Immunosorbent Assay (ELISA) for virus purification and YFV titre determination. Antibody inhibition assays will be conducted to determine if Axl-specific antibodies can block YFV binding and entry into human cells. I will also isolate monocytes from voluntary blood donors and differentiate them into M1 and M2-subset macrophages to investigate M1 and M2- Axl dependent entry. A significant data result for the interaction between YFV and M1 and M2 -Axl receptor will provide information about how YFV uses macrophages for infection and how Axl-specific antibodies can be used to block YFV binding.

13. **Title: Effect of Plant Defense Hormones Jasmonate and Salicylate on Caterpillar Gene Expression**

Principal presenter: Faisal Alsubaie

Major: Biology

Other presenters or co-authors: Chuck Leader

Faculty mentor: Dr. Richard O. Musser

Abstract: Jasmonate and salicylate are important and ubiquitous plant defense hormones that stimulate a wide range of plant defenses. Jasmonate is stimulated by wounding, particularly caterpillars, and results in the stimulation of anti-nutritive defenses that can reduce the growth of herbivores. Salicylate is primarily associated with plant pathogens and smaller piercing-sucking herbivores such as aphids and whiteflies. While it is well known that these plant hormones stimulate signal cascade that synthesis of allelochemicals that alter caterpillar gene expression it is not clear whether these plant hormones directly effect caterpillar gene expression. In this study, we determined the effect of jasmonate and salicylate on the caterpillar's gene expression. We chose a generalist herbivore, corn earworm (*Helicoverpa zea*) as neonates and allowed them to feed on an artificial diet containing either jasmonate or salicylate for seven days. The control was a diet free of these added hormones. Caterpillars weights were reduced after feeding on the jasmonate treated diet in comparison to control or salicylate treated diet. We then flash froze and purified total

RNA from the caterpillar to measure gene expression for those caterpillars with qPCR. Digestive genes such as trypsin, lipase and glucose oxidase were particularly up-regulated for caterpillars that fed on the jasmonate treated diet in comparison to salicylate and the control diet. Additional gene expression will be discussed, but it appears the caterpillars are able to respond to jasmonate priming for defenses that are normally associated with the plant hormone. However, in a diet void of this, plant defenses are maladaptive.

14. **Title: College Student's Knowledge of Special Olympics and Paralympics: A Survey Study**

Principal presenter: Danielle Thompson

Major: Kinesiology

Faculty mentor: Dr. Cindy Piletic

Abstract: The purpose of the study is to determine college student's knowledge and understanding of the Paralympics and Special Olympics using a survey of roughly 20 questions. For the 2016 Paralympic Games there was an estimated 4,350 athletes from 176 countries. Today, 4.5 million Special Olympics athletes, at least 8 years old, come from more than 170 countries. Even though there are large numbers for each organization many do not know much about either organization. Some even confuse the two. However, we predict all students will know the difference between the two organizations. We chose Western Illinois University Students because it would provide us with a baseline of college student perceptions where there is no specific program for either organization on campus.

15. **Title: The Effect of Arbuscular Mycorrhizae on Defense related Gene Expression of Tobacco Plants when facing Herbivory Challenges**

Principal presenter: Md Imtiaz Khalil

Major: Biology

Other presenters or co-authors: Jonathan Jenks, South Dakota State University, Department of Natural Resource Management,

Faculty mentor: Dr. Richard O. Musser

Abstract: Arbuscular Mycorrhizae are microbial fungi where the fungus penetrates the cortical cells of the roots of a vascular plant and help plants to capture phosphorus, sulfur, nitrogen and other micronutrients from the soil. Arbuscular mycorrhizal fungi (AMF) have developed a co-evolutionary mutualistic relationship with terrestrial plants and it is estimated that 80% of the plants' species are capable of maintaining this relationship. While the fungi depend on the photosynthetic product from the plants, it also provides plant resistance by stimulating several defense related genes. Herbivory is a natural ubiquitous phenomenon where the plants and insects undergo intricate relationship and plants' defense signaling pathways are modulated in response to herbivory. In nature, the three-way interaction between plants, insects and mycorrhizal fungi is common. The main objective of this study is to demonstrate the complexity of tri-trophic interactions, their alteration of plant defenses and alteration in gene expression in tobacco plants. We chose wild tobacco

plants (*Nicotiana attenuata*) as a representative of the solanaceous family and tobacco hornworm (*Manduca sexta*) to pose herbivory on these plants. In this study, wild tobacco plants were grown with or without fungi in greenhouse conditions with or without the third instar larva of tobacco hornworm. After 24 hours of herbivory, the leaves were flash frozen in liquid nitrogen, homogenized and total RNA was isolated for quantitative real-time PCR analysis. We then quantified the expression of some known tobacco defense and stress related genes. Defense genes such as Defensin were highly up-regulated due to caterpillar herbivory and further increased by the presence of AMF. Up-regulation was also evident in some anti-nutritive genes such as polyphenol oxidases (PPO). Caterpillar feeding also up-regulated some other defense genes of jasmonate pathways such as S-adenosyl L-methionine synthase (SAMS) and S-adenosyl L-methionine carboxy (SAMC) which were further modulated by the fungi. The findings of this study demonstrated that AMF has a substantial effect on the defense related gene expression in tobacco plants. The findings can be implemented to achieve eco-friendly agriculture by reducing the use of synthetic pesticides.

16. **Title: Sport Psychology Services for NCAA Student-Athletes**

Principal presenter: Alana Cesarz

Major: Kinesiology

Faculty mentor: Dr. Cynthia Piletic

Abstract: Approximately ten percent of American college student-athletes are struggling with issues that would significantly benefit from psychological services (Watson, 2006). Student-athletes face more stressors than their non-athlete peers, which can negatively affect their mental health and their athletic performance. Mental health services can provide student-athletes with the help they need; however, not all student-athletes seek mental help and not all student-athletes have access to the help they need or do not know where they can get help. Athletic departments play a key role in allowing staff counselors and sport psychologists to be readily available to their student-athletes. The purpose of this proposed study is to examine NCAA athletic directors' perceptions of the need for full-time sport psychologists within their program. Emails were sent out to the 65 identified ADs of the Power Five schools inviting them to participate in a Skype or phone interview. Participants will be asked in an interview what their opinion is on employing a sport psychologist full-time and also their opinion on creating a budget to set aside for sport psychology programming. Before the interviews will commence, informed consent will be obtained to ensure the participants will make an informed decision to participate. The interviews will begin with simple, close-ended questions to build rapport and introduce the grand tour questions gradually. Two audio recording devices will be used in each interview and the participant's demeanor will be noted. After the interviews are over, hard copies of each interview transcript will be printed in identical text size and font. The transcripts will be read to identify key themes. Interviewees will be included in member checks by contacting them with note of emerging themes to see if they accurately reflect their positions as athletic

directors.

17. **Title: Microbial Communities Associated with External Fur Surfaces of Bats and the Discovery of Novel Isolates with Antifungal Activity against *Pseudogymnoascus destructans***

Principal presenter: Pairs Hamm

Major: Biology

Faculty mentor: Dr. Andrea Porras-Alfaro

Abstract: White-nose Syndrome (WNS), a bat fungal disease caused by the psychrophilic fungus *Pseudogymnoascus destructans*, has been estimated to have caused the death of more than six million bats in the eastern U.S. and Canada. Fungal and bacterial surveys were conducted to explore bats' natural microbial communities as a possible defense against this pathogen. Our WNS research efforts have mainly focused on the study of microbial communities associated with bats using next generation sequencing, metagenomic analysis, and the evaluation of cultured Actinobacteria to determine antifungal activity against *P. destructans*. Metagenomic analysis showed that fungi on bat fur surfaces belong to Chytridiomycota, Ascomycota, Basidiomycota, Glomeromycota, and Neocallimastigomycota. Distinct fungal and bacteria communities were detected on WNS (+) bats from Illinois and Indiana and WNS (-) bats from New Mexico and Arizona using 454 pyrosequencing. Further, we evaluated the antifungal potential of naturally occurring Actinobacteria isolated from WNS (-) bats. Bacteria colonizing bat fur and membranes were isolated from 12 healthy bat species providing approximately 2,700 isolates. We have screened over 1,300 bacterial isolates using a bi-layer method, of which 36 isolates show antifungal activity against *P. destructans*. Of the antifungal producing Actinobacteria, 32 (89%) were from the genus *Streptomyces*, known for their antibiotic production. Fifteen of the isolates with antifungal activity against *P. destructans* were identified as novel *Streptomyces* species after morphological and multi-gene phylogenetic analysis. This study includes one of the largest surveys of microbial communities associated with healthy bats. Our results show that bats in western North America possess novel bacterial microbiota with the potential to inhibit *P. destructans*.

18. **Title: Influenza and HIV: A Comparative Analysis**

Principal presenter: Hali Strobel

Major: Health Sciences (Public Health)

Faculty mentor: Dr. Jamie Johnson

Abstract: Listed among other fatal disorders such as: cancer, heart attacks, strokes, and diabetes in Healthline's "Top 10 most Deadliest Diseases in 2014" are lower respiratory diseases and HIV/ AIDS. Lower respiratory diseases include pneumonia, bronchitis, and the most precarious of them all, Influenza, which also subsequently can cause both pneumonia and bronchitis (Morens, Taubenberger, 2008). In 2012 alone, lower respiratory diseases killed 3.1 million people, which totaled to 5.5% of all deaths that year (Pietrangelo, 2014).

Listed two spots below lower respiratory diseases is HIV/ AIDS, which was responsible for just 1.6 million, or 2.9% of deaths in 2012 (Pietrangelo, 2014). Historically, Influenza has caused more casualties than HIV/ AIDS, yet the general population associates a harsh stigma with HIV/ AIDS, but not Influenza. This research proposal will explore the differences between the two viruses in an attempt to discern common misconceptions and provide truth to the severity and complexity of each of them respectably. Primarily, the research study will focus on the pathology of the viruses and their transmission methods in addition to a historical overview of Influenza and HIV, and the associated stigmas that they have acquired as a result over time. In addition to prefacing this research proposal with plentiful information about both viruses, the proposal will conclude with a research experiment. This experiment includes a pre/post survey with an educational intervention, which was designed to determine the known information among high school and college students regarding HIV and Influenza, and additionally identify the lack of knowledge and misconceptions concerning both viruses. The survey is used to quantify these educational issues, and measures unknown information, misconceptions, and societal perceptions of both viruses. This research proposal and prospective study, and its findings, are significant for a few reasons. The first is that the research proposal will educate the public on Influenza and HIV, with a strong focus and emphasis on prevention. The second is that by conducting a pre/post survey with an educational intervention, health educators will be able to identify the areas that were commonly misunderstood by high school and college students, and determine which of them were furthermore corrected using the educational intervention tool. Finally, this study will provide insight and ideally correct the associated stigmas with each virus.

19. ***Title: H₂CS Absorption in the High Mass Star Forming Region G34.26+0.15***

Principal presenter: Wei Siang Tan

Major: Physics

Faculty mentor: Dr. Esteban D. Araya

Abstract: High-mass stars have masses greater than 8 solar masses and are the main source of heavy elements such as iron in the interstellar medium. This type of stars form in giant molecular clouds. Studying the molecular environment in star-forming regions is crucial to understand the physical structure and conditions that lead to the formation of high-mass stars. Thioformaldehyde (H₂CS) is among the molecules found in star forming regions. We present observations of H₂CS toward the high mass star-forming region G34.26+0.15. We detected an H₂CS absorption line at the rest frequency of 6278.65 MHz. We used the radiative transfer code RADEX to investigate the physical conditions of the molecular cloud responsible for this absorption line. We explored different models based on a range of temperatures, densities, abundances and physical sizes, and conclude that the absorption is most likely tracing the molecular envelope of the ionized region in G34.26+0.15.

20. **Title: Assessing the Contribution of Hyperfine Structure to the Line Profiles of Astrophysical Masers**

Principal presenter: Arup Barua

Major: Physics

Faculty mentor: Dr. Esteban D. Araya

Abstract: The term 'maser' is an acronym for Microwave Amplification by Stimulated Emission of Radiation, which is equivalent to lasers but at microwave frequencies. Naturally occurring masers are often found in star forming regions, for example, masers from water and formaldehyde molecules have been detected in regions of high mass star formation. Just as in the laboratory, spectral lines from molecules in space exhibit a phenomenon known as hyperfine splitting, which is due to nuclear spins. The energy difference between different hyperfine transitions is small, thus, detection of the hyperfine structure of molecular transitions requires observations of narrow spectral lines such as masers. We present a study of the line profiles of 22 GHz water and 4.8 GHz formaldehyde masers in several star forming regions. We conclude that the complex spectrum of water masers in NGC 7538 is not caused by hyperfine splitting. We also set limits in the level of hyperfine structure in the formaldehyde masers in G23.71-0.20 and G32.74-0.07.

21. **Title: C-H bond Chalcogenation and Oxidation of Indole**

Principal presenter: Osamah Al-Mohammed Baqer

Major: Chemistry

Faculty mentor: Dr. Jin Jin

Abstract: Indole is one of the most abundant heterocycles in nature. Its structure is found in many bioactive natural products and drug molecules. The examples of indole-containing bioactive molecules are tryptophan (one of the essential amino acids and a constituent of most proteins), indole-3-acetic acid (plant growth hormone) and serotonin (neurotransmitter). Many drug molecules also contain indole in their structures such as Imitrex, Maxalt and Ralpac for the treatment of the disease Migraine. During the past few decades, the field of C-H bond functionalization in organic chemistry has flourished. The approach is very attractive to organic chemists because C-H activation and functionalization is "greener" than conventional methods. In our research, we explored the C-H bond chalcogenation reactions of indole. We are interested in introducing chalcogen atoms to the heterocycles because chalcogens take very important roles in the biological world. All animals need significant amounts of sulfur. All animals and some plants need trace amounts of selenium and humans consume on average between 6 and 200 micrograms of selenium per day. Mushrooms and brazil nuts are especially noted for their high selenium content. Selenium and tellurium can both protect against heavy metal poisoning. Two chalcogenation products of indole were successfully prepared and characterized by NMR spectroscopy. We also found an interesting oxidation reaction of indole to give oxindole by using TeCl_4 and I_2 . We hope the combination of these two reagents can also be applied to catalyze other oxidation reactions.

22. **Title: Determination of Sulfur and Mercaptane in Crude Oil by using Gas Chromatography**

Principal presenter: Ibrahim A. Al-Dulaimi

Major: Chemistry

Faculty mentor: Dr. Brian Bellott

Abstract: The majority of liquid petroleum products are derived from crude oil. A refinery is used to separate crude oil into different products which are used in everyday life. The crude oil is tested prior to entering the refinery for the amount of sulfur present in the oil. Sulfur is a major problem in crude oil as it is the principle chemical in crude oil which corrodes refinery pipes. Sulfur is also the principle chemical which poisons the catalyst used to purify the oil and help break the larger compounds down into smaller compounds. Also, if sulfur is left in the oil after processing it will be combusted to produce SO_3 gas which when released into the atmosphere reacts with water to produce H_2SO_4 (acid rain). The goal of this work is to detect one of the more common families of compounds in crude oil, mercaptans. Our goal is to use a solid phase extraction method to isolate the mercaptans and then analyze that fraction using Gas Chromatography (GC). In the process of detecting the mercaptans we will determine the limit of detection for our instrument. This is the smallest amount of mercaptans present in the sample that we have statistical confidence in its presence in the crude oil. We will also determine the limit of quantitation, which is the lowest amount we can quantify in the sample.

23. **Title: Synthesis of an Analog of 2-Iodoxybenzoic Acid**

Principal presenter: Taiwo Esan

Major: Chemistry

Faculty mentor: Dr. T. K. Vinod

Abstract: My research objective is to synthesize an analog of 2-iodoxybenzoic acid. An environmental friendly organic compound that can be used as an oxidizing agent in various organic reactions with starting inexpensive material, readily available. Some reactions where the product can be found to be very effective, clean are listed below: (i) Oxidation of alcohols to the corresponding carbonyl compounds, (ii) Chemoselective oxidation of secondary alcohols with IBX/ $n\text{-Bu}_4\text{NBr}$ in $\text{CH}_2\text{Cl}_2\text{-H}_2\text{O}$ gave ketones in good yields and allowed the oxidation of secondary hydroxyl group even in the presence of primary hydroxyl groups. (iii) Oxidation of β -hydroxyketones to β -diketones, o-iodoxybenzoic acid (IBX) was found to be efficient, operationally easy, and superior to other common oxidants. (iv) 1,3-Diols undergo smooth oxidative cleavage of the C-C bond in the presence of 2-iodoxybenzoic acid (IBX) affording 1,2-diketones in excellent yields under mild conditions etc. My research project is rather unique because I am currently working on synthesizing 2-iodoxybenzoic with two benzene rings in a cyclophane motif. This analog of 2-iodoxybenzoic acid unlike the original 2-iodoxybenzoic with only one benzene ring also has unique structural features. Unlike the normal 2-iodoxybenzoic my product is expected

to be more reactive and soluble in organic solvents. The experiment involves the synthesis of the first benzene derivative Y which will be made to react with the second benzene derivative Z to form the expected product.

24. **Title: Exploratory Solid State Chemistry**

Principal presenter: Erik Sarnello

Major: Chemistry

Faculty mentor: Dr. Brian Bellott

Abstract: This research aims to investigate the many unique structures and properties associated with crystalline solid-state materials via optical microscopy, scanning electron microscopy, as well as X-ray crystallography. Recently, transition-metal tin-chalcogenide compounds have drawn a great deal of interest due to their unique electronic and structural properties. The thermoelectric and semi-conducting properties of these materials have the potential to greatly improve the efficiency of modern electronics as well as many industrial applications. A compound of interest, CoSn_2Te_4 , was first synthesized and crystallized via the ceramic solid-state synthesis method. To begin, each element, in powdered form, was combined in a stoichiometric ratio in carbon-coated quartz tubes. Each tube was then vacuum sealed under a pressure of roughly 40-60 microns of Hg. Sample tubes were then loaded into a temperature controlled furnace which reaches a maximum holding temperature of 800°C . Once the temperature program completes, each sample tube is then opened and sorted for crystalline materials via optical microscopy.

25. **Title: Synthesis of 1,2,3-Triazole Derivatives**

Principal presenter: Mary Shravanthi Kakumanu

Major: Chemistry

Faculty mentor: Dr. Jin Jin

Abstract: 1,2,3-Triazole is a basic aromatic heterocyclic compound with a five-membered ring of two carbon atoms and three nitrogen atoms. 1,2,3-Triazole is used widely in medicinal chemistry as a building block for more complex chemical compounds. The search for new biologically active compounds in the series of 1, 2, 3-triazoles is still continuing. Potential pharmaceuticals based on 1, 2, 3- triazoles include the anticancer compound carboxyamidotriazole (CAI), β -lactum antibiotics such as Tazobactam and Cefatrizine. Most of the 1,2,3-triazoles were prepared through 1,3-dipolar cycloaddition process using azides and acetylene equivalents. We are going to introduce chalcogen atoms to the 1,2,3-triazole ring. Chalcogens are the elements of group 16 in the periodic table-oxygen, sulfur, selenium, tellurium, and polonium. Each of them influence our lives on a daily basis, and are useful in numerous ways. Chalcogens take very important roles in the biological world. For example, selenium and tellurium can both protect against heavy metal poisoning. The 1,2,3-triazole derivatives containing some chalcogen atoms such as selenium and tellurium will be synthesized first and then characterized by NMR and Mass spectroscopy.

26. **Title: Impacts on Prices Paid to Colombian Coffee Growers**

Principal presenter: Alex Walker

Major: Economics

Faculty mentor: Dr. Kasing Man

Abstract: I am investigating what variables impact changes in the price paid to Colombian coffee growers in US dollars per pound of coffee sold during the time period 1986-2015. There are two main time periods amongst coffee trade, the first from 1965 to 1989, when coffee was regulated by four International Coffee Agreements, and the second from 1990-2010, which is regarded as the free market era (International Coffee Organization). Colombia is the third largest coffee producer in the world, after Brazil and Vietnam. Colombia produces only Arabica, as opposed to Robusta, beans and is the largest producer in the world of this variety. The main harvest happens between September - December after a period of flowering between July and September, with a smaller harvest occurring during the "mitaca" harvest of March - June after a period of flowering between January through March every year. Current news states that coffee rust, La Niña weather patterns, high labor costs, borer insect infections, and inflation rates have negatively impacted coffee prices (USDA). This is an important topic because it is hypothesized that as global warming worsens and increases storms and temperatures, many growers globally will see a disappointment in their crop yield. For the study, I tested several variables. The variables tested were: Colombian coffee export amount, total production of Colombian coffee, amount imported by the United States, re-exports of coffee by all countries, US Consumer Price Index, retail prices of all coffee in the United States, binary variable for rust resistant variety replanting years, average price of the complement good milk in the US, average price of the complement good sugar in the US, average price of the substitute good tea in the US, and amount of rainfall and temperature by year for each season individually and annually. Our dependent variable is average price (wage) paid to Colombian coffee growers per pound of coffee. Our significant variables are Colombian rainfall through the months of March-May, average retail coffee price in the US, average sugar price in the US, and re-exports by all importing countries. The average retail coffee price testing as a significant explanatory variable was not surprising, as it makes sense that this would be positively correlated with prices paid to growers because of the relationship between product value and wage paid to the manufacturer. The average sugar price in the US testing as a significant explanatory variable confirms the law of complementary goods in microeconomics, stating that as the price of one good rises, so does the price of its complement. It is nice to confirm and apply microeconomic laws to see their effects in practice. Our last variable is re-exports of all types of coffee by developed countries. This re-exportation decreases the prices paid to growers because more revenue will go to the re-exporting country, who repacked and/or reprocessed the coffee.

27. **Title: Nematode Parasitism of Orthopterans in Sand Prairies vs. Tallgrass Prairies**

Principal presenter: Lindsey Poore

Major: Biology

Faculty mentor: Dr. Ken McCravy

Abstract: The goal of this study is to examine parasitism rates of orthopterans (grasshoppers, katydids, and crickets) by parasitic roundworms in local restored tallgrass and sand prairies. I will be investigating potential effects of host species on the parasitism rates of orthopterans and the species composition of the roundworms at both restored and sand prairies and then comparing the results to see if there are differences between them. By being grassland herbivores, orthopterans do affect plant diversity. Many other animals also feed on them for survival. If a substantial number of these orthopterans are being parasitized it could drastically change the grassland habitat. If certain species have high infection rates or are being parasitized by a deadly parasite species, orthopteran species composition could be affected. This study will be done in restored and sand prairies in west central Illinois. Sand prairies are unique in the way that they are drier than tallgrass prairies, have sandier soils, and plants that are adapted to more xeric conditions. It will be interesting to see if parasitism rates are changed by the drier atmosphere. In June through October 2016, I captured orthopterans using pitfall traps and insect nets. The orthopterans will be dissected, worms will be counted and identified, and the species of orthopterans will be cataloged. Parasitism rates and species composition will be compared between the two prairie types.

28. **Title: Application of the Constructs of the Transactional Model of Stress and Coping to Grieving**

Principal presenter: Staci Shank

Major: Health Sciences

Faculty mentor: Dr. Fetene Gebrewold

Abstract: I am proposing research on the Transactional Model of Stress and Coping using the grieving process as the prime example. Grieving can come in many forms such as the death of a parent or child, loss of a job due to cutbacks, or the end of a relationship with a significant other. People react to grief in different ways, some are healthy and some are not. The main objective of this research is to show how the constructs of the Transactional Model can be applied to grieving. Almost everyone will feel the loss of something during their lives. Being aware of and applying healthy coping responses to these situations leads to emotional and mental well-being.

29. **Title: Using Canvasbacks (*Aythya valisineria*) as a Bioindicator of Wetland Quality in the Upper Midwest**

Principal presenter: Andrew Bouton

Major: Biology

Other presenters or co-authors: Eric J. Smith, Heath M. Hagy, Michael J. Anteau, and Randy Smith

Faculty mentor: Dr. Christopher Jacques

Abstract: The proposed research seeks to determine wetland quality through the use of Plasma-Lipid metabolites in wild Canvasbacks (*Aythya valisineria*). The canvasback is a wetland obligate dependent on food associated with submerged aquatic vegetation (SAV) including tubers, moist soil seeds and aquatic invertebrates. Unlike many other waterfowl species they do not obtain nutrients from surrounding land. Being a wetland obligate canvasbacks can be a valuable indicator of wetland quality likely selecting wetlands of higher quality. Canvasback populations have fluctuated since the 1950s possibly due to changes in wetland quality and abundance. These changes are largely due to the draining and alteration of smaller less permanent wetlands which impact the ecosystems of larger wetlands. Increasing turbidity of wetlands results in a change of the natural plant and invertebrate communities. Different metabolites are released into the plasma when catabolizing or accumulating lipid reserves. By using Plasma-Lipid Metabolites we can determine whether the birds are catabolizing or accumulating lipid reserves. In the first year we will capture canvasbacks on pool 19 using dive in traps baited with corn. The birds will be randomly separated into 2 groups. The first group, treatment 1 will be fasted for 24 hours with blood being drawn immediately and then every 8 hours for a total of 4 extractions. Treatment 2 will be force fed a diet high in nutrition. Once the birds have gained weight blood will be drawn every 8 hours for a total of 4 extractions. All blood will be immediately centrifuged and the plasma separated and frozen within 3 hours in order to prevent hemolysis. From the metabolites and known daily mass changes we will create an index to determine if the birds are accumulating or catabolizing lipids. When lipids are catabolized β -hydroxybuterate is released resulting in a negative correlation with mass change. Triglycerides are the main storage units of fatty acids and have a positive correlation with an increase in mass. In the second year canvasbacks will be collected by shotgun from 5 historic spring migration stopover locations including Pool 19, Pool 12, Swan Lake National Wildlife Refuge, Emiquon Preserve, Hennepin and Hopper lakes. Blood will be collected immediately through cardiac puncture, then centrifuged, separated and frozen. These samples will then be compared to the index, to determine whether they were accumulating or catabolizing lipids. These historical spring migration stopover areas are expected to be of higher quality than surrounding wetlands and the birds collected are expected to be accumulating lipids. This research may help agencies with future management decisions concerning waterfowl. On a landscape scale it may help determine wetlands and regions that are of greater concern and reveal the sensitivity of spring migration habitats.

30. **Title: White Blazes, Blisters, and Ramen Noodles: Reasons and Motivations of Thru-Hikers on the Appalachian Trail**
Principal presenter: Sadie Van Norman
Major: Kinesiology
Faculty mentor: Dr. Cynthia Piletic
Abstract: The Appalachian Trail spans 14 of the 48 continuous states of the United States. Each year thousands of individuals attempt to hike the 2,100 mile footpath. A thru-hiker is defined as someone who completes the entire length of the trail in one season. Hiking the AT trail generally takes 4-6 months. Individuals begin hiking anywhere from February to April and finish between August and October. The objective of my study is to examine the reasons and motivations to thru-hike the AT. It is important to study this demographic because there is such limited research on them. Thru-hikers are difficult to study because their drop-out rate is high. 85-95% of all aspiring thru-hikers drop out. Hikers do not want their solitude interrupted. They do not want to be intensively interviewed. Lastly, few researchers have the time and freedom to take four to six months to prepare and hike the trail.
31. **Title: Sexually Abusive Relationships, Alcohol Use, and Suicidal Ideation**
Principal presenter: Tyler Cieck
Major: General Experimental Psychology
Other presenters or co-authors: Kristy Keefe, Department of Psychology
Faculty mentor: Dr. Kristy Keefe
Abstract: Previous research has shown that 6.7% of high school students have attempted suicide, and 7.8% of these students have been sexually assaulted (Tomasula, 2012). Furthermore, 26.2% of female students who had been sexually assaulted within the previous year had attempted suicide, while 7.1% of those without such histories had attempted suicide. Similarly, 26.4% of sexually assaulted male students had attempted suicide, while 3.6% of those who did not have sexual assault histories had attempted suicide. It has also been reported that these sexual assault victims are more likely to abuse drugs and alcohol. This is particularly concerning when considering that sexual assault and suicidal ideation are both related to these behaviors (Behnken, 2010). A relationship between forced sexual intercourse and suicidal ideation has been demonstrated, and binge drinking has been identified as a potential mediator. Other research has shown that alcohol use is more common in women that had been physically and emotional abused and attempted suicide (Weaver et al., 2007). The current study examined whether alcohol use mediated the relationship between being in a sexually abusive relationship and suicidal ideation. Researchers analyzed a dataset collected with the American College Health Association National College Health Assessment (ACHA-NCHA II; American College Health Association). To measure sexual abuse, researchers used question 6C ("Within the last 12 months, have you been in an intimate [coupled/partnered] relationship that was

sexually abusive?"). To measure alcohol use, researchers used question 8A ("Within the last 30 days, on how many days did you use alcohol?"). To measure suicidal ideation, researchers used questions 30J ("Have you ever seriously considered suicide?") and 30K ("Have you ever attempted suicide?"). Hayes's (2012) PROCESS macro was used to examine alcohol use (N = 108,446) as a mediator of the relationship between being in a sexually abusive relationship and suicidal ideation. Results indicated that alcohol use partially mediated the relationship between being in a sexually abusive relationship and suicidal ideation, $r = .10$, $ps < .001$. These findings suggest that alcohol use may mediate the relationship between being in a sexually abusive relationship and suicidal ideation. Alcohol use may exacerbate suicidal ideation in people who had been in a sexually abusive relationship. These results are important, as they suggest that certain coping methods could possibly make a victim's mental health worse.

32. **Title: Synthesis and Chemiluminescence Study of Luminol Derivatives**

Principal presenter: Drew Whipple

Major: Chemistry

Other presenters or co-authors: Ezra Fuerman

Faculty mentor: Dr. Jin Jin

Abstract: Luminol is very popular in the field of forensic sciences mainly due to the strong blue light emission upon specific oxidative conditions. The chemiluminescence property (emission of light due to a chemical reaction) of luminol is so important that this reaction has also been widely applied in bio-analytical chemistry such as biosensors and heavy metal identification. Of all applications, the most relevant one is the identification of haematic iron from cleaned blood-stains. However, luminol has some drawbacks that can limit its use in a crime scene investigation. For example, the glow is much shorter-lived than that shown in TV shows, and lasts only around thirty seconds. The use of luminol solution can also damage other surrounding evidence, such as proteins, enzymes and genetic markers. If someone cleans a crime scene thoroughly with bleach, residual cleaner makes the entire crime scene produce the typical blue glow, which effectively camouflages organic evidence such as blood. Because luminol chemiluminescence can also be triggered by some other substances such as certain bleaches. Therefore the enhancement of chemiluminescence of luminol is very important. The objective of this project is to synthesize luminol derivatives that would enhance its chemiluminescence. Finally the chemiluminescence of these synthetic luminol derivatives will be tested in the presence of hydrogen peroxide solution and an oxidant enhancer following a literature method.

33. **Title: Analysis of Total Antioxidant Concentration in Brewed Teas**

Principal presenter: Rachel Crews

Major: Chemistry

Faculty mentor: Dr. Brian Bellott

Abstract: Analysis of Total Antioxidant Activity in Brewed Teas In today's society, people

are very health conscientious. This stems from people reading research articles about chemicals that they encounter daily that cause cancer. Leading most people to buy certain foods or take vitamins that can lower the possibility of one getting cancer. One class of chemicals that has been shown to help prevent and lower the risk of diseases, cancer, and other bodily damage are antioxidants. Antioxidants are a class of molecules that can inhibit the oxidation of other molecules, which is important because when molecules are oxidized in the human body, it can lead to cell membranes being damaged. Antioxidants are found in food, vegetables, and drinks making them easy to come by. One drink that has strong antioxidant properties is tea. One property of tea that is unknown is the antioxidant activity of hot brewed tea versus cold brew tea. The goal of this research is to determine which brew of tea has the most antioxidant activity, thus making it more helpful in preventing diseases. Thus, this research will be focused on finding the antioxidant activity of both brews by adding 1,1-diphenyl-2-picryl-hydrazyl (DPPH), a stable free radical that is easily oxidized, to the different brews of tea. The antioxidant activity will be determined using colorimetric analysis using Ultraviolet-Visible Spectroscopy (UV-Vis). As the tea is brewing DPPH will be added to the sample, if more oxidants are present than antioxidants, the color will turn a yellow brown. If more antioxidants are present than oxidants, the color should remain the same. The absorption of the tea will be measured using the same wavelength for both the hot brew and the cold brew thus making them comparable.

34. **Title: Diagnosis System Thyroid Disease**

Principal presenter: Rashid Atallah Aljohani

Major: Computer Science

Faculty mentor: Dr. Byoung Jik Lee

Abstract: Every day, we create more than trillion bytes of data (bim.com). Collecting the data without using it in useful applications would be a big mistake. Therefore, I applied my skills in artificial intelligence and machine learning to build a system that has the ability to predict if patients have/do not have thyroid diseases. I started the project after I took several courses in artificial intelligence, concentrated in artificial neural network. The system was trained by a dataset that was collected by Garvan Institute in Sydney, Australia. The system was trained with more than 2800 patients information. I used a supervised learning algorithm, called Back-propagation. The algorithm contains two main stages: Feedforward and Back-propagate the error. The main idea of this algorithm is using the error-rate to fix the network weights in order to reach the desired result. The accuracy of the system is 92.6%.

35. **Title: Optical Band Gap Measurements in Bismuth Boro-tellurite Glasses Doped with Sm₃₊ and Eu₃₊ Ions**

Principal presenter: Rehab A Yajzey

Major: Physics

Faculty mentor: Dr. Saisudha B. Mallur

Abstract: Glasses doped with rare-earth ions are of interest materials in several high-technological and environmental applications. Study of optical absorption near the fundamental absorption edge is a useful method for the investigation of optically-induced transitions, band structure and the optical band gap in glasses. We prepared bismuth borotellurite glasses doped with Sm³⁺ and Eu³⁺ ions by varying TeO₂/ Bi₂O₃ content. By taking appropriate amounts of TeO₂, Bi₂O₃, B₂O₃ and Sm₂O₃/ Eu₂O₃, glasses were prepared by melt quench technique. The raw materials were melted in a furnace around 900° C and the melt was quenched on a brass plate. The glasses thus produced were annealed to remove thermal strains by placing in a tubular furnace at 300° C for 3 hours. The glass samples were smoothed and polished using an Inland Swap Top Machine. Optical absorption measurements were carried out using a UV-VIS absorption spectrometer. Using Mott-Davis model, the optical band-gaps and the type of transitions near the fundamental absorption edge were determined from the absorption edge data which lies in the wavelength range 350 to 450 nm. The optical band gap of these glasses is found to remain constant with increase of TeO₂ content and the absorption edge is mainly due to direct forbidden transition for Sm doped glasses and indirect allowed transition for Eu doped glasses.

36. **Title: Detection Probability and Disturbance of Waterfowl During Aerial Surveys**

Principal presenter: Andrew Gilbert

Major: Biology

Faculty mentor: Dr. Christopher N. Jacques

Abstract: Aerial waterfowl surveys have been conducted in the Illinois and Mississippi River floodplains since 1948. These traditional surveys provide an index of waterfowl population size and are used to track migration events, set harvest regulations, and for research purposes. New methods are being evaluated to estimate population size by randomizing survey locations and estimating count bias. We used double sampling to determine a correction factor for waterfowl estimates during fall aerial surveys. Immediately before an aerial survey, a ground observer surveyed waterfowl in predetermined locations from an elevated, unobstructed location where probability of detection was assumed to be 100%. Aerial counts were divided by ground counts for all common species and foraging guilds to determine count bias. Preliminary results indicate that mean detection rate for all waterfowl was 96.0% (SE=7%). Mean detection rate was 94.4% (SE=8%) for ducks, 105.2% (SE=11%) for dabbling ducks, 74.8% (SE=11%) for diving ducks, 53.3% (SE=8%) for mergansers, and 92.4% (SE=9%) for geese. Observers also documented disturbance to waterfowl caused by aerial surveys. Preliminary findings indicated 18.4% (SE=2%) of waterfowl, 12.2% (SE=2%) of ducks, 11.5% (SE=2%) of dabbling ducks, 4.5% (SE=1%) of diving ducks, 13.0% (SE=3%) of mergansers, and 28.6% (SE=4%) of geese exhibited negative responses (i.e., flew short distances, swam away, changed behavior significantly) to aerial surveys. Preliminary findings indicated that 5.5% (SE=2%) of waterfowl, 2.0% (SE=1%) of ducks, 1.2% (SE=1%) of dabbling ducks, 0.7%

(SE=1%) of diving ducks, 4.3% (SE=1%) of mergansers, and 15.1% (SE=3%) of geese abandoned survey sites and did not return following aerial surveys. With our findings, traditional aerial surveys conducted in the Mississippi and Illinois River floodplains can be adjusted for count bias and compared with population estimates from randomized surveys to compare cost and time efficiency of aerial survey techniques.

37. **Title: Prevalence of Ectoparasites and Strongyloides Robustus in Southern Flying Squirrels (Glaucomys Volans) in West-Central Illinois**

Principal presenter: Beth Scheihing

Major: Biology

Other presenters or co-authors: Will T. Rechkemmer, Sean E. Jenkins, Bridget M. Walker, University of Wisconsin-Stevens Point, Shelli A. Dubay, University of Wisconsin-Stevens Point, and Christopher N. Jacques

Faculty mentor: Dr. Christopher N. Jacques

Abstract: Parasites can have long-term negative fitness consequences for host organisms. The degree to which parasites may affect populations of host species may depend on a variety of factors including the host species itself and the ability of parasites to move between host organisms. Southern flying squirrels (SFS; *Glaucomys volans*) commonly occurs in all wooded habitats and has an eastern distribution south of the Great Lakes that extends up the east coast into southernmost Quebec. Nevertheless, a paucity of information on SFS parasitic diseases across Midwestern landscapes. *Strongyloides robustus* is an intestinal nematode that infects SFS and its congener (i.e., northern flying squirrel; *G. sabrinus*), though infection is more prevalent in the southern species, which commonly acts as a reservoir for infection. Infection with *S. robustus* also could be influenced by other parasites (e.g., ectoparasites) which could potentially increase susceptibility to *S. robustus*. Thus, the primary objectives of our study were to 1) determine prevalence and intensity of infection of SFS with *S. robustus*, and 2) determine the diversity of ectoparasites in SFS across west-central Illinois. Because of the unique landscape characteristics (e.g., high forest fragmentation) across the Midwest, population and disease dynamics of SFS may vary relative to other landscapes characterized by more contiguous forests. A total of 51 SFS were examined for ectoparasites, of which 25 (49%) were infected. Mean intensity was 4.12 ectoparasites per host. Preliminary results also indicate that 80% (n = 10) of SFS were infected with *S. robustus*. Our study is the first documentation of ectoparasites in SFS across Midwestern landscapes, which may assist with understanding ecological factors contributing to infection with *S. robustus*, and in turn assist with geographic prioritization of future SFS conservation efforts.

38. **Title: The Examination of Time on Task Behaviors of Students with Disabilities in a Motor Clinic as a Result of the ExerciseBuddy Application**

Principal presenter: Lauren L. Brozman

Major: Sport Management

Faculty mentor: Dr. Cynthia Piletic

Abstract: The Adapted Physical Activity Motor Clinic hosts students from the West Central Illinois Special Education Cooperative (WCISEC) on Friday mornings throughout each Fall and Spring Semester. The Adapted Physical Activity Motor Clinic has been an ongoing experience for Western Illinois students for approximately 16 years. The motor clinic is a learning environment for Physical Education teacher candidates, Communication and Speech Disorder graduate students, Special Education teacher candidates, and Education teacher candidates who are asked to educate and interact with students from the WCISEC. The WCISEC students range in age from 3 - 21 years . This learning experience gives Western Illinois students the unique opportunity to see development in the WCISEC students while also collaborating with other future professionals in an interdisciplinary/cross departmental experience. During the clinic time is divided between an on-land portion, where the students are active in the Brophy Hall gymnasium and swimming portion where students learn aquatic skills in the Brophy Hall swimming pool. The lessons plans are initially created by the physical education teacher candidates with professional input from the instructors of the kinesiology course and other future professionals working directly with the WCISEC students. The ExerciseBuddy application is used on an iPad to display a visual representation of the content that is verbally and physically being instructed by the physical education teacher candidates. For the purpose of the clinic Western Illinois students were encouraged to use the ExerciseBuddy application during their warm-up and throughout the lesson if it pertained to the objectives of the lesson plan. The application is an electronic visual board, that incorporates components of fitness training to communicate: expectations, repetitions, and body movements. The purpose of the study is to examine how the ExerciseBuddy application impacts the time on task of students with autism and intellectual disabilities. Data collection included recording the teaching sessions of the WCISEC students while participating in the gymnasium portion that focus on fundamental motor skills, sport skills, and lifelong leisure activities. Recordings of the students were collected while they participated in motor activities three consecutive semesters. The data collected observed groups of students (3-7 per group); individual student's performance with the application was not taken into account for the purpose of this study. Data analysis is completed by reviewing the digital recordings with a computer software systematic analysis tool known as SOFIT. SOFIT, was used to observe the recording once the semester(s) had concluded. The specific elements reported included: (a) level of physical activity, (b) session content, (c) instructor interaction and (d) instructor involvement. Significance of the research will impact the multiple professions, including physical educators, that come into contact and work with people with different types of disabilities and impairments. It is hypothesized that the results will indicate when using a smart tablet, paired with the visual component of Exercise Buddy it will aid in students' success towards meeting the objectives of the lesson

39. **Title: Solid State Synthesis of Ceramic Materials**

Principal presenter: Mohammed Althuqbi

Major: Chemistry

Other presenters or co-authors: Dr. Brian Bellott

Faculty mentor: Dr. Brian J. Bellott

Abstract: Abstract: Ceramics materials have been known for many years. One early example is red clay which was used to manufacture pottery, building bricks, etc. Ceramic materials can exhibit a variety of properties such as being very hard materials. Scientists have an ever increasing interest in ceramic materials due to their multitude of properties. Nowadays, advanced ceramics are being developed by altering the nanostructure of the materials. These nanoceramics materials have many applications due to their hardness, wear resistance, corrosion resistance, and thermal stability. Alumina(Al_2O_3), Zirconia(ZrO_2) and Silicon carbide (SiC) are three examples of advanced ceramics. These materials are synthesized via high temperature solid state methods. This research is exploring the high temperature synthesis of these materials in the nano regime.

40. **Title: Electron Paramagnetic Resonance Spectra of Vanadium Ions**

Principal presenter: Faisal Alanazi

Major: Physics

Faculty mentor: Dr. Pengqian Wang

Abstract: Electron paramagnetic resonance (EPR) is a powerful technique to study the absorption spectrum of materials with unpaired electron spins in the presence of an external magnetic field. The electron paramagnetic resonance spectroscopy is analogous to other technique that depends on the absorption of electromagnetic radiation. The goal is to measure the DPPH (2,2-diphenyl-1-picrylhydrazyl) sample and the hyperfine splitting constant for the V^{2+} ions in a MgO crystal. EPR device is dividing into three main parts, which they are Microwave Bridge with controller, magnet, and receiving system. The settings for the DPPH sample were trimmed to generate a comparatively huge signal that simplifies tracing the spectral line. EPR spectra can be generated by either varying the photon frequency incident on a sample while holding the magnetic field constant or doing the reverse. In physics, a molecule or atom has discrete states each with a corresponding energy. The absorption of electromagnetic radiation in EPR spectroscopy is due to excitation between electron spin state whose energies depend on the external magnetic field and the microwave frequency ($10^9 - 10^{10}$ Hz).

41. **Title: Utilizing Apache Hadoop MapReduce to Analyze Trends in High School Students Performance and Postsecondary Decisions**

Principal presenter: Megan Corbett

Major: Computer Science

Faculty mentor: Dr. Hoang Bui

Abstract: With rapid advances in the technology used to collect data in varying fields, the

amount of data that is stored globally is vastly increasing. This has created a need for the ability to process and analyze large quantities of data within reasonable timeframes. Often, it is not practical to perform analysis on a single processor, as the data amount and analysis complexity may result in large delays and overhead. An alternative and more practical approach is to perform large data analysis in a distributed environment, where data is processed on many machines in parallel. Apache Hadoop MapReduce is a software framework that allows users a simplified, accessible method to achieve large scale data processing through automated distribution and parallelization of computational tasks. In the present research, this framework was utilized to analyze the dataset generated from the High School Longitudinal Study of 2009 (National Center for Education Statistics) and discern trends in student performance and participation in postsecondary educational classes. An auxiliary focus of the analysis was to identify trends in student enrollment in science, technology, engineering, and math (STEM) related courses as well as identify precursors that may contribute to student decisions to pursue higher education. To carry out analysis, several programs written in the Java programming language using the Hadoop MapReduce framework were executed on the Galaxy cluster at Western Illinois University. Ultimately, the MapReduce model was found to be efficient in analyzing the input dataset and produced valid, usable results. Results indicate that student gender may play a role in high school academic performance, the decision to enroll in postsecondary education, view of personal mathematical capabilities, and inclination towards taking STEM courses during high school. It is also indicated that student high school grade point average may be an accurate predictor of postsecondary academic and career choices, as well as a predictor of the total amount of STEM courses that will be taken during high school.

42. ***Title: The Inclusion of Disability in Athletic Training Curriculums and Clinical Experiences***

Principal presenter: Holly Hall

Major: Kinesiology

Faculty mentor: Dr. Cindy Piletic

Abstract: An increasing amount of individuals with disabilities are participating in athletics and physical activities. Many athletic trainers believe they should provide coverage for adapted sports events and competitions involving individuals with disabilities (Fowler, 2004). However, athletic trainers do not feel prepared to work with populations with disability (Conatser, Naugle, Tillman, & Stopka, 2010; Fowler, 2004). If athletic trainers do not feel competent to provide services for athletes with disabilities, then the education of athletic trainers should be discussed regarding learning and clinical experiences. No studies to date have examined the incorporation of disability in athletic training education. Therefore, the purpose of this study is to explore how professional athletic training programs in the U. S. include disability content within the curriculum and clinical experiences of future professionals. Second, to solicit factors that enable or inhibit the inclusion of disability content in the athletic training curriculum as provided by directors of

AT Programs. The study follows an explanatory sequential mixed methods design through use of an initial quantitative survey and a follow-up qualitative interview. All 418 directors of professional AT programs will receive an electronic email inviting them to participate in an online survey. Those that fill out the survey will have the opportunity to participate in a follow-up semi-structured interview. The study aims to answer the questions: (a) how do athletic training programs include disability content and where in the curriculum and clinical experience is disability addressed. (b) what opinions do athletic training program directors have on including disability content in the athletic training curriculum and exposures to clinical experiences with individuals with disability and, (c) what factors do directors of AT programs identify impacting the inclusion of disability content and clinical experiences.

43. **Title: Gene Expression of Corn Earworm in Response to Infection by *Serratia Marcescens* and *Pseudomonas Aeruginosa***

Principal presenter: Oluwabukola Ajasa

Major: Biological Sciences

Other presenters or co-authors: Randahl Nickerson, Gabriela Garcia, Keshab Mainali, and Jeff Liles

Faculty mentor: Dr. Richard Musser

Abstract: The corn earworm, *Helicoverpa zea*, is a common crop pest that causes huge economic losses in agriculture. Due to an increased selection pressure for insecticidal resistance, more and more insect pests are becoming resistant to insecticides making them progressively harder to control. An alternate form of pest control has been utilized; the development and application of different types of microbial pathogens for the control of pests. Work on the development of new insect control methods require that we understand the mechanisms involved in pathogen infection and resistance. This insect is susceptible to infection by several different types of pathogens. In this study we examined the effect of common pathogenic bacterial strains on the growth, survival and gene expression of corn earworm larvae. We examined how *Helicoverpa zea*, reacts when exposed to pathogenic strains of *Pseudomonas aeruginosa*, and *Serratia marcescens* by measuring the transcriptomic gene expression. *Helicoverpa zea* caterpillars were allowed to feed on diets that were treated *S. marcescens*, *P. aeruginosa* or a control diet. The caterpillars' growth and mortality rates were measured. We observed a decrease in weight, difference in time to pupation, and higher mortality in caterpillars in the bacterial treatments compared to the caterpillars that fed on control diet. Caterpillar microarrays and Real-time quantitative polymerase chain reaction analysis of caterpillar tissue revealed that caterpillars had a significant increase in the expression of genes involved in metabolism, digestion, and immune system as well as . The analysis of the specific gene regulation that occurs in the caterpillars in response to these pathogens gave insight into the defense mechanisms used by *H. zea* during bacterial infection and how biologists can exploit weakness in caterpillar defense to find a solution in biological control.

44. **Title: Prevention and Reduction of Childhood Obesity Using Social Cognitive Theory**

Principal presenter: Oluwatosin Adetolani Omoniyi

Major: Public Health

Faculty mentor: Dr. Fetene Gebreworld

Abstract: Childhood obesity is a major global health challenge of the 21st century. The rate of childhood obesity has increased at an alarming rate over the past decades. In the past three decades in the United States, childhood obesity rate has increased for more than 100% among children and more than 400% among adolescents. With obesity remaining a leading risk factor for chronic diseases such as heart disease and diabetes worldwide, there is a need for proactive approach to childhood obesity prevention. The purpose of this study is to develop an intervention to prevent and reduce the rate of childhood obesity in the United States. The aim is to promote healthy eating using the constructs of Social Cognitive Theory. The intervention is targeted at parents, particularly expectant mothers. It is centered around the concept of family diet and involves healthcare providers of the expectant mother and the pediatrician of the child.

45. **Title: Web-based Interventions Serving Foster Families**

Principal presenter: Lauren Isaacson

Major: Clinical Mental Health Counseling

Other presenters or co-authors: Alicia Means, Department of Counselor Education

Faculty mentor: Dr. Holly Nikels

Abstract: The foster care system should be more than the mechanism which helps children achieve physical safety: it should strive to transform an uncertain, damaging environment to one that facilitates purposeful, fulfilling lives. While distancing children from danger is unquestionably important, it does not necessarily equate to relief of suffering, let alone growth. If the system aims to remove children from a harmful environment, it is perhaps the cruelest irony that it is simultaneously injurious. The transitory nature of the system perpetuates existing developmental delays due to neglect or trauma, increases the sense of impermanence, and causes gaps in education. Furthermore, subsequent and recurrent exposure to these experiences can have lasting, pervasive effects. Unfortunately, the conversation of how the system's methods of intervention should be improved is far from linear, and what "should" be done is often irreconcilably juxtaposed from what "can." However, while a reconstruction of the foster system itself is too broad and sweeping of a dilemma, how we support children and parents through this process is not. The current research delineates the calculated benefits and risks of web-based interventions for those who have experienced foster care, suggesting programs and sources of information personalized for this vulnerable, widely spread, sometimes mobile population. Components of these interventions will be personalized by age, circumstance, and need. Web-based counseling, support, and resources secured within a personalized website means that children and adults will have access to vital information facilitating a healthy transition

through, and after, this trying experience. Such interventions take important steps towards rapport building with youth, as well, by offering support in a format kids today are comfortable accessing and navigating. From the perspective of a client, web-based interventions are particularly attractive in that they are portable, convenient, and can protect anonymity. From a professional perspective, they are inexpensive to implement, offer easy assessment opportunities, can be tailored to client needs, and have gained significant empirical momentum for generating long term behavioral change. The current research discusses ethical and practical considerations for online interventions and lays the foundation for future applied research acting on these proposals. It also highlights the areas of greatest concern for both foster parents and children and proposes the layout and contents of a website carefully tailored to their needs. Keywords: Foster Care, Counseling, Online Interventions, Foster Parents

46. **Title: Gene Knockout of a Secondary Alcohol Dehydrogenase using CRISPR/Cas9 Technology**

Principal presenter: Susan Ovbude

Major: Chemistry

Other presenters or co-authors: Jacob Seiver

Faculty mentor: Dr. Jenq-Kuen Huang

Abstract: Gene knockout of a secondary alcohol dehydrogenase using CRISPR/Cas9 technology Pure 10-hydroxystearic acid (10-HSA) is a fatty acid derivative of significant industrial applications for its use as plasticizers, lubricants, surfactants, paints and resins (Erickson et al., Am. Soybean Assoc (1980)). *Nocardia cholesterolicum* 5767 (NRRL 5767) is a well-known bacterium that effectively transforms oleic acid to 10-HSA through the enzymatic activity of oleate hydratase in about 95% conversion yield (w/w) (Koritala et al., Appl Microbiol Biotechnol 32, 299-304, 1989). However, a small percentage of 10-HSA is always converted to 10-ketostearic acid (10-KSA) by the activity of another enzyme, secondary alcohol dehydrogenase (2°-ADH) which complicates downstream separation of 10-HSA from 10-KSA. Our long-term objective is to block the production of 10-KSA by silencing the 2°-ADH gene using CRISPR/Cas9 technology. CRISPR/Cas9 (Clustered Regularly Interspaced Short Palindromic Repeat/Cas-9) system is an important improvement over homologous recombination method in Genome engineering discovered in 2013 (CRISP101:A Desktop Resource from Addgene). To accomplish our long-term objective, we must first design and construct three single guide RNA (sgRNAs) which contain the protospacer RNA and the tracrRNA to guide the genome editing by CRISPR/Cas9 technology. The only difference among these three sgRNAs is the protospacer RNA; these three protospacer RNAs specifically complementary to three locations in the 2°-ADH gene. The tracrRNA binds to the Cas9 to activate this DNA digesting enzyme while the protospacer RNA guide the Cas9/tracrRNA complex to the targeted site and cut the double-strand genomic DNA right on the 2°-ADH gene. Here we describe the construction of one of the three sgRNAs. A 20 nucleotide protospacer that

targets 5' end of the 2°-ADH gene was selected. Based on this sequence, two 24 nucleotide oligos (20 nucleotides spacer sequence plus unique sticky ends on both forward and reverse primers) were designed and custom synthesized. The pair of oligos were annealed using a thermocycler pre-programmed to heat to 95° C and then ramp to 4° C over a period of about 20 minutes to generate ligatable fragments with overhangs that are complementary to overhangs of the desired plasmid. The annealed oligos were inserted to pCRISPomyes-2 plasmid by Golden Gate assembly in the presence of BbsI and T4 DNA ligase. BbsI, a type IIS restriction enzyme, was used to produce compatible 4 base overhangs on pCRISPomyes-2 thus allowing ligation with the annealed spacer. The assembled products were then transformed into E. coli NEB 5 alpha competent cells by heat shock. We have successfully obtained putative transformants containing the desired assembly by apramycin selection and blue/white selection in the presence of IPTG and X-gal (Cobb et al., ACS Synth. Biol. 4, 723-728 (2015)). The presence of the desired spacer in these putative recombinant plasmids will be confirmed by DNA sequencing and used to silence the 2°-ADH gene in NRRL 5767. This research is supported in part by the Department of Chemistry and WIU Foundation, Western Illinois University.

47. **Title: Overexpression of a Putative Oleate Hydratase Isozyme from Nocardia Cholesterolicum NRRL 5767**

Principal presenter: Hekmat AL-Hmadi

Major: Chemistry

Other presenters or co-authors: Dr. Lisa Wen

Faculty mentor: Dr. Jenq-Kuen Huang

Abstract: Overexpression of a Putative Oleate Hydratase Isozyme From Nocardia Cholesterolicum NRRL 5767 Nocardia Cholesterolicum NRRL 5767 (NRRL5767) is well-known for the ability to transform about 95% of added oleic acid to value-added product, namely 10-hydroxystearic acid (10-HSA) (Koritala et al., Appl Microbiol Biotechnol 32, 299-304, 1989) which is catalyzed by oleate hydratase. The NRRL 5767 genome contains two annotated oleate hydratase, both of these genes have been cloned recently and possess oleate hydratase activity by converting oleic acid to 10-HAS.

(www.fasebj.org/content/30/1_Supplement/838.1 by Huang et al, 2016; and www.fasebj.org/content/30/1_Supplement/838.2 by Vanderway et al, 2016;). Naturally occurring, renewable fatty acids in vegetable oils and their chemical derivatives are industrial useful compounds. These compounds have been widely used as plasticizers, lubricants, surfactants, components of coating, paints, and resins (Erickson editor, Handbook of Soy Oil Processing and Utilization. Am. Soybean Assoc. 1980). The objective of this research is to overexpress, purify, and characterize one of the isozymes by studying factors that might effect on the enzyme activity such as temperature, chemical inhibitors, pH, and cofactor. Such studies will provide optimal conditions for enzyme kinetics study. In this abstract, we report some of our preliminary results. The recombinant oleate hydratase has been overexpressed in the presence of IPTG and the successfulness was analyzed by

SDS-polyacrylamide gel electrophoresis which separates proteins by molecular mass. The recombinant protein has been purified to near homogeneity by the use of Ni affinity chromatography. The optimal pH was 6.5 and our enzyme doesn't require cofactor such as FAD and is sensitive to temperature. The activity of enzyme was monitored by two methods: using TLC and the second method was the coupling of oleate hydratase reaction with the secondary alcohol dehydrogenase. The 10-HSA produced by oleate hydratase (in the presence of oleic acid) is converted to 10-KSA in the presence a secondary alcohol dehydrogenase and NAD⁺. The NADH thus produced was monitored using spectrophotometer at 340 nm. The biotransformation product was confirmed to be 10-HSA by GC/MS. This research is support in part by the Department of Chemistry and WIU Foundation, Western Illinois University.

48. **Title: Physical Attractiveness and the General Factor of Personality**

Principal presenter: Riley Marshall

Major: Experimental Psychology

Other presenters or co-authors: Curtis Dunkel

Faculty mentor: Dr. Curtis Dunkel

Abstract: Personality traits covary such that an individual who possesses a desirable trait is more likely to possess another desirable trait, suggesting a General Factor of Personality (GFP; Figueredo, Vásquez, Brumbach & Schneider, 2004). The GFP is thought to reflect social effectiveness, and evolutionarily reproductive fitness. Physical attractiveness also contributes to reproductive fitness, so due to mutation-selection balance it is likely that the GFP and physical attractiveness (PA) would be correlated (Dunkel & Van der Linden, 2014). This association is the focus of the current investigation. Specifically, the associations between the GFP and physical attractiveness was examined using a behavioral genetic framework. Data were derived from the sibling subsample of the National Longitudinal Study of Adolescent to Adult Health (N=1639; Harris et al., 2009). This investigation utilizes data from the fourth wave, which occurred when the participants were between the ages of 25-33. During this wave, measures of personality and self-rated and rater-based physical attractiveness were collected. Univariate Cholesky models were used to determine the genetic and environmental contributions to the GFP and PA. Bivariate Cholesky models were used to investigate the extent to which genetic factors and environmental factors contributed to the relationship between PA and the GFP. Univariate Cholesky models showed significant additive genetic and non-shared environmental effects, but the non-shared environmental effects were more substantial in all cases. A bivariate Cholesky model of GFP and rater-based PA revealed that the covariance between these two constructs was due entirely to genetic factors (Table 1). On the other hand, additive genetic factors and non-shared environmental factors were responsible for the association between self-reported physical attractiveness and the GFP (Table 2). The covariance between rater-based PA and GFP was entirely due to genetic factors. This suggests that rater-based PA and GFP are both reflective of a genetically-based fitness factor. On the other hand, the

association between self-rated PA and GFP was primarily due to non-shared environmental factors. This reflects a possible response bias in the reporting of both constructs (Bäckström & Björklund, 2016). Additionally, it is likely that self-rated PA is influenced by experiences, such as social interactions, that enforce beliefs about attractiveness (Kurzban and Weeden, 2005). Taken together, these results show that differential processes shape the associations between rater-based and self-reported physical attractiveness and the GFP.

49. **Title: True Metabolizable Energy of Submersed Aquatic Vegetation for Mallard**

Principal presenter: Margaret Kenna

Major: Biology

Other presenters or co-authors: Sarah E. McClain, Dr. Christopher N. Jacques, Dr. Heath M. Hagy, and John W. Simpson

Faculty mentor: Dr. Christopher N. Jacques

Abstract: Aquatic systems in the Midwest have been highly modified since the beginning of the 20th century, including channelization, damming, and dredging of most large rivers (e.g., Illinois, Mississippi, Ohio, Missouri) and disconnection from their natural floodplains with networks of levees. While the loss of submersed aquatic vegetation from hydrologically-connected wetlands and backwater lakes along the Illinois and Mississippi rivers is well-documented, information is unavailable to determine the implications of these losses on energetic carrying capacity for waterfowl, especially dabbling ducks. The objective of this study is to estimate true metabolizable energy of six species of submersed aquatic vegetation common to the Upper Midwest for dabbling ducks. We have conducted feeding trials using wild-caught mallards (*Anas platyrhynchos*) during autumn 2015 and autumn 2016. Feeding trials consist of a 48-hour fast, precision feeding of focal submersed aquatic vegetation (e.g., *Stuckenia pectinata*) followed by a 48-hour period in a metabolic chamber to collect excreta. Gross energy of test foods and excreta were determined using a Parr oxygen bomb calorimeter, and were corrected for digestion efficiency to ascertain true metabolizable energy. We expect the true metabolizable energy of submersed aquatic vegetation to be less than that of seeds, tubers, and other hard mast. True metabolizable energy analysis will be completed during early 2017 and will be included in the presentation. Our data will be useful to conservation planners for estimating energetic carrying capacities of semi-permanently-flooded marsh habitats, which will aid in projecting impacts of wetland management alternatives (i.e. semi-permanently-flooded marsh versus moist-soil management). Understanding the true metabolizable energy of submersed aquatic vegetation will allow managers to assess the impacts on dabbling ducks of wetland habitat change over time or in response to stressors (e.g., hydrologic connectivity with rivers/lakes, climate change).

50. **Title: True Metabolizable Energy of Submersed Aquatic Vegetation for Dabbling Ducks**

Principal presenter: Margaret Kenna

Major: Biology

Other presenters or co-authors: Dr. Christopher Jacques

Faculty mentor: Dr. Christopher Jacques

Abstract: Wetlands and the vegetation communities provide critical foraging habitat for waterfowl. Many of these wetlands are disappearing at an alarming rate, reducing the amount of habitat available for waterfowl. Current conservation planning for wetlands is based on the assumption that food energy may be a limiting factor for waterfowl during their migration. This food limitation hypothesis states that by providing sufficient food energy for migrating ducks, populations will be in better overall health, incur fewer mortalities due to the harshness of migration, and will ultimately increase in number. One of the ways habitat managers can determine the energetic carrying capacity for a wetland is by using a daily ration model. This model states that in order to determine the food energy available in a wetland, managers need three pieces of information 1) the daily energetic requirement of ducks using a wetland, 2) the amount of food available in the wetland, and 3) the energetic value of the available foods for ducks. The energetic value an organism obtains from a food is considered True Metabolizable Energy (TME). So far, most TME values are derived from seeds and have only been collected from a few species of ducks. While managers know that ducks consume both seeds and Submersed Aquatic Vegetation (SAV) to obtain energy during their migration, the knowledge about TME values for SAV is limited. We are working on determining the TME values for seven SAV species commonly found in the Midwest to better understand what food energy SAV has for waterfowl. This study takes place at the Forbes Biological Station in Havana, IL and is a continuation of an ongoing TME project. The first stage of this project researched the TME values for mallards on seven species of SAV and was completed during the fall of 2016. The data for the second stage is currently being collected and will focus on researching the TME values of the same seven plants for gadwall. The gadwall for this study are wild caught and are fed freshly collected SAV for the TME trials. TME trials consist of fasting and feeding gadwall, then collecting their excreta. The excreta is dried, ground, and pressed into pellets that undergo combustion in a Parr 6050 compensated jacket calorimeter to determine the gross energy of the sample. The gross energy is used to calculate a TME value for the excreta sample. The objectives of this project are 1) determine TME values of seven species of SAV for gadwall, 2) compare gadwall TME values with the mallard TME values obtained during the first stage of this study, and 3) use TME values of SAV determined in this study, along with SAV density data provided by the Winous Point Marsh Conservancy, to predict food energy availability across the Midwest. To date, we have conducted gadwall TME trials on four of the seven species of SAV and are currently working on processing the excreta to determine the gross energy of these samples.

51. **Title: Solid State Synthesis of $\text{Cu}_2\text{Sn}_2\text{S}_6$**

Principal presenter: Majed Almashnowi

Major: Chemistry

Other presenters or co-authors: Dr. Brian Bellott

Faculty mentor: Dr. Brian Bellott

Abstract: There are many methods to produce single crystals of materials. One such method is called the high temperature solid state synthesis method. In this method reagents are combined in a reaction vessel and heated to high temperatures for long periods of time. The high temperatures and long periods of time are required because the mixing of reagents is a slow process. This method has delivered many useful solid state materials. This research is focused on the high temperature solid state synthesis of $\text{Cu}_2\text{Sn}_2\text{Se}_6$. The prepared materials were characterized using a light microscope, scanning electron microscope, and energy dispersive X-ray spectroscopy.

52. **Title: Photoluminescence Spectral Measurements of Lead Borate Glass Doped with Samarium Ions and Lead Germanium Borate Glass Doped with Terbium Ions**

Principal presenter: Grija Kumar Thapa

Major: Physics

Other presenters or co-authors: Dr. Mark S. Boley, Dr. Saisudha B. Mallur, and Dr. P. K. Babu

Faculty mentor: Dr. Mark S. Boley

Abstract: Photoluminescence is the technique of using light itself in order to excite the luminescence spectra to be collected from solid-state samples. Photoluminescence spectra give us the unique ability to study the electronic transitions available in a sample and categorize their energy changes and intensities, thus helping us determine the applications of that sample as an optical material. The photoluminescence system in our laboratory uses an Argon ion laser for excitation at wavelengths in the blue and violet, and a high-resolution Triax 550 spectrometer equipped with a GaAs Photomultiplier Tube (PMT) for collection and analysis of the sample luminescence in a computer-controlled LabVIEW environment. Emission spectra for glass samples of composition $36.5\text{PbO}: 60\text{B}_2\text{O}_3: 3\text{CdSe}: 0.5\text{Sm}_2\text{O}_3$ and $30\text{PbO}: 15\text{GeO}_2: 51.5\text{B}_2\text{O}_3: 3\text{Ce}_2\text{O}_3: 0.5\text{Tb}_2\text{O}_3$ were obtained and compared as a function of excitation wavelength and intensity in the first sample, and the emission intensity versus emission wavelength was plotted for both samples. These particular glasses promise to have a wide range of application in materials science, such as in fiber optics telecommunication, lasing media, solar energy conversion, and even medical bio-imaging. Our goal is to study the photoluminescence spectra of these materials as a means to understand the mechanism to improve the efficiency of the luminescence applications of the materials.

53. **Title: Optical Properties of Samarium (Sm) and Dysprosium (Dy) Doped Lead Boro-Tellurite Glasses**

Principal presenter: Tanjina Nasreen Ahmed

Major: Physics

Other presenters or co-authors: Dr. Saisudha B. Mallur and Dr. P. K. Babu

Faculty mentor: Dr. Saisudha B. Mallur

Abstract: We prepared a series of rare earth doped lead boro-tellurite glasses containing silver nanoparticles by varying the annealing time. We studied the density, refractive index and fluorescence of rare earth ions in these glasses. These glasses are prepared using appropriate amounts of PbO, H₃BO₃, TeO₂, Sm₂O₃, Dy₂O₃ and AgNO₃ of high purity (99.9%). These raw materials are homogeneously mixed and melted in a porcelain crucible at 9300° C. The melt is air quenched by pouring it on a thick brass plate and covering it immediately with another brass plate. The glass samples obtained are annealed at 3500C for different times i.e. 15, 30, and 45 hrs to grow silver nanoparticles as well as to remove the thermal strains. Annealed glass samples are first flattened and then polished using a lapping machine to obtain well reflecting surface. The sample density is measured by the Archimedes method using xylene. The refractive index of the glasses is measured by the Brewster angle method using a PASCO set up (OS-8170) with a diode laser operating at 632 nm as the source. Fluorescence of Sm and Dy ions in these glasses are measured using Shimadzu spectrophotometer. Here we report the dependence of density, refractive index, and fluorescence of these glass samples on the annealing time.

54. **Title: Hyperpersonal Relationships Transitioning to Real Life**

Principal presenter: Joshua Fitzgerald

Major: Communication

Faculty mentor: Dr. Josh Averbeck

Abstract: Current studies have established that relationships primarily using computer mediated communication (CMC) can be more intimate and closer than traditional face to face relationships. These CMC relationships have been defined as hyperpersonal, if they reach a significant level of closeness and intimacy. Few studies have looked at what happens when these hyperpersonal relationships transition from CMC to face to face, specifically how both parties reduce their uncertainty during the first face to face interaction. The purpose of this research is to discover whether meeting someone online is truly more beneficial than originally meeting someone face to face. Relationships will be evaluated on their level of closeness and intimacy, level of uncertainty, and how both parties reduce their uncertainty face to face. This study will be an experimental study observing how close, intimate CMC relationships reduce uncertainty compared to individuals who are meeting face to face for the first time ever. Analyzing and evaluating these first face to face interactions while observing how all parties reduce uncertainty will shed light on the true benefits of relationships that originate via CMC. If both hyperpersonal and non-hyperpersonal relationships contain similar levels of uncertainty and closeness

after meeting face to face, and attempt to reduce uncertainty using the same techniques during the interaction, then the benefits research suggests of a CMC relationship may be reduced only to a convenient way to meet new people with no significant relational benefits outside of online interaction. If the relationship is hyperpersonal and intimate before the face to face meeting, and the relationship changes after the first meeting; then this research could suggest that face to face relationships and CMC relationships are two separate entities altogether, regardless of the fact that they are involving the same people. The study will include participants exchanging emails with an anonymous partner developed by the experimenter in an effort to generate an intimate relationship, and this relationship will progress to meeting face to face to observe the uncertainty reduction techniques being used. Other non-hyperpersonal relationships will also be evaluated during the first face to face meeting to see how the two relationships vary in reducing uncertainty. The levels of closeness and intimacy will be analyzed as well to measure changes in the relationship after the first face to face meeting. Findings will indicate the possible change in the relationship after transitioning from CMC to FtF communication.

55. **Title: Objectifying Women: A Content Analysis**

Principal presenter: Antoinett Lane

Major: Sociology

Faculty mentor: Dr. Tawnya Adkins Covert

Abstract: The purpose of this research is to examine sexualization and objectification of men and women in fitness magazines using the gender criteria developed by Erving Goffman in his work, Gender Advertisements. By conducting a content analysis of images found in articles published in the magazine Muscle and Fitness between the years of 2015 and 2016 was conducted for this project. Goffman's ideas behind gender display in the media helped define how men and women were viewed by their audiences. Goffman exposed the many issues regarding female objectification and sexualization in fashion advertisements. He assessed advertisements by looking for relative size, ritualization of subordination, licensed withdrawal, function ranking, and feminine touch. This research examines how the five categories provided by Goffman can be used to analyze articles within Muscle and Fitness.

56. **Title: The Effect of Trade and Innovation on Poverty**

Principal presenter: David Alton

Major: Economics

Faculty mentor: Dr. Shankar Ghimire

Abstract: Are poverty rates in developing countries affected by trade and innovation? I believe in a closed system that the answer is yes, but the world is not that simple. In a world of imperfect government spending, an ever-increasing income gap, and possible corruption, the answer is more gray than black or white. There is a study that suggests that when a country's average income increases the lowest income quintile rises proportionately

regardless of location, time period, and growth rates (Dollar and Kraay 2002). The same authors in a different study suggest that developing countries that participate in global trade see faster economic growth and shrinking poverty rates over developing countries that do not participate (Dollar and Kraay 2001). Innovation in economic terms has only recently gained support over past interpretations of the term. Innovation has been found to be associated with higher productivity in both developing and developed countries. Innovation is a powerful force of growth in both the public and private sectors (Fagerberg et al., 2010). Trade and poverty are easy variables to work with because there are countable measurements for both topics; innovation on the other hand has no standard metric. The definition of innovation is frequently thought to be only the most advanced technology. Innovation can be so much more than the latest technology. Innovation could be a revised method of operating daily tasks. I will be investigating three large subsets of innovation. First is human knowledge, the inexhaustible resource that might be able to be used as an indicator of innovation. Patents, Scientific publications, and several key education statistics can measure knowledge. Second, Productivity is the efficiency of production and can be examined by product output numbers. Finally, technology is the practical use of scientific knowledge. It can be measured by accessibility of electricity, web utilization, and the use of household appliances. I believe my study will be different from previous literature because my data will see the world about 15 years past 2000. Where technology has been growing at an outstanding rate. My data will also cover the 2008 global financial crisis that hit developing countries; though it was deferred to a later date, it did eventually transmit through trade (Gurtner 2010). I will be examining existing literature and I am anticipating on finding a suitable metric for innovation. I will do a panel regression on data obtained from the World Bank Group and Open Data for Africa on trade, innovation and an interaction variable between the two and their effect on poverty in developing countries. I expect to see a positive trend between trade and innovation on poverty but there is a variable not yet examined that will have a major impact as well. I also expect to see a correlation between trade and innovation. This study's purpose is to provide a better understanding of a relatively underexplored topic of innovation and economic development.

Podium Presentations

1. **Title: The Impact of Student Teaching on the Preservice Teacher**

Principal presenter: Carol L. Kilver

Major: Educational Leadership

Faculty mentor: Dr. Carol Webb

Abstract: Most Americans would agree that public education is designed to provide quality experiences for the youth of the nation. Skilled, profession-ready educators significantly impact the public school experience. Student teaching has been a long accepted culminating experience for undergraduates entering the field of education. This mixed methods single case study reviews the thinking and perceptions of the preservice teacher before, during and after student teaching. While experiencing each phase of student teaching (before, during and after), the study captures the metacognition of the preservice teacher through the States of Mind as defined by Cognitive CoachingSM. The outcomes and findings within the study center on the shifts in the States of Mind held by the preservice teacher. These States of Mind center on *efficacy, craftsmanship, consciousness, flexibility, and interdependence*.

2. **Title: Differential Gene Expression of Tomato Fruitworm (*Helicoverpa zea*) in Response to Feeding on Different Types of Tomato (*Solanum lycopersicum*) Plant Tissues**

Principal presenter: Ammar Al-Furaiji

Major: Biology

Other presenters or co-authors: Donald Bath, Sue Hum-Musser, Richard Musser

Faculty mentor: Dr. Richard Musser

Abstract: Plants can evolve defenses to caterpillar feeding. As a response to these defenses, the herbivore evolves counter-defenses to cope with plant defenses. Most previous studies have focused on the gene expression of tomato plant leaf defenses in relation to caterpillar herbivory. Here we investigate the response of *Helicoverpa zea* (tomato fruitworm) gene expression after consuming on leaves and fruits of the tomato plants (*Solanum lycopersicum*). Our bioassay confirms that caterpillars grow faster on tomato fruits than on leaves suggesting that the fruits are a more optimal food source for the caterpillars. We then look at the transcriptomic changes in gene expression for caterpillars that feed on tomato leaves and fruit in comparison to an artificial diet. The microarray was conducted to measure the gene expression. Also, microarray results were confirmed in a separate study using quantitative Polymerase Chain Reaction (qPCR). Microarray data were expected to reveal thousands of *H. zea* genes that are significantly altered due to herbivory on the tomato leaves and fruits compared to artificial diet. The transcriptomic expression for compensatory gene expression for caterpillars that fed on leaves in comparison to fruits was particularly dramatic for digestive-, immune-, growth- and detoxification-related genes. This is likely due to tomato leaves having higher levels of plant defenses and lower well nutritive available than fruits. All in all, gene expression analysis will give us a better

understanding of caterpillar counter-defenses in relationship to its host.

3. **Title: Effectiveness of School Oral Health Education in the Reduction of Dental Caries among School Children in Enugu, Nigeria**

Principal presenter: Chukwuebuka Ogwo

Major: Public Health

Other presenters or co-authors: Dr. Mei Wen

Faculty mentor: Dr. Mei Wen

Abstract: Dental diseases are one of the most common and widespread diseases affecting mankind globally. Poorly treated and untreated dental conditions can have a significant effect on children's quality of life with a resultant deterioration in general health. In Nigeria, there is an expected exponential rise in the incidence of dental caries in the near future due to increased sugar consumption and inadequate fluoride exposure. Studies among school children in Enugu have reported low prevalence of some dental caries (15.5% to 24.4%) compared to the global rate with about 80% prevalence of untreated caries which is among the highest in the world. This has been attributed to high cost of dental treatment and negligence of dental disease. This study aims to examine the effectiveness of curriculum-based school oral health education in reduction of dental caries and improvement of oral hygiene among 12 to 14 year old school children in Enugu, Nigeria. We used secondary data to collect information about the prevalence of dental caries and oral hygiene status among teenagers as well as the distribution and performance of school oral health education in that area, and conducted analysis to explore how effective these programs are to help reduce dental caries. Overall, the study finds most of the programs are effective and contributed to the reduction of dental caries and improvement of oral hygiene among the school children.

4. **Title: The Literary Struggle for Homosexual Acceptance in Moroccan Literature**

Principal presenter: Selina Mannion

Major: English

Faculty mentor: Dr. David Banash

Abstract: My project is on the causes of homosexual censorship in Moroccan literature, the problems it has caused, and the remedies currently being used to rectify the situation. My primary focus will be on author Abdellah Taia and the ways he has created acceptance through space between language. My research wants to answer the questions Is the current environment in Morocco hospitable towards homosexual literature, has homosexual literature provided more safety for homosexuals in Morocco, and has the literature been influential in other Islamic countries?

5. **Title: Brexit: The Economic Impact of Immigration on the European Union**

Principal presenter: Susmita Raut

Major: Economics

Other presenters or co-authors: Dr. Shankar Ghimire

Faculty mentor: Dr. Shankar Ghimire

Abstract: This paper examines the economic impact of immigration on the European Union, in the context of Brexit*. In particular, it analyzes whether immigration has a positive or negative impact on economic growth of the European Union. The relationship between migration and economic growth is particularly captivating in the light of Brexit, as the issue of immigration in Europe was the leading cause of the whole event. More specifically, net migration to the European Union as of 2012 was under three million, but this number for the United Kingdom alone was almost a million. The impact of the migration pattern on the GDP growth rate of the EU member countries is analyzed, using the data obtained from the World Development Indicators database for the period 2004 to 2015. The dependent variable is growth rate of GDP of the respective EU countries and the independent variables are net migration, patent filed by immigrants, labor and capital growth. In addition, the paper analyzes the economic growth in European Union in the presence of innovation, measured by the patent filed by the immigrants. The existing articles mostly show a positive impact of migration on economic growth, achieved through human capital accumulation. I expect the result from this paper to be valuable addition to the study of innovation and economic growth due to immigration. *abbreviation of the term exit of Britain from European Union

6. **Title: Perception of HIV/AIDS Vulnerability and the Screening Tests among Youths**

Principal presenter: Oluwasola Ayosanmi

Major: Public Health

Other presenters or co-authors: Dr. Mei Wen

Faculty mentor: Dr. Mei Wen

Abstract: Since the first identification in the 1980s, HIV has been a big concern to all the countries and nations worldwide, regardless of rich or poor, young or old, male or female. According to WHO, more than 70 million people have been infected with the HIV virus and about 35 million people have died of HIV. Globally, 36.7 million [34.0-39.8 million] people were living with HIV at the end of 2015. Worldwide, an estimated 0.8% of adults aged 15-49 years are living with HIV. This study aims to explore the perception of youth towards the vulnerability of HIV/AIDS and the attitude and knowledge about the screening tests to help formulate more effective strategies to fight against HIV/AIDS among young people. We conducted a systematic search about the topic with different search terms to include the maximum amount of publication, studies and reports in the past ten years. The search includes both internet sources and print copies. After a detailed examination of papers according to the selection criteria, the data and findings were summarized and entered into Excel spreadsheet and analyzed. The findings will be described in a report and

submitted to the Health Sciences and Social Work department newsletter.

7. **Title: The Silenced and Naked People: A Representations of the Philippines and Filipinos at The Quincy Museum**

Principal presenter: Nancy Dixon

Major: History

Faculty mentor: Dr. Febe Pamonag

Abstract: Starting with the 1904 World's Fair in St. Louis, the representation of the Philippines Islands and Filipinos has been a slanted view. The exhibition institutionalized colonial knowledge about Filipinos and their lands. This analysis examines how The Quincy Museum in Quincy, Illinois represents the Philippines and Filipinos to the public. Twentieth century knowledge about Filipinos has impacted the way The Quincy Museum displays and silences the Philippines Islands and Filipinos. The analysis in this paper is explored through Filipino artifacts from both "tribal and modernized" areas, photographs, American letters from the Spanish-American War, pamphlets from the 1904's World's Fair, and other written and material items. A majority of the primary sources are housed in the archives at The Quincy Museum. The sources used in this paper will further the historical debate about museum representation and the utilization of colonial knowledge. By analyzing representation in small town museums, the legacy of colonial knowledge is illuminated and advances the idea of cultural consumption in the early to mid-1900s. In order to analyze museum's representation of the "Other," questions concerning colonial knowledge about the Philippines and the consumption of the Filipino culture are pertinent: How did American colonial knowledge influence the representation of the Philippines and the Filipino people at The Quincy Museum? How did American consumption of the Filipino culture influence and shape post-colonial representation? These questions lay at the heart of this analysis. This analysis advances the specific roles of museums and the politics behind the representation of the Philippines in order to expose the legacy of colonial knowledge, memory, and the production of knowledge. The findings showcase how The Quincy Museum enables an unequal representation of the Philippines compared to the representation of the Japanese or Chinese. This unequal representation and romanticizing of the Philippines has created a justification for the public to hang on to negative historical connotations of the Philippines and Filipino people and culture. Museums are pillars of historical communication and either create historical amnesia or are enablers of the amnesia. The promotion of "nineteenth century representations of the past have, perhaps unwittingly in most cases, contributed to a form of institutionalized rationalization of the past." The promotion of certain images The Quincy Museum exhibits to the public of the Philippines and the Filipino people perpetuates a nation that no longer exists in the same colonial context. The implications of colonial knowledge are long lasting. The Quincy Museum altered the context of time and therefore, has placed the Philippines Islands and Filipinos in a rigid, colonial framework without exposing the advancement of the Philippines.

8. **Title: The Determinants of Partitioning in the Arab World**

Principal presenter: Hashim Al-Rikabi

Major: Political Science

Faculty mentor: Dr. Vincent Auger

Abstract: Even though scholars have challenged the assumptions and findings of partition theory, advocates of partitioning continue to suggest partition as a solution to civil wars. Partition as an outcome of civil war has been attributed to various factors. Scholars have identified cluster of factors as determinants of partition, such as the scale of the security dilemma, the type of regime, the nature of killing (one-sided or mutual), the nature of neighboring countries (aggressive or seeking-stability), and the level of economic development. This paper conducts a single country study, the case of 1991 Iraq, to investigate the relevance of certain conditions. The 1991 Iraq case is very puzzling and demonstrated the inability of these factors to explain the divergence of the political outcome of the 1991 Shi'ite and Kurdish uprisings, where Kurds obtained de facto partition and Shia were oppressed, despite the shared similarities. On the contrary, this case highlighted the significance of the interaction of three factors (demographic concentration, separatist agenda, and permissive external environment) as determinants of partitioning. Since one case might be a deviant, rather than the norm, the paper proceeds by testing the applicability of these determinants in the Arab region by conducting few countries study that is based on the Most Similar System Design (MSSD) by comparing the cases of Lebanon Civil War of 1975, which concluded by maintaining state-unity; and Sudan's Second Civil War of 1983, which concluded with partition. These cases support the significance of the highlighted factors. Since this paper does not advocate partitioning, it recommends mechanisms to motivate cross-ethnic cooperation, such as civil society organization; international norms that reduce the viability of partition; and constitutional designs that satisfy, or at least, pacify the warring parties.

9. **Title: Plastic Waste as the Partial Replacement of Coarse Aggregates in Asphalt Mixes**

Principal presenter: Dhanunjay Kumar Donipudi

Major: Engineering Technology Leadership

Faculty mentor: Dr. Garrett Hunter

Abstract: The purpose of this research is to study the use of aggregates made from different types of plastic as partial replacement of coarse aggregates in Asphalt mixes and the stability, density in long run and to find out if there is any significant difference in the stability of HMA and HMA with a polymer binder, The density of HMA and HMA with a polymer binder. An ANOVA was used to analyse the Marshall test results as it has multiple specimens which show the proportion of aggregates and a T-test was used for the last test to figure the stability and the density. The results basically show the stability and the density of asphalt mix increases as the bitumen content increases till it reaches the max bitumen content and later it gradually falls.

10. **Title: Defining Fan Subculture in Dungeons and Dragons**

Principal presenter: Klaira Strickland

Major: English

Faculty mentor: Dr. Rebekah Buchanan

Abstract: First created in 1974, the largest table-top role-playing game (RPG) Dungeons and Dragons (D&D) started out as a war game where multiple players could join in and fight monsters. Grounded in fantasy conventions and as a way to explore fantasy genres, Dungeons and Dragons popularity continued through new editions and add-ons. In addition, Dungeons and Dragons legacy has lived on in the gaming world as the father of most RPGs and fantasy games with a large fan following across various editions and over multiple decades. The fan following is still evident today due to D&D's foundations in high fantasy. An exploration of the ways in which fantasy plays a role in the fan culture of D&D is necessary to understand how the aspects of fantasy affect gameplay and how players view D&D. By conducting a survey of Dungeons and Dragons players which focused on game play, players' relationships to other fantasy genres, and when players were introduced to the game, we explored the ways in which Dungeons and Dragons introduced players to other fantasy texts and experiences as well as other TRPGs. This paper will present the findings of the survey as well as situate Dungeons and Dragons in relationship to other fantasy and gaming subcultures.

11. **Title: Neisseria Gonorrhoeae Biofilm Interactions with the Human Immune System**

Principal presenter: Soumya Saha

Major: Biology

Faculty mentor: Dr. Catherine Miller-Hunt

Abstract: *Neisseria gonorrhoeae* is the etiologic agent of gonorrhea, a sexually transmitted disease (STD) in humans affecting both males and females. Some of the common symptoms of gonorrhea include inflammation of cervix or urethra and permanent health problems may arise with lack of treatment. Centers of Disease Control (CDC) recommended diagnosis of gonorrhea involves both presumptive and definitive steps and biochemical, enzymatic and serological testing. CDC recommended treatment of gonorrhea is a dual therapy, and involves the administration of two drugs (antibiotics) simultaneously. However, antibiotics are becoming increasingly ineffective with the rise in bacterial antibiotic resistance. The Innate immune system is the body's first line of defense and is employed when pathogens encounter host cells and host proteins. Virulence in *N. gonorrhoeae* is genetically linked to clonal variation and some of the genes responsible for virulence were identified in recent studies. Like many bacterial species, *N. gonorrhoeae* can form biofilm and laboratory tests suggest the presence of a biofilm component in cervical gonorrhea infection especially in females. Cells forming biofilms do not elicit a strong immune response in a host and gonococcal infections in women are often asymptomatic. The scope of the current research includes a detailed study of the biofilms formed by wild

type *N. gonorrhoeae* and two mutants, namely MisR and AckA. The type and continuity of the biofilms formed by the three strains will be analyzed and the mature biofilms will be treated against blood serum and neutrophils isolated from different hosts. *N. gonorrhoeae* will be grown on chocolate agar plates and venipuncture technique will be used to collect blood samples from four donors to isolate serum. Serum will be filter-sterilized, separated into small aliquots and frozen at -80°C until used. The multi-well or 96-well plate format will be used for the serum sensitivity and the biofilm assays. The wells will be divided in four segments for control, wild-type, MisR and AckA respectively and the biofilm content will be measured using a spectrophotometer by calculating the optical density. Blood serum and neutrophils will be used against mature biofilms in the next phase of the experiment. Currently, the biofilms formed by the wild type and two mutants are being analyzed. All data collected will be normalized and subjected to a student's t-test to determine the statistical significance.

12. **Title: London: Policing and Prostitution Victorian England to 1950's**

Principal presenter: Heather Grooms

Major: History

Faculty mentor: Dr. Ute Chamberlin

Abstract: This research paper discusses the development of policing practices to manage prostitution in London from the Victorian era through the post-WWII period revealing the changing ways that prostitution was regulated. Prostitution became increasingly associated with urban growth during the nineteenth century, especially in large metropolises such as London, and both reformers and government institutions sought to develop strategies to combat the problem. By tracing the debates surrounding prostitution, the creation of legislation, and policing activities, it becomes apparent that the city of London was willing to control and tolerate prostitution rather than suppress it altogether. As the city grew and London society changed, so too did the policing tactics for controlling prostitution, the geographical location of prostitution moved within the city, and a liberalization in London's attitudes of social justice towards prostitution evolved. This paper will examine primary sources such as W.T. Stead's *The Maiden Tribute of Modern Babylon* and other writings by reformers and social critics, government papers such as *The Wolfenden Report*, and the laws that regulated prostitution in London, along with relevant secondary sources that describe a variety of approaches to the policing of prostitution. While the issue of prostitution during the Victorian time period is well researched, longer-term analyses that include the years of the Great War, the Interwar years, and the decades after World War II are mostly missing. This paper attempts to trace the long-term changes in the regulation of prostitution in London in order to place the Victorian conditions into a broader historical context and to articulate how long-term trends and changes in the regulation of prostitution affected London's cityscape.

13. **Title: Detection of Thermophilic Fungi in Corn-based Food Products and Determination of Their Optimal Growth Temperature.**

Principal presenter: Adeyemi Olanrewaju

Major: Biology

Other presenters or co-authors: Dr. Andrea Porrás Alfaro

Faculty mentor: Dr. Andrea Porrás Alfaro

Abstract: Thermophilic fungi can grow at high temperatures between 45° C to 55° C and represent an important component of the microbial community in soils. The diversity and distribution of these fungi in corn-derived food products and their potential role in mycotoxin production have not been studied. Based on previous studies, we hypothesized that thermophile spores might be present in corn-based food products due to their high abundance in corn after harvest. Thermophilic fungi in corn-based food products were isolated using serial dilutions. Dilutions were plated on corn meal agar (CMA) and Emerson yeast starch agar (EYSA) and incubated at 45° C for 1 week. Fungal identification was carried out using microscopy and DNA sequencing. Fungi were isolated from all the corn-based food products tested. A total number of 36 cultures from various products including corn flour, corn flakes, corn bread, corn meal and corn starch were isolated. Sequencing showed that the different corn-based food products are colonized by thermophilic fungi including *Rhizomucor pusillus*, *Thermomyces langinosus*, *Rhizopus microsporus*, *Aspergillus fumigatus* and *Aspergillus waksmani* and *Aspergillus terreus*. Optimal growth temperature experiments were conducted to determine the temperature at which thermophilic fungi grows best and also to differentiate the isolates into thermotolerants and thermophilic fungi. The genera *Rhizopus*, *Rhizomucor* and *Thermomyces* were true thermophile while genus *Aspergillus* was the only thermotolerant. These results indicated the presence of thermophiles in corn products which may have significant implications on human health.

14. **Title: The Internet of Things: Issues and Challenges**

Principal presenter: Ranjith Kumar Gannamani

Major: Computer Science

Faculty mentor: Dr. Chandra Amaravadi

Abstract: Internet of Things, IOT, refers to the connection of the objects or things to the Internet. The main goal of IOT is to connect the physical world to the Internet. With the use of sensors in IOT, objects will exchange data with other machines without human intervention. The primary sources for data collection and transformation are sensors. These sensors have been placed, deployed, and installed on multiple locations in buildings, factories, cars etc. They communicate with each other by using different protocols. The main function of these sensors is to record values like heat, temperature, light, power usage etc.

For example, a car connected to IOT is gaining more importance nowadays. Drivers have a

wide range of security features that keep them connected and safe in the event of an emergency, including automatic crash notification, stolen vehicle tracking, and roadside assistance. They can even control devices at home from their car itself like adjusting the temperature, starting a bath, sending a text messages to the other devices etc., receiving notifications and tracking young drivers when they have travelled beyond predetermined boundaries or crossed a preset speed limit.

IOT implementation boils down to communication between devices. These are divided into layers where each layer performs a function. The application layer provides necessary interfaces to the user to interact with the physical world through the nodes. There are five layers in the application layer. They are Virtual Terminal, FTAM, Manufacturing messaging, X.400 and X.500 [1]. These layers are used for communication between sensors. Exchange of sensor data is possible only through the Application Layer. It involves many protocols to exchange the data between the sensors. But, mainly UDP (Universal Datagram Protocol) and CoAP (Constrained Application Protocol) are the two types of protocols which are used to collect the sensor data. CoAP is a document transfer protocol. It carries request and response messages. CoAP runs over UDP. CoAP is a web transfer protocol that provides request/response model for interacting between endpoints in the communication such as between a sensor and a server [2]. These protocols will be discussed in detail.

Implementing IOT requires addressing many challenges. There are trillions of devices on the internet. The challenge is how to name these things, authenticate access, protect and use them. Will IPv6 be enough to provide all of the above or will an entirely new standard and protocol be? The other challenge is there is a vast amount of data continuously collected by these devices. Raw data which is not useful must be converted to useful data by developing techniques. For example, in health care industry, raw data like sensor values must be converted to semantically meaningful activities performed by or about a person such as eating, poor respiration etc. In converting the raw data to useful data we face privacy and security issues. After converting into useful data, safety problems will occur [3]. Like these, there are several more issues we discuss in detail.

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15. **Title: Hybridization of *Hyla versicolor* and *Hyla chrysoscelis* using Microsatellite Analysis**

Principal presenter: Nicole Roseman

Major: Biology

Faculty mentor: Dr. Mike Romano

Abstract: *Hyla versicolor* and *Hyla chrysoscelis* are both gray tree frog species that live throughout central and eastern United States (Lannoo et al., 2001). Both of these tree frog species are morphologically identical to each other. *Hyla chrysoscelis* is a diploid organism, while *H. versicolor* is tetraploid. It is hypothesized that *H. versicolor* evolved from *H. chrysoscelis*. These two gray tree frog species are interesting because polyploidy usually only occurs in plants. Two types of polyploids occur in anurans: allopolyploidy and autopolyploidy (Tymowyska, 1991). Allopolyploids are organisms created from two or more species hybridizing. Autopolyploids are organisms created from the same species and contain double the amount of chromosomes through duplication during meiosis II (Konda and Kashiwagi, 2004). The significance of this research is to use microsatellite and statistical analyses to better understand the origin of *H. versicolor*. Collection took place during June/July; peak breeding season for both frog species. Each individual organism was identified through call. DNA for both species was obtained through toe clippings. Toe pad clippings were stored in ethyl alcohol at room temperature until laboratory analysis. Qiagen's Genra procedure was used to extract DNA from toe clippings. To confirm the presence of DNA and evaluate quality, agarose electrophoretic gels were completed. Polymerase chain reaction (PCR) was then conducted to amplify DNA markers. After PCR, amplification of DNA was again confirmed by agarose electrophoresis. Collected DNA sequences will then be sent off for sizing and allele scoring. Data analysis is currently underway.

16. **Title: Evaluating Gene Expression in Chronic Wasting Disease Infected White-Tailed Deer**

Principal presenter: Emma Trone

Major: Biology

Other presenters or co-authors: Christopher N. Jacques, James T. Lamer, Paige Zick, Guoqing Lu, University of Nebraska-Omaha, and Paul A. Shelton, Illinois Department of Natural Resources

Faculty mentor: Dr. Christopher Jacques

Abstract: Throughout much of their range, white-tailed deer (*Odocoileus virginianus*) are affected by transmissible diseases such as chronic wasting disease (CWD). Although previous research has evaluated CWD genetics (e.g., PRNP gene polymorphisms) the underlying pathogenicity and mechanisms of the disease remain poorly understood. The primary objective of our research was to create a genetic profile of CWD-infected deer to better understand how the disease affects deer on a transcriptome (i.e., full range of mRNA molecules expressed by individual) level. We evaluated gene-expression in CWD-infected

and non-infected white-tailed deer collected by Illinois Department of Natural Resource game managers during annual population reduction (e.g., sharpshooting) and disease monitoring efforts throughout the CWD-endemic area of northcentral Illinois and established a timeline for RNA viability. We used next generation sequencing (NGS) to analyze tissue samples from CWD-infected deer euthanized by IDNR sharpshooters during winter 2015 (February - March 2015). Specifically, we used the Illumina HiSeq 2500 Sequencing System (Illumina Inc., San Diego, CA, USA) to quantify and map the transcriptomes de novo, and identify novel and known genes from CWD-infected (n=5) and non-infected (n=5) deer. Preliminary results indicate 59 differentially expressed genes, of which 23 can be annotated using the Blast2GO database. Molecular functions of these genes include binding, catalytic activity and receptor activity. Specifically, we have identified ADIPOQ and CCL3 as differentially expressed. These genes are responsible for regulation of tumor necrosis factor in a typical immune response. Unidentified genes may be previously un-described cervid genes or related to CWD infection. Annotation and validation of differentially expressed genes is necessary when creating a genetic profile. Identification of differentially expressed genes involved in the pathogenesis of CWD may enable researchers and wildlife managers throughout Illinois to predict the infectious status of harvested deer using gene expression (transcriptome) profiles.

17. **Title: Gene Expression in Tomato Plants in Response to Arbuscular Mycorrhizal Symbioses and Caterpillar Herbivory**

Principal presenter: Md Imtiaz Khalil

Major: Biology

Other presenters or co-authors: Nicholas A. Barber, Northern Illinois University; Donald A. Bath, Sue Hum-Musser, Richard O. Musser, Richard O. Musser

Faculty mentor: Dr. Richard O. Musser

Abstract: Plants have established a mutualistic relation with Arbuscular mycorrhiza forming fungi (AMF) for more than 400 million years and it is estimated that more than 80% of plant species are able to maintain this symbiosis. AMF are obligate biotrophs which require a plant species for their nutrition and proliferation. In exchange for this symbiosis, the fungi appear to increase plant defenses to both abiotic and biotic stresses that are found in the environment. Also in nature, a tri-trophic interaction occurs commonly between these fungi, its host plants, and caterpillar herbivores. Previous evidence supports that AMF fungi stimulate defenses in tomato plants against caterpillars. In our study, I measured the transcriptomic expression of tomato plants (*Solanum lycopersicum*) that were grown with or without AMF in growth chambers under greenhouse conditions with or without a third instar *Manduca sexta* (Lepidoptera: Sphingidae) caterpillars. After 24hrs of herbivory, the leaves were frozen in liquid nitrogen, homogenized, and total RNA was isolated from each sample for qPCR analysis. We then measured many of the more well-known plant defense and stress genes. In tomato leaves increased anti-nutritive defense genes were stimulated primarily due to caterpillar feedings such as the protease inhibitors, polyphenol oxidase,

and lipoxygenase and appeared to be modulated by AMF, in some cases stimulating and in other cases suppressing. Additional genes will be discussed, our findings demonstrate the complexity of tri-trophic interactions and their alteration of plant defenses. These findings may also lead to novel methods of pest control that can result in the less use of pesticides.

18. **Title: The Anti-Sidekick in British Fantasy: Gollum and Draco Malfoy**

Principal presenter: Erica Salmonson

Major: English

Faculty mentor: Dr. Rebekah Buchanan

Abstract: J.R.R. Tolkien's *The Lord of the Rings* and J.K. Rowling's *Harry Potter* series influence the way audiences and authors think about British fantasy. One of the main tropes of British fantasy is experiencing the fantasy world through the hero's lens. Unlike heroes of superhero comics, heroes in British fantasy are known as fairy-tale heroes, who need the help of their companions and friends because they aren't larger than life, like the common hero in popular culture. Not only do the fairy-tale heroes need the help of their friends, they need the help of characters who have villainous traits. The fairy-tale heroes' counterparts who aid them are often cast aside as merely villains. By examining characters, such as Gollum from *The Lord of the Rings* and Draco Malfoy from the *Harry Potter* series, as anti-sidekicks, we gain insight into the fantasy world, which is a world not dominated by one strong, courageous, male presence. A variety of characters are needed for the fantasy world to thrive. This presentation aims to examine the 'villain' or 'bully' in both *The Lord of the Rings* and the *Harry Potter* series through the lens of the anti-sidekick as seen in popular culture.

The sidekick in popular culture is a common trope and is seen in a variety of superhero comics and detective fiction. There are characters in British fantasy who help the fairy-tale hero but do not have the hero's best interests in mind, which is why I explore the anti-sidekick in British fantasy. The anti-sidekick, although characterized by negative qualities, performs the duty of helping the fairy-tale hero with his task and moves the story forward. By looking at the genre of British fantasy through the lens of the anti-sidekick, we see these characters as more than 'villains' or 'bullies.' For this presentation, I will look at the characters of Gollum in *The Lord of the Rings* and Draco Malfoy in the *Harry Potter* series.

Both Gollum and Draco fulfill the characteristics of the anti-sidekick. While Gollum remains by Frodo's side throughout Frodo's journey, Draco is by Harry's side in many pivotal moments. In this presentation, I will show that not only are Gollum and Draco anti-sidekicks, they also prove they are necessities to the heroes' missions and the overall stories. Without Gollum and Draco, Frodo and Harry would not have been able to complete their missions, due to certain qualities that Gollum and Draco have, like Gollum's knowledge of Middle-earth and Draco's constant need for attention. While both characters prove their determination to get what they want, their evil characteristics move the plots

forward and ignite events that would otherwise have not happened if their characters were omitted from these stories.

19. **Title: Aedes Mosquito Surveillance in Western Illinois**

Principal presenter: Jason Hunt

Major: Environmental Studies

Faculty mentor: Dr. Roger C Viadero

Abstract: The spread of invasive mosquito species as potential vectors for exotic and endemic diseases poses significant challenges to public health agencies worldwide. In particular, the genus *Aedes* possesses a number of species capable of transmitting lethal arboviruses. In Illinois, *Ae. triseriatus* is the primary vector for La Crosse encephalitis virus (LACV), the leading cause of neuroinvasive arboviral infections in children. The majority of LACV cases in Illinois are centered in Peoria, Woodford and Tazewell counties, with case distribution extending into the western Illinois counties of Fulton, McDonough, and Hancock. In collaboration with state and local health departments, we sought to assess the abundance and distribution of potential *Aedes* arboviral vectors. From June to September of 2014, 2015, and again in 2016, mosquitoes were collected using gravid traps and *Aedes* mosquitoes were identified to species level. *Ae. japonicus*, a dangerous invasive species from East Asia, was collected in multiple western Illinois locations during this study. We found *Ae. japonicus* for the first time in Fulton and Schuyler counties, and confirmed active populations in Cass and McDonough counties. Results from 2016 surveillance indicate an increase in the percentage of *Aedes* species collected at most of the locations examined in 2014 and 2015. *Ae. japonicus* has been found to possess LACV RNA and virus in Appalachians. *Ae. japonicus* has also been shown to be a competent vector for St. Louis encephalitis virus, Eastern equine encephalitis virus, Rift Valley fever virus, and West Nile Virus. Discovery of this species suggests the potential for arboviral transmission to humans in western Illinois. As Peoria, IL is located within the analyzed watershed, river corridors near Peoria may play a role in the active expansion of *Ae. japonicus*. This is likely due to the extensive use of rock pools as oviposition sites. Further studies will determine arboviral disease carriage status of the collected *Ae. japonicus* mosquito species.

20. **Title: Towards High Precision Metrology via Quantum Interferometry with Entangled States of Atoms**

Principal presenter: Sylvester Amoah

Major: Physics

Other presenters or co-authors: Dr. K. T. Kapale

Faculty mentor: Dr. Kishor T. Kapale

Abstract: Interferometry, where two or more light or matter waves are mixed with each other, allows precision measurement of small phase differences between the constituent waves. Interferometry is useful, for example, in the field of astronomy to increase effective resolution of a system of telescopes. We are particularly interested in the applications of

interferometry to the fields of metrology, which deals with measuring physical quantities such as small electric, magnetic, and gravitational fields and small rotational velocities. Precise measurements of these quantities are important to meet a large class of technological needs of the humankind. I will discuss basics of interferometry with light and matter. I will also discuss some of the modern trends in interferometry, where the quantum properties of the constituent waves are used as a tool to increase sensitivity of the interferometers. We are working on developing methods to do interferometry with entangled states of atoms. As a first step toward this goal I will discuss proposals for generating entangled states of Atoms that are useful for interferometric applications.

21. **Title: Is WIU Democratic: How Did Ideology Affect a Student's 2016 Presidential Choice?**

Principal presenter: Chantal Kitchen

Major: Political Science

Faculty mentor: Dr. Jonathon Day

Abstract: When college students vote in a presidential election, a collective theory suggests they vote more Democratic. This research examined whether undergraduate students at WIU support that theory of voting for the Democratic candidate in the 2016 Presidential Election by analyzing surveys distributed to the students and student responses in focus groups. The research then examined if the liberal ideology typically associated with the Democratic Party is an influential factor in a student's candidate selection. The data collected supports the theory that WIU students voted for the Democratic candidate at a rate of twice the percentage than the Republican candidate. Ideology was also an influential and significant variable in all the models conducted. WIU students believe their ideology is important in a presidential candidate, and that candidate is more than likely Democratic.

22. **Title: Investigating the Association of Formaldehyde Emission with a Hot Molecular Core**

Principal presenter: Onic Islam Shuvo

Major: Physics

Other presenters or co-authors: Esteban D. Araya

Faculty mentor: Dr. Esteban D. Araya

Abstract: Massive stars (stars that have more than eight times the mass of the Sun) form in dense and extremely cold concentrations of interstellar dust and gas known as giant molecular clouds. The denser parts of the clouds break into molecular clumps and each clump collapses gravitationally, forming protostars and heating up the gas producing hot molecular cores. Spectral lines from formaldehyde molecules at cm wavelengths are typically detected in absorption, and trace the extended molecular gas of giant molecular clouds. In contrast, thermal emission of formaldehyde lines at cm wavelengths is rare. In previous observations with the 100m Green Bank Telescope, we detected 2 cm formaldehyde emission toward a prominent high-mass star-forming region in our Galaxy

known as NGC 7538 IRS 1. We present results of a work focused on measuring the angular size of the 2 cm formaldehyde emission in this region. The angular size is important to determine the brightness temperature of the emission, which is needed to investigate the physical conditions of the gas. To estimate the angular size of the source, we used East-West and North-South pointing positions of a cross-scan map. Assuming Gaussian distributions in both directions, we found that the deconvolved size (at half maximum) of the 2 cm emission is equal to $52'' \pm 12''$. We note that within 3σ errors, our measurement is consistent with the angular size of $16''$ assumed by McCauley et al. (2011). Thus, our data agrees with the interpretation that the 2 cm formaldehyde emission is due to thermal radiation, and that the emitting region could be compact enough to be associated with the hot molecular core in NGC 7538 IRS 1.

23. **Title: Co-Occurring Cigarette Use and Prescription Stimulant Misuse and Related Factors**

Principal presenter: Tyler Cieck

Major: General Experimental Psychology

Other presenters or co-authors: Jonathan Hammersley, Department of Psychology

Faculty mentor: Dr. Jonathan Hammersley

Abstract: Previous research suggests that drinking alcohol and smoking cigarettes predates the use of illicit drugs such as cocaine; nicotine exposure is shown to increase cocaine preference for mice, for example (Kandel & Kandel, 2014). Cigarette use is found to predict use of stimulant drugs such as methamphetamines (Goldsamt, 2005; Yen, et al., 2005) and is also associated with non-medical use of prescription stimulants (McCabe, et al., 2005). Such results provide some support for the Gateway Hypothesis. In a review, Bavarian, Flay, Ketcham, and Smit (2015) noted a positive relationship between academic difficulties and prescription stimulant misuse, as well as distress and prescription stimulant misuse. Stress has also been linked to stimulant misuse (Janusis, 2015). The current study therefore examined whether academic difficulties and stress mediated the relationship between cigarette use and prescription stimulant misuse. Researchers analyzed a dataset collected with the American College Health Association National College Health Assessment (ACHA-NCHA II; American College Health Association). The questions analyzed were 8A1 ("Within the last 30 days, on how many days did you use [cigarettes]?") and 18E ("In the last 12 months, have you taken any [stimulants] that were not prescribed to you?"). For these analyses, responses were collapsed into three categories: 1 (Never used), 2 (Have used, but not in the last 30 days), and 3 (Have used in the last 30 days). Response options to 18E were either yes or no. Stress was measured with question 37, and academic difficulty was measured by summing all responses to question 45. Hayes's (2012) PROCESS macro was used to examine stress ($N = 106,786$) and academic difficulties ($N = 107,133$) as mediators of the relationship between cigarette smoking and stimulant misuse. Results indicate that overall academic difficulty and stress partially mediate the relationship between cigarette use and prescription stimulant misuse, $ps < .001$. These findings provide

preliminary evidence suggesting that stress and academic difficulties may be important mediators in the relationship between cigarette use and prescription stimulant misuse. Stress and academic difficulties may relate to both cigarette use and stimulant misuse, or cigarette smoking may actually exacerbate stress in certain situations. Potential implications for these associations will be discussed further.

24. **Title: Marijuana Use among College Students with Mood and Anxiety Disorders**

Principal presenter: Heather Lucke

Major: Experimental Psychology

Other presenters or co-authors: Colin Harbke, Jonathan Hammersley, Kristy Keefe, Bradley Aleshire

Faculty mentor: Dr. Hammersley

Abstract: Cannabis is the most frequently used illicit substance in the United States, particularly among young adults (Davis et al., 2014). Previous research suggests that mood and anxiety disorders are associated with cannabis use, particularly when the two disorders co-occur (Dorard et al., 2008). Further, the severity of symptoms is associated with increased frequency of cannabis use. Stress also contributes to marijuana use because individuals may self-medicate to alleviate stress and psychological symptoms (Baumeister & Vonasch, 2015; Tice et al., 2001). In addition, prior research indicates that high stress is associated with higher frequency of drug use (particularly marijuana) in individuals with anxiety and mood disorders (Baumeister & Vonasch, 2015; Semcho et al., 2016). We therefore examined the effects of recent stress and existing anxiety or depression diagnoses on marijuana use (within the past 30 days). The sample consisted of 107,919 students from the American College Health Association - National College Health Assessment (ACHA-NCHA-II) dataset. The ACHA-NCHA-II is a national survey measuring students' health habits, behaviors, and perceptions. Data were collected from Fall 2008 to Spring 2009 at 158 colleges in the United States. Of the total sample, 65.6% were female, 33.7% male, and 0.1% transgender. We analyzed the following questions: `Within the last 30 days, on how many days did you use marijuana?`, `Within the last 12 months, have you been diagnosed or treated by a professional for anxiety/depression?`, `Within the last 12 months, how would you rate the overall level of stress you have experienced on a scale from 1 (no stress) to 5 (tremendous stress)?` Roles of stress, anxiety, and depression in predicting frequency of marijuana use were explored. 35.4% of sampled students used marijuana including 14.2% with anxiety and 14.1% with depression. Diagnoses of anxiety and depression within the last 12 months were significant predictors of marijuana use during the most recent 30 days. However, co-occurring anxiety and depression was not predictive of marijuana use beyond that of either anxiety or depression alone. Stress (last 12 months) was also unrelated to frequency of marijuana use. The same pattern was found when the analysis was limited to marijuana users alone. Results support the role of prior anxiety or depression as predictors of recent marijuana use, suggesting that individuals diagnosed with anxiety or depression may have an increased likelihood of self-medicating their symptoms with

marijuana. Neither comorbidity of depression and anxiety nor stress was predictive after accounting for diagnosis.

25. **Title: Quantum Tic-Tac-Toe Game**

Principal presenter: Steven Akwabli

Major: Physics

Other presenters or co-authors: Dr. K. T. Kapale

Faculty mentor: Dr. K. T. Kapale

Abstract: In the last several decades, new ideas based on quantum mechanics have been applied to the field of information processing and communication. The processing of information when quantum systems are used has shown to yield tremendous advantages over their classical counterparts in terms of efficiency, speed, and resources. Similarly, quantum ideas can help improve strategies applied to classical games with the aim of developing winning strategies that are more efficient than their classical counterpart. We present an example of the classic tic-tac-toe game, which does not always end up with a result and its quantum version, which always has a winner. Since quantum rules do not quite match our common sense, the question is whether we can translate the quantum steps into strategies that can help us win this game with higher probability. The larger goal of the project is to understand applications of quantum mechanics to game theory.

26. **Title: Out or Left Out? An Investigation into Biphobia**

Principal presenter: Sarah Elizabeth Nielsen

Major: Psychology

Faculty mentor: Dr. Julie Herbstrith

Abstract: While prejudice towards gay men and lesbian women has been well established (Herek, 2000), the study of negative attitudes aimed towards bisexual individuals is just beginning to gain attention in the literature. Several studies indicate that bisexual individuals are subject to greater negative attitudes (biphobia) from both heterosexual (Herek, 2002) and non-heterosexual individuals (Mohr & Rochlen, 1999). This study aims to assess the attitudes towards bisexual individuals in a college population while simultaneously investigating the relationship between negative attitudes, personality measures such as Agreeableness, and social desirability (Graziano, Bruce, Sheese, & Tobin, 2007). This study also seeks to understand the relationship between prejudice and measures of social distance, or the likelihood that a person would like to get to know a person. In this study, 200 undergraduate students will be randomly assigned to one of six vignette conditions portraying bisexual or heterosexual couples. In the vignette, the target partner runs into a previous partner and experiences a pleasant exchange with this person in a public place. This vignette is accompanied by a black-and-white 4-by-4 inch photograph of the exchange. After reading the vignette and viewing the photograph of the target, the participant will be asked to indicate what they believe to be the sexual orientation of the target to be to indicate salience of the situation. They will also be asked to respond to

questions to indicate their preferred social distance from the target as indicated by liking, favorability, and, intent to meet measured on a 10-point scale. To induce cognitive depletion and reduce socially desirable responding, participants will be asked to complete a Letter Cancellation Task. In this task, participants read a passage while crossing out each letter "E" they come across. Then, they read another passage and cross out "E's" that do not violate a set of complicated rules, which induces mental strain and encourages honest responding. After completing this task, participants will complete the Big Five Inventory (BFI) to measure openness, conscientiousness, extraversion, agreeableness, and neuroticism on a 5-point scale. Then, they will complete the Gender-Specific Biphobia Scale (GSBS), which measures the extent to which a person exhibits biphobia towards men and women on a 6-point scale. To measure each participant's socially desirable responding, they will complete the RD-16, which poses questions for participants to agree or disagree with. Finally, to measure participants' internal and external to motivation to respond favorably when asked about prejudice, they will complete the Motivation to Withhold Prejudice reaction scale. A series of regression analyses will be conducted. It is expected that participants will indicate higher levels of social distance from bisexual targets than from heterosexual, particularly from male bisexual targets. This effect is expected to be moderated by Agreeableness and gender-specific biphobia. Additionally, males are expected to rate all targets more negatively than females. The findings of this study will help predict explicit biphobia in individuals and may help to explain why some people hold more negative attitudes toward bisexual individuals than others.

27. **Title: Attention Bias and Trait Mood: Possible Clinical Uses of Stroop Task Performance**

Principal presenter: Tiffany Botsford

Major: Psychology CCMH

Faculty mentor: Dr. Jonathan Hammersley

Abstract: The Stroop Task has been utilized since 1935 (MacLeod, 1991). Since its first use to distinguish naming the color of a word versus reading the actual word written (Stroop Effect), as a measure of attentional bias, this task has been used for a variety of purposes in psychology research. Such research is still ongoing and continues to examine how Stroop Task performance is affected by mood and personality factors. How anxious someone feels, fear or anxiety-related symptoms, depression (Fontenot, Jackson, & Terry, 2015), and drug cravings (Yip, Balodis, Carrol, Krishnan-Sarin, & Potenza, 2016) have been associated with performance on different versions of the Stroop Task. Other types of traits, including trait mood such as anger, anxiety sensitivity, or trait depression have been less commonly examined. For example, in a study using the Stroop Task to detect suicidal behaviors in college students, those who had tried to commit suicide in the past reacted less quickly to the word "suicide" in comparison to those who had not attempted suicide. This study also found that suicide attempts made by females of this group were more delayed when they had attempted suicide within the last twelve months (Chung & Jeglic, 2016). The current

project will use regression and correlational analyses to examine if a person's levels of trait anger, anxiety, anxiety sensitivity, and depression are related their Stroop Task performance. There were 105 participants in our study, who answered questions about these trait mood factors and performed a Stroop Task that included negative emotional word, color naming, neutral word, and smoking-related word conditions. The Anxiety Sensitivity Index and State-Trait Personality Inventory were two trait mood questionnaires that were analyzed. Possible clinical uses of such measures and their implications will be discussed. For example, anxiety sensitivity assess sensitivity to physiological anxiety, and someone prone to panic attacks could possibly be assessed by performing such a Stroop Task. Preliminary results suggest slight but non-significant associations between trait depression/anxiety and Stroop performance. Further data analysis is ongoing.

References:

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28. **Title: Study of Optical Absorption, Fluorescence and Chromaticity, of Sm-doped Bismuth Telluro-borate Glasses.**
Principal presenter: Suman Rijal
Major: Physics
Other presenters or co-authors: Dr. P. K. Babu and Dr. Saisudha B. Mallur
Faculty mentor: Dr. P. K. Babu
Abstract: Glass doped with rare earth (RE) ions are important materials for optical devices. We prepared a series of bismuth borate glasses with the composition $x\text{Bi}_2\text{O}_3:(99.5 - x)\text{B}_2\text{O}_3$ ($x = 29.5$ to 59.5 mol%) doped with 0.5 mol% Sm_2O_3 and studied the optical absorption and fluorescence spectra. Judd - Ofelt (JO) theory is used to study the optical absorption and to calculate the radiative transition probabilities. We used area of the spectrum to calculate the oscillator strength. The set of the intensity parameters Ω_t ($t=2,4,6$) is obtained from the experimental oscillator strengths and the calculated oscillator strength.

Ω_2 parameter which depends on the asymmetry of the ligand field at the RE site and RE-O covalency is found to be maximum for the glass sample having 39.5 mol% Bi_2O_3 . We calculated the stimulated emission cross-sections of the intense fluorescence lines of Sm_{3+} ions. We used three glass samples with TeO_2 to study the chromaticity. The color coordinates corresponding to the prominent emissions of the glass samples were determined by using the CIE color matching function calculator. The color emissions were analyzed using the CIE color coordinate diagram. We got white color for all the samples except $30\text{Bi}_2\text{O}_3:20\text{TeO}_2:59\text{B}_2\text{O}_3:0.5\text{Sm}_2\text{O}_3:0.5\text{Eu}_2\text{O}_3$ which gave yellow.

29. **Title: SAARC: Aids and Impediments, A theoretical case study**

Principal presenter: Fahim Ashhab

Major: Political Science

Faculty mentor: Dr. Vincent A. Auger

Abstract: SAARC, as a regional organization has been operating over 30 years since its inception. Although a lot of data-oriented research has been carried out on account of the successes and failures of its operational existence over the years, it has not been able to live up to the expectation it has borne. The objective of this paper is to examine the regional behavior of the member states in relation to Realist and Liberalist perspectives. This study will examine all the states to deciding which one is more inclined to either of this IR theoretical approaches and whether this is the primordial reason that caused the ineffectiveness of SAARC in a broader sense. Political leaders have come and gone but their promises and agreements never came as worthwhile due to internal never-ending tensions. Moreover, US engagement in South Asia over the years, considering the gains over Russia and at times over China has played a pivotal role in maneuvering regional peace and policymaking as well. Sub-regional programs and initiatives have been taken, some of them have been successful in the recent times, but this rather indicates that auspices assured by SAARC are going into despair with no apparent future of its own. My suggestion in this paper would be the de-politicization of economic activity to avoid such animosity in between and ascertain greater socio-economic and cultural growths beyond borders and relive SAARC as it was promised.

30. **Title: Distinguishing Behavioral Performance of Fatigue and Malingering.**

Principal presenter: Jose Maldonado

Major: Experimental Psychology

Other presenters or co-authors: Lindsey K. Robinson, Experimental Psychology, Sandra McFadden, Department of Psychology

Faculty mentor: Dr. Sandra McFadden

Abstract: Introduction: Malingering-feigning symptoms for personal or financial gain--is a major concern for neuropsychologists assessing traumatic brain injury (TBI). Poor test performance can indicate malingering. However, fatigue, a frequently reported symptom of TBI, may also result in poor test performance, leading to a misclassification of individuals

with true TBI as malingerers. The current study sought to determine how fatigue influences behavioral performance, and how fatigued performance compares to malingering performance in individuals with a history of head injury and healthy controls (HCs). Methods: Participants completed a demographic form, a guided TBI interview, and the Mental Fatigue Scale (MFS, Johansson et al., 2010) which measured baseline fatigue. Then, they completed three blocks of a computerized match/mismatch task. Participants were instructed to report whether a pair of images or 3-digit numbers were the same or different. Accuracy and reaction time (RT) were measured. Afterwards, participants filled out a manipulation check (i.e., desire to do well/malinger, and feeling of boredom/fatigue). Results: Independent t-tests revealed that the TBI group reported significantly higher baseline fatigue scores than HCs, $t(24.37) = -2.119$, $p = .045$. Group (TBI, HC) x Condition (normal, malingering, fatigue) mixed ANOVAs revealed significant main effects of Condition on accuracy, $F(2, 84) = 177.91$, $p < .001$, $\eta^2 = .81$, and RT, $F(2,84) = 66.21$, $p < .001$, $\eta^2 = .61$. Pairwise comparisons showed that accuracy while malingering ($M = 72.66\%$, $SEM = 1.78$) was significantly lower than accuracy for normal ($M = 98.04\%$, $SEM = .26$) and fatigued blocks ($M = 97.63\%$, $SEM = .54$), and participants responded more slowly when malingering ($M = 1195.15$ ms, $SEM = 47.06$) than normal ($M = 849.29$ ms, $SEM = 30.46$) or fatigued ($M = 843.06$ ms, $SEM = 31.39$). There were no significant main or interaction effects involving Group. Participants reported feeling moderately fatigued at the end of the study (HC: $M = 2.96$, $SEM = .20$; TBI: $M = 3.44$, $SEM = .20$), with no significant difference between groups, $t(42) = -1.63$, $p > .05$. Discussion: Our results indicate that individuals with TBI report higher mental fatigue than HCs at baseline. Even though both TBI and HC groups reported feeling moderately fatigued during Block 3, fatigue did not impair performance. These findings are encouraging and suggest that TBI fatigued patients may not be misidentified as malingering using behavioral data. Therefore, fatigued patients may perform similarly to healthy persons. Our physiological data has also supported these findings. Future research could address subjective fatigue on various neuropsychological assessments or assess mental fatigue by utilizing a case study method.

31. **Title: Evaluating Home Range Size of Bobcats (*Lynx rufus*) in an Agriculturally Dominated Landscape of West-central Illinois**

Principal presenter: Tim C. Swearingen

Major: Biology

Other presenters or co-authors: Christopher Jacques, Bob Bluett, Robert Klaver, Christopher DePerno, Chuck Anderson, Jonathan Jenks

Faculty mentor: Dr. Christopher N. Jacques

Abstract: Home range size is affected by many ecological factors, including population density, climate, distribution and abundance of resources, spacing of individuals, sex, and mating system. Annual variation in home range size can be influenced by seasonality in any of these factors. Historically, bobcats (*Lynx rufus*) were found throughout the Midwest, but were extirpated from many areas due to habitat loss and unregulated harvest that occurred

after European settlement. Expansion of bobcats throughout Illinois since the early 1990s lead to the implementation of a bobcat hunting during Fall 2016 that featured limited harvest for the first time since the early 1970s. To date, previous research on bobcat demographics has been limited to southern Illinois, thus, quantitative information on bobcat population demographics (e.g., home range use patterns) in other regions of the state is timely. During 2015, we initiated research to evaluate home range size of bobcats in relation to area-based population estimation techniques (e.g., non-invasive camera trapping) across west-central Illinois. From January 2016 to January 2017, we monitored weekly movement status of 21 (12 males, 9 females) radio-collared bobcats. We used Program Locate to estimate animal locations and GIS to calculate 95% home ranges and 50% core areas using ≥ 10 locations. Preliminary results indicate that mean 95% and 50% adaptive kernel home-range size for male and female bobcats was 1407.93 and 164.02 km² and 79.12 and 6.65 km², respectively. Intersexual differences in spatial use patterns between sexes should be interpreted with caution given small sample sizes used in preliminary analyses. Future analyses will provide a more complete assessment of interrelationships between home range requirements and density estimation protocols across west-central Illinois, and in turn inform harvest decisions about management programs and approaches for monitoring abundance of bobcats throughout the state.

Performance Presentations

1. **Title: Composing Theatrical Stories Informed From the Reduced and Essential Elements of Source Material 'Metropolis'**

Principal presenter: Jason Shores

Major: Acting

Other co-performers or co-authors: Monica Tate

Faculty mentor: Dr. Jason Conner

Abstract: Metropolis, a German expressionist film created in 1927, was written by Thea Von Harbou and directed by Fritz Lang. The futuristic and dystopian world created by Harbou and Lang illustrates themes of class struggle, poverty, industrialization, religion, and gender. It is my desire to use this film and associated themes as source material for the creation of a related, but new, story. Mary Zimmerman, a director, playwright, and professor at Northwestern University, often adapts new works from source material in a way that is aided by the rehearsal process. Putting the rehearsal cart before the finished script horse is a risky but exciting way in which to create, utilizing not only her own research and materials but real-time input from human actors as well. Using Zimmerman's approach, I will, with my co-contributor and performer Monica Tate, begin an adaptation of 'Metropolis;' attempting to reduce its essential qualities into a single scene. Having selected

what we see as two essential elements, we will focus our attention on the clockworker scene, which exemplifies the struggle of the working classes in the industrialized world, and secondly, the idealized human form: a robot woman. This idealized and reimagined human introduces elements of gender, religion, and continued mechanization, specifically artificial intelligence; themes that continue to occupy our societal thoughts today. Anne Bogart, artistic director of the SITI Company, and Tina Landau, director and playwright, co-developed a technique of composition for actors. The composition elements, named Viewpoints, primarily focus on creation through physical movements and gestures. Using these elements, Monica and I will begin physically exploring, creating, and rehearsing the reduced 'Metropolis' and arranging it into a reimagined story of our own. This artistic process will continue to be reevaluated, deconstructed, and reconstructed in several iterations prior to a 'finished' product. It is my hope that this exploration will result in a fresh and relevant work that not only reinforces themes of the original source material but also transmits new themes as well. Our performance for the conference will consist of this newly crafted scene.

2. **Title: The Sound of Music: The Performer's Journey through J. S. Bach's Cello Suite no. 5**

Principal presenter: Klaudia Jarosz

Major: Music (Cello Performance)

Faculty mentor: Dr. Anita Hardeman

Abstract: When we open a music score, what we see in front of us are just notes on the piece of paper. From this visual perspective, music is just a graphic notation. Those simple graphic structures of notes are a musical invitation to create art. As we interpret what we see – we create music. Sound of music is the way we feel, play and understand what we see. Why then might the same composition sound differently even though the notes are the same? How does one make choices as a musician? How do you make correct decisions? Is there even a correct way to interpret those black spots on the page? And finally - what does it mean to be a musician and make performance choices about the music? Being a cellist for 19 years, has brought me to a point where I am more and more aware of myself as a musician. I want to make my performances memorable and interesting. I do not want to recreate music - I want to create. This process of creating music and making a piece of music my own starts even before the music starts to sound. With this lecture-recital I would like explore what it means to be a musician and present my journey of learning and preparing a piece of music. Through a combination of presentation and performance, I will examine a series of specific problems I have encountered in preparing J. S. Bach's Cello Suite No. 5 for performance. Throughout my lecture I will highlight some technical, interpretative and stylistic problems presented in this composition. I will talk about the aspect of graphic notation itself and the way Bach used articulation and dynamic markings. Then I will move to the aural medium where I will discuss different types of ornaments such as trills or vibrato and how, when and where to use them. By putting an emphasis on

two movements, the Prelude and the Sarabande, I will explain my expressive and creative choices. Based on my research into the instrument itself, the genre of the suite and the component baroque dances and performance practice I will try to explain what it takes to interpret musical notation, bring it to life with sound and make it interesting, personal but also historically accurate and correct. My lecture will conclude with the performance of the Sarabande which illustrate and bring all components of my presentation together in a musical finale. Through this lecture-recital I hope to show the journey of creating music which starts even before the music starts to sound. The goal of my presentation is to highlight the important steps that musician has to take in order to be able to deliver memorable but also stylistically correct performance.

3. ***Title: Holistic Acting Training, and its Application to the Irene Ryan Acting Scholarship***

Principal presenter: Jeff Allen Young

Major: Theatre Performance/Acting

Other presenters or co-authors: Brett John Olson Graduate Program: MFA Theatre, Bob Bluett, Illinois Department of Natural Resources, One Natural Resources Way, Springfield, IL.

Faculty mentor: Dr. Bill Kincaid

Abstract: In the performing of our project we discovered the value of WIU's holistic actor training methods in the format of a practical audition setting. Many universities choose to adopt a specific actor training technique, whereas the theatre department at WIU introduces students to a large variety of acting, movement, and vocal training. The Irene Ryan Acting Scholarship Audition, a national audition sponsored by the Kennedy Center American College Theatre Festival, served as the setting for our performance. Succeeding in the scholarship audition validated the holistic approach to actor training used by WIU's MFA Acting Program. The process of being nominated for the Irene Ryan Acting Scholarship Audition was both lengthy and arduous. A critic from the KC/ACTF was invited to critique the WIU production of Tribes. The critic chose two students as nominees to perform at the regional festival. Once nominated, those students chose an acting partner with which to perform. Upon finding the partner, the nominee set out to find the performance material best suited to display the strengths of both actors. Two contrasting scenes and a monologue were chosen and rehearsed by the nominee and partner. The audition package was then reviewed by the performance faculty at Western. With package prepared, we traveled to Indianapolis to audition at the regional level. The regional audition is comprised of three-rounds and includes hundreds of students from Illinois, Indiana, Michigan and Wisconsin. All nominees auditioned at the preliminary level. From there, 46 pairs were chosen to advance to the semi-finals; the audition concluded with 16 finalists and their partners. We have been auditioning for the scholarship for a combined total of 14 years, and have both never made it past the final round. This year we won. A holistic approach to acting allowed us to develop a multiplicity of skills which helped to breathe life into our work, and for us

garnered national recognition. Our performance, bolstered by our years of training at WIU, put us in a position to audition for and ultimately receive a fellowship to perform at the Kennedy Center. Being selected to perform is significant in ways both tangible and intangible. The week-long festival provides numerous professional development opportunities. In addition to the Kennedy Center Fellowships we receive, we will be considered for numerous other scholarship, fellowship, and apprenticeship opportunities at leading theatre companies across the nation. Intangible awards are inherent in any artistic endeavor. Validation of creative contributions for our combined 17 years of study is humbling and appreciated. We also feel that this accomplishment helps to bring an awareness to the arts at Western Illinois University while we continue to go through a budgetary crucible.