WIU Graduate Research Conference

Friday March 2, 2018.

Poster Presentations

1. *Title:* **The impacts of Vietnamese air traffic controllers' English language proficiency on radiotelephony communication**
   Principal presenter: Van Ha
   Major: Educational Studies
   Faculty mentor: Dr. Sharon Stevens
   Abstract: Communication between pilots and air traffic controllers (ATCs) via radio frequencies is considered to be one of the most important factors that contributes to the safety of air traffic. The English language has become the predominant language used in air-ground communication and it is of vital importance that non-native English controllers, such as Vietnamese controllers, possess good English skills to communicate effectively with pilots. The International Civil Aviation Organization (ICAO) has set regulations and rules for English competency that pilots and ATCs are required to follow, which include standard phraseologies - special phrases or terms regulated by ICAO that are used in air-ground communication and plain English. Pilots and controllers are required to demonstrate at least an operational level 4 (out of 6) in the ICAO English language proficiency test. In Vietnam, the last two decades have witnessed major developments in air traffic management when we regained controlled airspace from our neighboring countries in 1994. In recent years, the number of flights over the regions has increased by 10 percent yearly. In 2013, about 500,000 flights were safely controlled by Vietnamese ATCs, which jumped to over 600,000 flights in 2015. The significant increase in the volume of traffic requires higher concentration in the safety of aeronautical communication. Working in such an international environment, there are many linguistic factors such as pronunciation, listening ability and enunciating that affect verbal communication between native and non-native ATCs and pilots. L2 speakers are likely to face additional challenges due to difficulties in

production of words, unfamiliar word meanings and pronunciation. In Vietnam, ICAO language proficiency tests have come into effect since 2011 which require all air traffic controllers to reach the minimum standards of pronunciation, structure, vocabulary, fluency, comprehension and interactions of operational level 4. Although the majority of Vietnamese ATCs acquire ICAO level 4, miscommunication is still a problem. Standard phraseology was created with common coded language that can be understood by both parties. By careful compliance of standard phraseologies, it will lessen the chance that non-native English speakers cannot comprehend the messages. However, research has shown that crews of Western cultural backgrounds tend to use more informal language while pilots from non-English speaking countries employ more formal language. In addition, using general English instead of standardized utterances can cause confusion, especially to L2 speakers with limited in-depth knowledge of the English language. Standard phraseologies were created to minimize radio misunderstandings, deviation from standard regulations is more likely to diminish communication effectiveness. A link to an online survey was sent out to Vietnamese air traffic controllers in Vietnam to collect data from January 15 to 31, 2018. This mixed method of qualitative and quantitative analysis explores Vietnamese ATCs' perceptions of their communications with pilots and the aviation English training programs they received. My hopes are that the results of this study will be beneficial to future aviation English training programs in Vietnam, and may serve as a reference to other ATCs from non-English speaking countries.

2. *Title:* **Phage-Mediated Affinity Chromatography**
   Principal presenter: Taylor Gunby
   Major: Chemistry
   Faculty mentor: Dr. Mette Soendergaard
   Abstract: In recent years, phage display has become a very popular technique within the science world. Bacteriophage (phage) are virus which infect and replicate within the bacteria. Phage display technology was first explored by George Smith in the 1980's. This is a method which selects and identifies peptides that are based on specific cancer targeting agents. Phage display has been used widely to develop a number of high affinity peptide-based targeting molecules against many different cancers. Using cancer-targeting phage is more economical and less time consuming than developing peptides. In many studies, phage has been used to deliver antibiotics to an infection site. Phage have also been used for tumor imaging as cancer targeting agents. Using phage to bind target proteins has numerous applications in research. Affinity chromatography is one of the most common techniques used to purify proteins. The overall goal is to attach phage to an antibody or peptide bead and break the biotin-streptavidin bond while ensuring the phage retains its infectivity. It is important to determine the conditions which phage will remain active in order to infect and replicate within E. Coli. Reinfecting E. Coli with phage is less time consuming and much more economical than using an expensive antibody which can only be used once.

3. *Title:* **Food Selection of American Green-winged Teal During Spring Migration in Illinois**
   Principal presenter: Samuel Klimas
   Major: Biology
   Other presenters or co-authors:
   Faculty mentor: Dr. Christopher Jacques
   Abstract: The Illinois River Valley (IRV) is an important region for non-breeding waterfowl, especially during spring migration as they replenish reserves to complete migration and prepare for the breeding season. Identification and management of preferred waterfowl food species can improve habitat quality and increase the body condition of waterfowl. American green-winged teal (Anas crecca; hereafter teal) specialize on natural foods, often feeding on small seeds and invertebrates in shallow water or mudflats. To identify food selection we experimentally collected 64 foraging teal and three benthic and nektonic core samples from each collection site during spring migration in the Alton, La Grange, and Peoria Pools of the Illinois River during February-April 2016-2017. We removed and sorted, dried, and weighed (± 0.1 mg) food items from the upper digestive tract (proventriculus and esophagus) of collected birds and core samples for comparison of use and availability, respectively. Further, we performed proximate analysis on teal carcasses to analyze body condition in relation to diet composition. Preliminary results suggest teal consumed 73.9% (CI95 = 65, 83%) plant material and 26.1% (CI95 = 17, 35%) invertebrates based on aggregate dry mass. In spring 2016, the most abundant foods in teal diets were seeds of smartweed (Polygonum spp.) and flat-sedge (Cyperus spp.) and aquatic worms (subclass Oligochaeta). Average food availability estimated from core samples was 308.9 kg/ha. and smartweed, duckweed (Lemna spp.), and aquatic worms were the most abundant food items at collection sites. Our study will present a novel look at food selection of an ecologically and economically important duck in Illinois and the Mississippi Flyway. Moreover, our results will provide a composition of vegetation to guide active wetland management resulting in increased food availability for spring migrating teal and other waterfowl species that forage in emergent wetlands.

4. *Title:* **Sorption dynamics of Cadmium (II) and Chromium (II) onto montmorillionite from mixed solvent systems**
   Principal presenter: Matthew Cash
   Major: Chemistry
   Other presenters or co-authors: Amanda Hagen and Dr. J.S. McConnell
   Faculty mentor: Dr. J.S. McConnell
   Abstract: Transition metals have been used as catalysts in industrial chemistry extensively and continue to be used today. Since catalysts are untransformed or regenerated and only affect the reaction rate, they are often discarded as waste. Most industrial chemical waste is either sent to a special landfill or a disposal pond where organic chemicals will decompose

over a long period or inorganics will be reabsorbed into the environment. This causes an inherent risk to living organisms. Transition metals may, inadvertently, be reintroduced into the environment causing contamination. Mixed solvent systems are routine in industrial chemistry. Mixed acetone and water systems will be used in our experiments are 0/100, 25/75, 50/50, 75/25, and 100/0 (% by volume) ratios. Mercury (II) and chromium (II) sorption dynamics will be examined using sodium saturated montmorillonite. Our hypothesis is that the sodium saturated clay will preferentially adsorb the transition metals from mixed solvent systems. To test this hypothesis the transition metals chromium (II) and mercury (II) will be prepared using analytical standards. Smectite clays are the best choice for the absorbent since they have a very large surface area and high negative charge. The sodium saturated montmorillonite will be treated with ratios of chromium (II) and mercury (II) in mixed solvent solutions, and equilibrated for twenty-four hours. The supernatant solution will be analyzed to determine the equilibria concentrations of solution phase sodium, chromium, and cadmium.

5. *Title:* **Adsorption of BSA into Montmorillonite in the presence of monovalent, divalent, and trivalent cations**
   Principal presenter: Amanda Hagen
   Major: Chemistry
   Other presenters or co-authors: Matthew Cash, Dr. J. Scott McConnell
   Faculty mentor: J. S. McConnell
   Abstract: Montmorillonite is part of the smectite group of clay minerals and is commonly found in naturally occurring soils. Proteins have been adsorbed into mineral structures, including montmorillonite, to create ecologically friendly and cost-effective materials. These materials have been used to create alternative plastics and drug delivery systems. Minerals have been used to remove contaminate proteins from consumer goods and understanding the interactions between proteins and minerals can give insights into soil ecology. This research aims to expand on knowledge of intercalation of proteins into mineral layers by comparing adsorption of bovine serum albumin (BSA) into montmorillonite in the presence of monovalent cations, K+ and Na+, versus divalent cations, Ca+2 and Mg+2, and the trivalent cation Al+3. Adsorption rates were measured with each cation at pH 4 and pH 7, it was found that adsorption decreased in the presence of divalent cations. Fourier Transform Infrared (FTIR) spectroscopy and X-ray diffraction were used to characterize the protein-metal-mineral structures.

6. *Title:* **Forensic Analysis of Illicit Drugs by Nitrogen Direct Analysis in Real Time Mass Spectrometry (N_2 DART/MS)**
   Principal presenter: Wei Chean Chuah
   Major: Chemistry
   Other presenters or co-authors: Liguo Song, Jeffrey D. Quick, Sheher Mohsin, Ben Owen, Edward Remsen and John E. Bartmess.

Faculty mentor: Dr. Liguo Song
Abstract: The metastable nitrogen species have a wide range of internal energy occupied from 6.2 up to approximately 12.3 eV which theoretically have sufficient energy to ionize all the illicit drugs. In our current works, N_2 DART with a JEOL TOFMS (AccuTOF™) efficiently ionized all the selected ten commonly abused drugs under optimized conditions. The LOD was estimated to be approximately 10 μg/mL. The dominant ions formed for all commonly abused drugs were [M+H]+ ion and all identified ions have mass error within ±5 mDa of the theoretically calculated monoisotopic mass. A 3-minutes analytical protocol was established and applied in the tablet analysis of prescriptions drugs, all active ingredients i.e. acetaminophen, clonazepam, cyclobenzaprine, metaxalone, oxycodone, tramadol and zolpidem, were identified, while the inactive ingredients were practically omitted. Lastly, the feasibility of N_2 DART on the drugs analysis was further tested on Agilent 6550 QTOFMS. The [M+H]+ ion for each commonly abused drug were positively identified.

7. *Title:* **Effect of the association of Fusarium species and Bouteloua gracilis (Blue grama grass)**
Principal presenter: Titilope Ayosanmi
Major: Biology
Faculty mentor: Dr Andrea Porras-Alfaro
Abstract: Fusarium is a genus of fungi widely distributed in soil commonly acting as pathogens and decomposers of plants and animals. This study was conducted to determine the effect of 12 different species of Fusarium on Bouteloua gracilis (blue grama) seeds. Fungi were isolated as root endophytes and from soil samples across North America. They were isolated in MEA and characterized using microscopy and germination experiments. We evaluated the effect of volatile organic compounds (VOC) and direct organic compounds (DOC) for the Fusarium isolates. Each fungus was cultured on MEA media and seeds were exposed to fungal VOCs and DOCs in the same container. Seed growth was recorded with respect to each fungus. Some Fusarium species improved germination and about 40% improve root length. Although Fusarium is a genus characterized by its pathogenicity, we did not observe any negative effects on B. gracilis in the VOC and DOC assays. This experiment indicates potential beneficial effects of Fusarium strains on plant growth.

8. *Title:* **Male Student-Athlete Perception of Sexual Objectification**
Principal presenter: Jade Mariman
Major: Kinesiology
Faculty mentor: Dr. Steven Radlo
Abstract: Perceptions of, and experiences, in Men's Swimming and Diving team uniforms with regard to sexual objectification, (i.e., looking at individuals as body parts or sexual interactions rather than their personality will be investigated). The research questions are:

do uniforms make male student-athletes feel sexually objectified? Do student-athletes feel more objectified if they are required to wear more revealing uniforms? Can sexual objectification occur via the same gender (males sexually objectifying other males)? Finally, are there similarities between males and females, or do negative thoughts, perceptions, and feelings only affect females? Objectification theory has only been concerned with women's thoughts and perceptions, so it is hoped that the proposed research will advance this theory by studying the male population. The researcher will conduct interviews with volunteers from the Men's Swimming and Diving team at Western Illinois University. During the interview process, the researcher will note actions of the participants to be used for data purposes. Observation of participants at practice will be used in data analysis to reveal the common actions of male student-athletes during competition. Once the interviews are complete, the researcher will transcribe the interviews verbatim and begin the thematic analysis process to recognize, evaluate, and describe the common themes and subthemes within the data set. The themes and subthemes found within the data set will add to existing research that has only focused on women.

9. *Title:* **Quantitative Analysis of Limonene Content in Citrus Oil by Gas Chromatography Using Anisole as the Internal Standard**
   Principal presenter: Olusola John Dahunsi
   Major: Chemistry
   Faculty mentor: Dr. Liguo Song
   Abstract: Limonene is a common naturally occurring compound that can be extracted from Citrus oil. An experiment to integrate three vital topics in analytical chemistry and other related disciplines such as gas chromatography (GC), internal and external calibrations, has been successfully developed. This experiment has been carried out by quantitative analysis of limonene content in Citrus oil using Anisole as the internal standard. Through this experiment, students are exposed to GC principle, GC instrumentation, the optimization of GC separation, the advantages and disadvantages of internal versus external calibration, and the selection criteria of an internal calibration standard. The technique employed and the chemicals used in this experiment are safe, simple and easy. It clearly shows from the experimental results that this experiment is an ideal laboratory assignment for undergraduate level students.

10. *Title:* **Exploring the Astrometry and Flux Density Consistency of Interferometric Observations**
    Principal presenter: MD Nazmus Sakib
    Major: Physics
    Other presenters or co-authors: Esteban D. Araya
    Faculty mentor: Dr. Esteban D. Araya
    Abstract: Interferomety is one of the most powerful tools in astronomy. The signal from a large number of antennas can be combined to obtain images with very high angular

resolution. However, the calibration of interferometric data is a complex multi-step process in which data from a point source (typically a quasar) is used to calibrate a source that has unknown structure. Observations of a high-mass star forming region were conducted with the Karl G. Jansky Very Large Array by our group and the data were calibrated. This poster presents results of a series of tests exploring consistency in time, polarization and frequency domains of the calibrated dataset. We find consistent results within the measurement uncertainties in all explored domains.

11. *Title:* **Determination of Antioxidant Levels in Wild Tomato (Solanium Lycipersicum) Cultivars**
Principal presenter: Jamie Greathouse
Major: Chemistry
Other presenters or co-authors: Dr. Shelby Henning and Dr. Mette Sondergaard
Faculty mentor: Dr. Mette Sonderdaard
Abstract: Antioxidants have been found to play an important part in the human body's natural defense against many forms of disease. In particular, antioxidants neutralize accumulating endogenous and exogenous free radicals, which increase the risk of diseases such as cancer, as well as general aging. While the antioxidant levels of many fruits and vegetables have been reported, there are many that have not effectively been investigated. The objective of this research is to determine the antioxidant levels in cultivars of the wild tomato plant. The two main compounds in the tomato plant with antioxidant interest that are found in the tomato plant are phenolic and carotenes compounds, in particular the caretonoid lycopene. Tomatoes will be grown at the WIU greenhouses, and preserved with freeze-drying at approximately the same level of ripeness. To test the levels of the antioxidants in the wild tomato cultivars and a control (Big Beef), tomato extracts will be made using water, ethanol, and hexane. Extracts will then be subjected to two antioxidant assays. Trolox equivalent antioxidant capacity assay (TEAC) will be used to determine the levels of lipophilic antioxidants such as carotenoids. This assay is based on the scavenging of the colored 2,2'-azinobis-(3-ethylbenzothiazoline-6-sulfonic acid) (ABTS) into the correlating radical (ABTS(*)), which is colorless. Thus, antioxidant capacity can be measured colorimetrically 734 nm. The second assay that will be performed is known as the ferric reducing ability of plasma (FRAP). Antioxidant capacity is measured as the reduction of ferric to ferrous ion at low pH, which causes formation of a colored ferrous-tripyridyltriazine complex. The complex can be measured spectrophotometrically at 593 nm. This study will determine the antioxidant content of wild tomato cultivars compared to the commercial Big Beef tomato. Wild tomatoes may provide a high content and natural source of antioxidants, which may contribute in preventing cancer.
1. Deanto, V., Xianzhong, W., Kafui, A., Liu Hai, R. (2002) "Thermal Processing Enhances the Nutritional Value of Tomatoes by Increasing Total Antioxidant Activity", Agriculture Food Chem, 3010-3014 2. Schlesier, K., Harwart, M., Bitsch, R. (2002) "Assessment of Antioxidant Activity by Using Different In Vitro Methods", Free Radical Research. 177-

187.

12. *Title:* **Modification of Peptide J18 For Enhanced Ovarian Cancer Cells Targeting**
Principal presenter: Michael Oni
Major: Biology
Faculty mentor: Mette Soendergaard
Abstract: Cancers are known to be malignant tumors of potentially unlimited growth ability that expand locally by invasion and systematically by metastasis. Cancers of various types are now the second leading cause of death in the United States. They are named and characterized based on the site of occurrence in the affected tissue or organ. It is projected that there will be 22,240 new cases of ovarian cancer and 14,070 ovarian cancer-associated deaths in the United states in 2018. Although not the most common type, ovarian cancer is of particular importance among women. While OC is responsible for 2.5% of total cancer incidence among women, it accounts for 5% of all cancer deaths in women. The low survival rate is due to inadequate means of detection. While mammography is known to be a largely successful and effective screening procedure for breast cancer, which has significantly reduced the incidence and mortality, the trend has not been the same in the case of ovarian cancer. The two most common methods routinely available for the diagnosis of ovarian cancer are measurement of cancer antigen 125 (CA-125) levels and transvaginal ultrasound scan (TVUS). However, these techniques have proved to be ineffective for detection of malignant ovarian cells at early stage, hence unfit for use as screening tests. Presently, only 20% of women are diagnosed at the early stages, at which point over 90% of patients live longer than five years post diagnosis. About 80% of cases are diagnosed at advanced stages, thereby giving rise to a five year survival rate of merely 35%. Since the high mortality rate of ovarian is due to inefficient detection, developments of effective screening techniques are needed. Peptide J18 was discovered using in-vivo bacteriophage (phage) display technology, and was found to bind specifically to ovarian cancer cells. In an effort to further improve the binding properties of the peptide, an alanine scanning experiment was carried out. Results showed that substituting serine-5 (S5) and aspartic acid-6 (D6) with alanine increased the binding affinity approximately 10-fold. The objective of this study is therefore to determine and compare the binding affinity of a peptide (J18-S5A-D6A) carrying these two amino acid substitutions. with that of J18. This will be done by a modified enzyme-linked immunosorbent assay (ELISA), in which varying concentrations of the peptides will be incubated with human ovarian cancer cells (SKOV-3). The binding will be determined spectrophotometrically. In conclusion, peptide J18-S5A-D6A may be used in the detection of ovarian cancer, and may be utilized in delivering diagnostic and therapeutic compounds specifically targeting malignant ovarian cells.

13. *Title:* **Attitude Change via Implicit Learning: Gender Stereotypes in a STEM-Related Field**

Principal presenter: Aimee Bertolli
Major: Psychology
Other presenters or co-authors: Olga Lebed
Faculty mentor: Dr. Virginia Diehl

Abstract: Introduction The very existence of implicit bias has been debated for more than a decade (Jost et al., 2009). Some of the latest studies show that the obscurity of the mechanism underlying implicit processes leads to small effect sizes, but that methodological tools such as the Implicit Associate Test (IAT) do well at predicting discriminatory behavior (Greenwald, Banaji, & Nosek, 2015). However, explicit procedures aimed at reducing implicit prejudice seem to have inconsistent effects (Lai et al., 2014). The current study introduces a procedure of implicit learning aimed to change the implicit bias against women in STEM fields. Method Subjects (N = 24) received course credit for participation in the study. Participants were randomly assigned into one of the three implicit bias direction conditions: Women more likely to get into a Math Graduate Program compared with men, men are more likely, or neither is more likely. Participants completed the "Gender-Math Attitudes" IAT (the Implicit Attitudes measure) to measure initial gender bias towards women`s math skills. Participants were then presented with a series of 200 slides with information about two potential candidates for the Math Graduate Program. Each slide was presented for two seconds and contained two resumes of candidates composed of randomly generated first and last names, universities, hometowns, gender, and scores on three entrance exams. Participants were asked to choose which candidate had higher scores; however, they did not have time to calculate the sum of scores, therefore they had to make their decision based on their intuition. Visual and audio feedback followed the participants' decision, indicating if their decision was correct. Depending on their assigned bias direction condition, the slides had a different ratio of women or men having higher scores compared to the second candidate of the opposite gender. Finally, the participants completed the "Gender-Math Attitudes" IAT again and answered a set of explicit questions (Explicit Attitudes measure) about their opinion of women`s and men`s ability to solve math problems. Results For the Explicit Attitudes measure, there was no significant main effect of target gender, $F(1, 15) = .37$, $p = .55$, $np2 = .02$, no main effect of bias direction, $F(2, 15) = .03$, $p = .97$, $np2 = .004$, and no interaction, $F(2, 15) = .05$, $p = .95$, $np2 = .01$. Similarly, for the Implicit Attitudes measure, there was no significant main effect of intervention, $F(1, 16) = .34$, $p = .57$, $np2 = .02$, no main effect of bias direction, $F(2, 16) = .16$, $p = .86$, $np2 = .02$, and no interaction, $F(2, 16) = .55$, $p = .59$, $np2 = .07$. Conclusion It is possible that no significant effects were obtained due to the small sample size, high individual differences in initial bias, and the low difficulty of the decision-making task. We plan to make this task more difficult to force participants to intuitively rely on the gender of the candidates more than on the quick calculation of candidates' exam scores in making their decisions.

14. *Title:* **Marsh Bird Use of Wetlands Managed for Waterfowl in Illinois**
Principal presenter: Therin Bradshaw
Major: Biology
Faculty mentor: Dr. Chris Jacques
Abstract: Conservation planners often assume that waterfowl management activities benefit other wetland-associated birds, but few studies have quantified benefits among management strategies for multiple species. Overall, marsh birds are an understudied guild that can be valuable indicators of wetland conditions. Our objectives were to 1) compare marsh bird use of restored and natural wetlands, 2) determine characteristics of wetlands and the surrounding landscape that influence marsh bird use of wetlands, and 3) compare marsh bird use of wetlands managed for waterfowl across a continuum of management intensities. During late spring and early summer 2015-2017, we conducted call-back surveys to quantify marsh bird use of wetlands and assessed wetland quality using a modified version of the Ohio Rapid Assessment Method (ORAM) throughout Illinois. We conducted surveys on wetlands managed primarily for waterfowl (focal), wetlands selected randomly from emergent class polygons of the National Wetland Inventory across natural divisions in Illinois (random), and those surveyed through the Critical Trends Assessment Program (CTAP). We conducted three rounds of surveys at each site and followed the standardized North American marsh bird monitoring protocol. Preliminary analysis suggests differences in detections across management intensities, percent flooded, and water depth. Average detections (birds/survey/site) were greatest in survey round one (x-bar = 14.5, SD = 46.3), and less in round two (x-bar = 7.5, SD = 28.6) and three (x-bar = 2.2, SD = 5.7). Average detections (birds/survey/site) were greatest in focal sites (x-bar =21.7, SD = 54.7), followed by random (x-bar = 2.9, SD = 9.0) and CTAP sites (x-bar = 0.4, SD = 0.8). We used logistic regression in an occupancy modeling framework to evaluate potential effects of environmental factors on probability of detection and habitat use. Our goal is to provide management recommendations that will encourage marsh bird use and increase overall wetland quality.

15. *Title:* **Incorporating Aerial Imagery into Waterfowl Population Estimates**
Principal presenter: Andrew Gilbert
Major: Biology
Other presenters or co-authors: Christopher N. Jacques, Heath M. Hagy, Aaron P. Yetter
Faculty mentor: Dr. Jacques
Abstract: With advances in digital photography, aerial imagery has become a common method of estimating wildlife population size. This method has typically been used when wildlife congregate in large groups and can be photographed efficiently. When wildlife are distributed widely across the landscape, a series of aerial images have been taken along transects to estimate population size. From September through January of 2014-2016, we conducted aerial waterfowl surveys using a quadrat method to determine population size of

waterfowl using floodplain lakes, wetlands, and other areas of the Illinois River valley. We established a grid of 359 quadrats (260 ha) in the 100 year floodplain and randomly selected 50 quadrats each week from a high and low density strata. We placed a single transect in each quadrat running diagonally from the NE to SW corner and obtained aerial images using an automated camera affixed to the fuselage. We manually searched each aerial image and enumerated individuals by species or lowest taxonomic unit. We compared the corresponding aerial estimate with the extrapolated estimate from aerial images and estimated an error rate (difference between aerial image count and aerial observer estimate) for all major guilds. Error rates were high (ducks 111% ± 43%; geese, 224% ± 147%; swans, 80% ± 72%; American coot, -46% ± 13%). Analysis will be conducted to determine the minimum number of aerial images needed to estimate waterbirds within 15% of aerial estimates. Once the minimum number of images is determined, the feasibility of the method can be analyzed by taking into account the additional time and cost required to take and analyze that amount of aerial images.

16. *Title:* **Quantification of phenylbutazone in equine plasma for doping control in horse racing by liquid chromatography with ultraviolet detection**
Principal presenter: Natasha Frig
Major: Chemistry
Other presenters or co-authors: Ravi Lella Terrence Petry
Faculty mentor: Dr. Liguo Song
Abstract: In this study, a method for separation analysis of phenylbutazone (PBZ) in equine plasma has been developed using high performance liquid chromatography coupled with ultraviolet detection (LC-UV). Phenylbutazone is one of several nonsteroidal anti-inflammatory drugs (NSAIDs) commonly found in equine plasma, i.e. diclofenac, flunixin, ketoprofen, meclofenamic acid, naproxen, and oxyphenbutazone. Baseline separation of PBZ from other NSAIDs, as well as internal standards correcting for possible analyte loss during sample preparation, i.e. tolfenamic acid and ibuprofen, has been successfully achieved. A Kinetex® C18 column from Phenomenex was used to systematically optimize separation under gradient and isocratic conditions via three 0.1% acetic acid mobile phase systems including acetonitrile:water, methanol:water, and methanol:acetonitrile:water. It has been discovered that while methanol provides the necessary selectivity for the separation, acetonitrile prevents nonspecific interactions of the NSAIDs with the stationary phase. The optimized mobile phase consists of 70% 95:5 methanol:acetonitrile and 30% water with 0.1% acetic acid under isocratic conditions. Upon optimization of the mobile phase, the desired separation was achieved in under 16 minutes.

17. *Title:* **Infrared Characterization of a Sample of High-Mass Star Forming Regions**
Principal presenter: Michael Starzyk
Major: Physics
Other presenters or co-authors: Esteban D. Araya
Faculty mentor: Dr. Esteban Araya
Abstract: Stars form in opaque gaseous clouds where non-thermodynamic equilibrium conditions led to the generation of very intense spectral lines know as masers. Gravitational collapse of the clouds produces thermal energy that is detectable with infrared telescopes, and this infrared radiation is thought to be responsible for the generation of maser lines of several molecular species. We are studying a sample of high-mass star forming regions with maser detection to investigate whether the infrared environment in the regions is correlated with the characteristics of the masers that have been detected. For each object in our sample, three infrared images of different wavelengths were obtained from the Spitzer and WISE space telescope databases. The programs DS9 and CASA were used to make three-color images with an overlay of the radio continuum emission from the CORNISH survey. Three-color images of 22 objects have been generated. A discussion of the infrared and radio characteristics of the sample is presented.

18. *Title:* **Description of Darksidea, a Novel Genus within Pleosporales, and Evaluation of their Effects on Grasses**
Principal presenter: Maria-José Romero-Jiménez
Major: Biology
Other presenters or co-authors: Ari Jumpponen, Jennifer Rudgers, Jose Herrera, and Andrea Porras-Alfaro
Faculty mentor: Dr. Andrea Porras-Alfaro
Abstract: Dark septate endophytes are dominant colonizers in arid plants. Pleosporalean fungi that belong to the genus Darksidea were recently described, yet their distribution and function in semiarid grasses remains poorly known. The objective of this study was to describe novel Darksidea fungi and evaluate their effect on semiarid grasses. A total of 24 sites and 6 grass species were sampled across grassland ecosystems in central south states in the United States. We used a collection of 77 Darksidea isolates and characterized them using light microscopy and culturing in different media. Fungi were identified using the ITS rRNA region. The resulting sequences were compared with curated databases such as the Ribosomal Database Project and UNITE. Among the 77 congeneric Darksidea isolates, we identified a total of eight Operational Taxonomic Units (OTUs) defined at 97% similarity, representing likely yet unidentified diversity within the genus. Using representative isolates from each OTU, five potential novel clades of Darksidea were identified. Most isolates were obtained from the southwest field sites in Texas and were abundant in three of the sampled plant species (Büchloe dactyloides, Bouteloua eriopoda and B. gracilis). The potential function of the fungal isolates was assessed using grass germination bioassays to evaluate direct contact and volatile organic compounds effects. Darksidea isolates vary in

their role to improve plant growth and survival after 30 days. However, most fungal isolates produced VOCs that enhanced plant growth.

19. *Title:* **True Metabolizable Energy of Submersed Aquatic Vegetation for Dabbling Ducks**
Principal presenter: Margaret Gross
Major: Biology
Other presenters or co-authors: Sarah McClain, Christopher Jacques, Heath Hagy, Sean Jenkins, John Simpson, and Brian Davis
Faculty mentor: Dr. Christopher Jacques
Abstract: Wetland vegetation communities provide critical foraging habitat for waterfowl and are disappearing at an alarming rate. There is a lack of information regarding how the energetic carrying capacity for waterfowl is affected in degrading wetland ecosystems where submersed aquatic vegetation (SAV) is present. Managers can estimate the energetic carrying capacity for a wetland by determining the energetic value (true metabolizable energy; TME) of foods available to ducks. Although energetic carrying capacity models are sensitive to TMEs, few TMEs are available for SAV. Most available TME values are from plant seeds and have only been estimated from waterfowl that do not primarily consume SAV. We estimated TME values of eight common species of SAV for mallards (Anas platyrhynchos) and gadwall (Mareca strepera) to parameterize energetic carrying capacity models. We used established TME methods which consisted of fasting and feeding ducks a known amount of vegetation, and subsequently collecting their excreta. Excreta was dried, ground, pressed into pellets, and combusted in a Parr 6050 compensated jacket calorimeter to determine gross energy. We calculated TME from gross energy of raw vegetation and excreta. Preliminary results for mallards indicate that TME was greatest for Canadian waterweed (Elodea canadensis; 1.69 ± 0.33 kcal/g) and southern naiad (Najas guadalupensis; 1.40 ± 0.43 kcal/g) and lowest for Eurasian watermilfoil (Myriophyllum spicatum; - 0.53 ± 0.51 kcal/g), which required more energy to process than was assimilated. TME values for gadwall are currently being estimated and will be presented at the conference. The TME values for these SAV species will allow wetland managers to more accurately evaluate wetland management practices and refine energetic carrying capacity estimates. Moreover, these values contribute a better understanding of the value of emergent marshes containing SAV for ducks, which could potentially provide as much energy as moist-soil wetlands.

20. *Title:* **Ground beetle diversity in sand prairies and restored tall grass prairies of west-central Illinois**
Principal presenter: Jessi Edmiston
Major: Biology
Other presenters or co-authors: Dr. Kenneth McCravy
Faculty mentor: Dr. Kenneth McCravy
Abstract: Tallgrass prairies and sand prairies are home to many plant and animal species, but these prairie types are distinctly different in edaphic qualities and plant composition. Ground beetles (Coleoptera: Carabidae) are biologically important insects; they capture and consume soil-dwelling insects, ingest seeds of troublesome weeds, and, because of habitat specificity, can be used as biological indicators of environmental conditions. Ground beetles were sampled to evaluate the distinctiveness of restored tallgrass prairies and sand prairies of west-central Illinois. The objective of this study is to compare the diversity, species richness, species composition, and habitat associations of ground beetles within and between the two types of prairies. Ground beetles were collected with pitfall traps placed in three tallgrass prairies and three sand prairies in Hancock, Henderson, Mason, and McDonough counties in west-central Illinois from late spring to late fall of 2016. Preliminary analyses using the multi-response permutation procedure and indicator species analysis revealed significant differences in ground beetles' species composition and habitat associations. These results suggest that sand prairies provide habitat for a ground beetles assemblage distinct from the from the tallgrass prairie ground beetle fauna. Continued monitoring will allow detection of seasonal or yearly variation in the ground beetle fauna of these prairie ecosystems and help in determining if conservation measures are needed within these habitats.

21. *Title:* **Quantitative analysis of the explosive TNT in water by high performance liquid chromatography with ultraviolet detection**
Principal presenter: Shashi Bhushan Pathipaka
Major: Chemistry
Faculty mentor: Dr. Liguo Song
Abstract: Chemical explosives and weapons are real threats for public safety and their health. Hence detection of those chemical explosives is really important. TNT which is known as 2,4,6-trinitrotoluene and its chemical formula is $C_6H_2(NO_2)3CH_3$. It is a yellow nitroaromatic single ring crystalline solid compound at room temperature and odorless which is not a natural product. It is prepared by combing the mixture of nitric acid, sulfuric acid with toluene. TNT is considered one of the powerful explosives. Hence there has been increasing interest in the analysis of chemical explosives for forensic investigations and increased emphasis on antiterrorism and homeland security. GC (Gas Chromatography) is the one of the mostly used techniques for determining explosives. But GC results can be inexact determinations because of these explosives are organic compounds and are nonvolatile or thermally unstable. But high performance liquid chromatography (HPLC)

overcomes these limitations. Environmental Protection Agency (EPA) method 8330A describes an HPLC method by using UV detectors for determination of fourteen main chemical explosives. In this research, we focused to quantitatively determination of TNT in water samples. In order to get out of interference by other chemical explosives, a baseline separation of TNT from other thirteen main explosives was determined by HPLC and C18 reversed-phase column. After achieving the separation, subsequent quantification was accomplished through external calibration by preparing a series of standards by using water without contamination of chemical explosives. They are after subjected to HPLC analysis. Finally, linear equation was obtained by fitting TNT concentration versus TNT peak area plot, which are used for determining the TNT concentration in TNT contaminated samples after they are analyzed by HPLC at same conditions and TNT peak areas are obtained.

22. *Title:* **Synthesis and characterization of thiophene fused pyridine heterocycles**
Principal presenter: Sumia Ehsan
Major: Chemistry
Faculty mentor: Dr. Jin Jin
Abstract: In organic chemistry, bicyclic compounds in which the two rings share two adjacent atoms or a covalent bond are called fused ring systems. Thiophene fused pyridine systems are one important class of heterocyclic compounds. They attract considerable interest because of their great practical usefulness, primarily due to their various biological activities. Thienopyridines, which are a class of drug targeting the platelet adenosine diphosphate (ADP) 2 receptor, demonstrate the high importance of this class of compounds. Our objective is to look for a simple method for the synthesis of thiophene fused pyridine heterocycles. In our research, a multi-component reaction was explored by reacting an aldehyde with malononitrile and NaSH in the presence of a base producing a very important intermediate 2-amino-3,5-dicyano-6-mercaptopyridine. This intermediate is the precursor for synthesis of the final product thiophene fused pyridines. It was then undergone alkylation and cyclization reactions after treatment with alpha-halogen compounds in presence of sodium alkoxide as base catalyst. The products synthesized have given excellent yields and they were analyzed by 1H NMR and 13C NMR spectroscopy.

23. *Title:* **The Gene Expression of Corn Earworm (Helicoverpa zea) when Infected with Bacteria: Serratia marcescens and Pseudomonas aeruginosa**
Principal presenter: Deji Adekanye
Major: Biology
Other presenters or co-authors: Keshab Mainali, Jeffery Liles, Sue Hum-Musser, Richard Musser
Faculty mentor: Dr. Sue Hum-Musser
Abstract: The Corn Earworms (Helicoverpa Zea) is one of the main economically important pest to Maize (Zea mays) production. It can be affected by different types of bacteria .Studying the immune system response to infection may provide information on how to

overcome their defences for development of bio control methods. This study aims to compare the gene expression of Helicoverpa zea when infected with bacteria: Serratia marcescens and Pseudomonas aeruginosa. In this experiment, artificial diet prepared in the laboratory was laced with the bacterial cultures of mascescens and aeruginosa in different cups. The Control group was the artificial diet with no bacteria. Three groups of the caterpillars were allowed to feed on the three different diets for 72 hours. The caterpillars from the three groups were ground using liquid Nitrogen. The RNA of the caterpillars was extracted. A microarray analysis was done to reveal the caterpillar's gene expression. The expressions of the different groups were compared to the control group. A total of 3,396 genes were significantly differentially expressed in the caterpillars, out of which 1066 have unknown functions. The main functional categories affected were genes encoding for digestion, immunity, and stress and cell growth. Aeruginosa - infected larvae had a significantly different pattern of gene expression compared to the marcescens- infected group and to the control caterpillars. This study provides information on the immune response of this important corn pest in response to bacterial Infection.

24. *Title:* **The Effects of Urbanization on Bees' Microbiome in West-Central Illinois**
Principal presenter: Jacob Torres
Major: Biology
Other presenters or co-authors: Kendall Smith
Faculty mentor: Dr. Ken McCravy
Abstract: Pollinating insects are an important component of the world's biodiversity. Pollination is an essential ecological process; it has been estimated that over 90% of flowering plants are animal pollinated. Bees are the most important group of pollinators in most habitats and are the most important pollinators for most of the world's flowering ecosystems. I plan to determine whether there is a relationship between increasing levels of disturbance (intact ecosystem, urbanization as a disturbance, agriculture as a disturbance) and the diversity of pollen collected by bees as they forage throughout west-central Illinois, and whether this pollen diversity has an impact on the microbial communities found within the intestinal tract of bees. I will also be able to determine whether there is a relationship between bee species diversity and levels of urbanization. The goals of this study are to record bee to plant associations by identifying pollen associated with specific bee species, to discover potential associations between pollen microbiota, plant species, bee species, bee gut microbiome, bee health, and habitat type, and to understand the impact that urbanization has on biodiversity and factors that may impact bee health. This study may also lead to better bee conservation plans and practices and provide insight into microbial relationships not previously studied in the western Illinois area.

25. *Title:* **Pollen Microbiome of Bee Species (Hymenoptera: Anthophila) of Western Illinois**
Principal presenter: Kendall Torres
Major: Biology
Other presenters or co-authors: Jacob Torres
Faculty mentor: Dr. Catherine Miller-Hunt
Abstract: The bees (Class Insecta, Family Apidae) are main pollinators for most of the world's flowering ecosystems. In recent years, honeybee populations have declined, due in part to Colony Collapse Disorder (CCD) as well as habitat destruction and invasive species impacts. This has led to some species of bees being placed on the endangered species list and a drive for greater public knowledge of the importance of bees for our food and survival. Symbiotic relationships are common among most insect species, with many focusing on intracellular endosymbionts. For many species of bumble bees (Genus Bombus) and honeybees (Genus Apis), pollen is a main source of protein for their diet and for the development of their queens. Although pollen has been found to have specific microbiotic bacterial associations with host flower species little research has been done on the microbiome of pollen from bees in Illinois. Habitat alterations and fragmentations have occurred throughout the Midwest region, where native forest and prairie ecosystems have been reduced due to cultivation and urbanization. For my project, I plan to compare bee pollen found on both honey and bumble bees in various habitats (sand prairies, tallgrass prairies, and urban) in western Illinois. The goal of this study is to discover potential associations between pollen microbiota, plant species, bee species, and habitat type. Thus, examining associations may help in bee conservation and provide insight into microbiota not previously known in the western Illinois area.

26. *Title:* **Eyeblink Conditioning: A Pilot**
Principal presenter: Shannon Wachter
Major: Psychology
Faculty mentor: Dr. Matt Blankenship
Abstract: The classical conditioning paradigm involves an unconditioned stimulus (US), which produces an unconditioned response (UR), and a conditioned stimulus (CS) (Gormezano & Kehow, 1975). Eyeblink conditioning is a form of classical conditioning, in which an association is established between an air puff and a tone, such that the puff elicits an eyeblink as a response. Classical conditioning has been termed the simplest form of associative learning (Kim & Thompson, 1997). For a stimulus to be considered a US, the stimulus needs to reliably and consistently produce a UR. For a stimulus to be considered a CS, it must not produce a response that is similar to the UR. During classical conditioning, the CS and US are presented repeatedly in a specific order with consistent timing between them. Eventually, the CS will begin inducing a response similar to the UR, which is then referred to as a conditioned response (CR). When applying this to eyeblink conditioning, the US is an air puff, the CS is a tone, and the UR is the blink of the eye. There are two

main types of eyeblink conditioning, delay and trace conditioning. Delay eyeblink conditioning involves the US and the CS to co-terminate, while trace eyeblink conditioning involves a period of time between the end of the US and the onset of the CS. Eyeblink conditioning relies heavily on the cerebellum. With this in mind, eyeblink conditioning can be used to assess how different stimuli can affect cerebellar function. For example, some research has indicated that binge drinking affects cerebellar function (Green, 2004). Both paradigms rely on the cerebellum; however, trace eyeblink conditioning also relies on hippocampal processes. The purpose of this study was to pilot test an Electromyogram (EMG) and classical eye blink conditioning set up that was built. In addition, it was used to solidify the amount of acquisition trials need to see a clear learning curve produced by the conditioning. There are several factors that can affect the conditioning process, including caffeine and nicotine consumption, which were assessed during the study. A delay eyeblink conditioning paradigm was used. Each participant had 80 trials, with every 8th trial containing only the CS. Results indicated that there was reliable and consistent conditioning occurring.

27. *Title:* **Study of alkynyl chalcogenides and the potential application in organic electronics**
Principal presenter: Bala Madhuri Yeruva
Major: Chemistry
Faculty mentor: Dr. Jin Jin
Abstract: Alkynyl Chalcogenides are very important building blocks for many chemical transformations and are important intermediates in many organic syntheses. These compounds have been used as precursors in many reactions such as hydrosulfonation, hydrostannylation, and hydroboration reactions. They have also been utilized in supramolecular chemistry and materials science. This research mainly focused on the synthesis of two alkynyl selenides by simple methods using reagents like n-butyl lithium, selenium powder, and an alkyl halide. The synthesized products were further studied by treatment with some oxidizing reagents. We found a highly pi-conjugated system was formed after oxidation of the alkynyl selenides with a single electron-oxidizing reagent $NOPF_6$, while a Se-Se dication product was formed when Tf_2O/DMSO was used as oxidizing agents. The highly pi-conjugated products have the potential applications in organic electronics such as organic conductive materials, organic solar cells, organic field-effect transistors, etc.

28. *Title:* **C-H bond Functionalization of Indole**
Principal presenter: Nagajyothi Bhavanam
Major: Chemistry
Faculty mentor: Dr. Jin Jin
Abstract: Indole is an aromatic heterocyclic organic compound consisting of a benzene ring fused to a five-membered nitrogen-containing pyrrole ring. It is the parent substance of

many important compounds that occur in nature. Its structure can be found in many bioactive products and drug molecules such as tryptophan (one of the essential amino acids and a constituent of most proteins), indole-3-acetic acid (plant growth hormone) and serotonin (neurotransmitter), and Ralpax for the treatment of the disease Migraine. The field of C-H activations and functionalization by transition metal catalysts is identified as an effective tool for C-C and C-X bond formations, and it is an extremely attractive field in organic chemistry. C-H activations have interesting features including low toxicity, inexpensive method, environmental friendly, characteristic selectivity, and atom-economical dehydrogenative transformations. In our research, we explored the C-H bond chalcogenation and alkenylation reactions of indole. 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. Diphenyl diselenide (PhSeSePh) and diphenyl ditelluride (PhTeTePh) were used as the chalcogen sources for the chalcogenation reactions of indole. While ethyl acrylate was used as the reagents for alkenylation of indole. Palladium acetate was found to be best catalyst to catalyzed the C-H functionalization of indole. The chemical structures of all products were confirmed and characterized by NMR and Mass spectroscopy.

29. *Title:* **Using a Balance Trainer for Improved Ankle Stability and Proprioception in Athletes**
Principal presenter: Jilliann Biswell
Major: Kinseiology
Other presenters or co-authors: Jade Mariman
Faculty mentor: Dr. Tim Piper
Abstract: In the world of fitness and rehabilitation, balance training has become a widely accepted method used to improve overall proprioception, neuromuscular facilitation, and stability in healthy and injured individuals. The most recent literature examining balance training has focused on healthy individuals, therefore it is important to look at other populations such as athletes. The numerous benefits found from balance training can undoubtedly be translated to sports by aiding in the prevention of ankle injuries, as they are the most common injuries seen in sports. Additionally, athletes routinely have to have balance and ankle proprioception in order to make changes in their movements especially to avoid a fall. The BOSU, originally meaning "both sides up", debuted in 2000 as a means of strengthening and improving balance. However, while the BOSU is still relatively new, it has limited research surrounding ankle stability training. Although this will not be conducted as a research project, previous literature supports the importance and benefits of stability training in general. Therefore, my purpose was to extend the research to apply stability training to athletes as they are at a high risk of ankle injuries throughout their careers. There are several modalities utilized to train balance, but the BOSU is one of the most practical and commonly accessible devices to the everyday population. The invention

of the BOSU was intended to be versatile and functional in the sense that individuals could perform various exercises. For the purpose of this project, four exercises were chosen to demonstrate how to properly, safely and effectively utilize the BOSU. The exercises are in progressive form from easiest to hardest. Modifications can and should be implemented based on the individuals fitness level or if there are any past injuries.

30. *Title:* **Synthesis of novel derivatives of α-lipoic acid and evaluation of their anti-oxidant activity**
Principal presenter: Kondam Chaitanya
Major: Chemistry
Faculty mentor: Dr. Jin Jin
Abstract: Alpha lipoic acid is an antioxidant found in certain foods, including red meat, spinach, broccoli, potatoes, yams, carrots, beets, and yeast. The aim of our research is to synthesize novel derivatives of lipoic acid by chemically modifying Alpha-lipoic acid and to study the activity of the synthetic products. Several derivatives of lipoic acid were designed based on previous experimental evidence and literature data. The synthesis of the derivatives of lipoic acid will be described. Various modifications were made on the disulfide bond in lipoic acid. The modified derivative of lipoic acid was confirmed by 1H NMR and GC-MS. We are hoping the modified lipoic acid derivatives would show greater antioxidant activities compared to Alpha lipoic acid. The anti-oxidant activity of synthetic derivatives will be measured and compared with that of lipoic acid.

31. *Title:* **Phage Display Selection of Exosome Targeting Peptides for Detection of Pancreatic Cancer**
Principal presenter: Olanrewaju oni
Major: Chemistry
Faculty mentor: Dr Soendergaard Mette
Abstract: The high mortality rate of pancreatic ductal adenocarcinoma is due to late detection of the cancer. At this point resection is inefficient because the cancer has already metastasized to other parts of the body, causing a 5 year survival rate of approximately 5%. Recently, the use of exosomes in detection of pancreatic cancer has received increased attention. Exosomes are extracellular vesicles ranging from 40-100 nm in size, and are derived from the cell membrane and secreted by a wide range of cell types in the body. Exosomes contain several molecular constituents such as proteins, mRNA, non-coding RNAs and microRNAs that may be useful as biomarkers of the cell of origin. Since the content of exosomes is unique to the type of cell from which it originates, it may provide unique attributes specific to the metabolic status and progression of pancreatic cancer. This may lead to an improvement in the detection of the cancer at early stages. Due to the presence, abundance, and stability of exosomes in biologic fluids, they may serve as suitable biomarkers for the non-invasive diagnosis of pancreatic cancer. The aim and objective of this proposed study is to isolate exosomes from normal and cancerous

pancreatic cells, and to then utilize phage display to select peptides that bind specifically to pancreatic cancer exosomes. Phage display is a technique that provides a means of selecting peptide ligands with high affinity and specificity to any given target. A phage display library is the collection of different phage displaying up to 109 different peptides, of which some are likely to bind to pancreatic cancer exosomes. In this proposed study, both normal pancreatic cells (hTERT-HPNE) and the cancerous pancreatic cells (MIA PaCa-2) will be grown in the laboratory. Exosomes will then be isolated from both cell lines through centrifugation using the ExoQuick-TC™ kit. The phage display selection will consist of a negative selection and four subsequent positive selections. The negative selection entails incubating the phage library with exosomes obtained from normal pancreatic cell line. Unbound phage will be collected and amplified in E. coli. For the positive selections, purified phage will be incubated with pancreatic cancer exosomes. Unbound phage will be washed away, and the bound phage will be collected by elution and amplified. The collected phage will be used in three subsequent positive selection rounds. Selected phage will be identified by next generation DNA sequencing, and further characterized in regard to their binding properties. In conclusion, phage display selection of exosome targeting peptides for detection of pancreatic cancer may enable early diagnosis of pancreatic cancer.

32. *Title:* **Evaluation of Cas9 Expression in Nocardia cholesterolicum NRRL 5767 Bearing a CRISPR/Cas9/sgRNA Construct by Western Blotting**
Principal presenter: Kadidia Samassekou
Major: Chemistry
Other presenters or co-authors: Scott Holt and Jenq-kuen Huang
Faculty mentor: Dr. Jenq-Kuen Huang
Abstract: Oleic acid is an abundant agricultural commodity which can be converted to value-added hydroxy fatty acid by biotechnology. Nocardia cholesterolicum NRRL 5767 (NC NRRL 5767) is a well-known microorganism which converts oleic acid to 10-hydroxystearic acid (10-HSA) and 10-ketostearic acid (10-KSA). The conversion of oleic acid to 10-HSA and 10-KSA is catalyzed by the enzymes oleate hydratase and secondary alcohol dehydrogenase (2o-ADH), respectively. The 10-HSA, produced at a high yield (~90% w/w), is a valuable product in industry as a lubricant and a cosmetic composition. The long-term goal of this research is to perform microbial strain improvement of NC NRRL 5767 by knocking out the 2o-ADH gene using CRISPR/Cas9 technology, a genome editing tool. This will enable NC NRRL 5767 to convert oleic acid to 10-HSA only, thus, optimizing the production of 10-HSA and eliminating the need for further separation and purification. In our previous work, a chimeric plasmid carrying the single guide RNA targeting the N-terminal region of the 2o-ADH gene was successfully constructed and transformed into NC NRRL 5767 by electroporation. Here, we evaluated the two transformants for their ability and efficiency to express the Cas9 enzyme, an RNA-guided DNA endonuclease responsible for site-directed double strand breaks in DNA. To assess the performance of the CRISPR/Cas9 technology, the expression level of Cas9 protein level

was quantified by Western blotting using a polyclonal antibody against the Cas9 enzyme. This technique was performed in three steps. The first step was the separation of the proteins by size performed via gel electrophoresis. The NC NRRL 5767 cells were lysed and crude soluble proteins separated by SDS-PAGE. The second step was to transfer the proteins from the gel to a solid support like a nitrocellulose or PVDF membrane. Lastly, the target protein (Cas9) was detected immunologically. The membrane was probed with rabbit polyclonal Cas9 antibody which should bind specifically to Cas9 protein. After washing the membrane to remove unbound materials, the bound Cas9 antibody was probed with a second antibody, goat-anti rabbit IgG- Horseradish Peroxidase (HRP) conjugate. The protein band bound by the antibodies was detected by using a chromogenic substrate of HRP. The result from our Western blotting showed that both transformants did not express detectable amount of Cas9 suggesting that the rpsL promoter (control the expression of Cas9 in the plasmid used) may not be recognized by RNA polymerase in the NC NRRL 5767. Future work will include construction of a new CRISPR/Cas9 vector containing rpsL promoter from NC NRRL 5767, thus, ensuring expression of the Cas9 enzyme.

33. *Title:* **A Review of Flu Vaccination Policy and Acceptance in the United States**
Principal presenter: Roselind Brown
Major: Health Sciences
Other presenters or co-authors: Dr. Mei Wen
Faculty mentor: Dr. Mei Wen
Abstract: Every year, flu vaccination is recommended to the health personnel as well as the general population to prevent health complications, such as pneumonia, which is serious and even fatal, especially for pregnant women and young children. This study aims to examine the policy and acceptance level of flu vaccination by conducting a review on the existing data, and published papers and reports. We look back at the history and procedure to have a better understanding of the current policy related to the use of flu vaccination. Stakeholder analysis is used to identify the different forces in the decision making and implementation process. We also identify the issues in the implementation of the policy and discuss suggestions to improve the quality and coverage of flu vaccination in the United States. This study will help people to look at the intervention from a health policy perspective and with the Health Belief Model. It will also concentrate on cooperation and understanding between different stakeholders in the implementation of the flu vaccination process.

34. *Title:* **Self-Control: Protection from Substance Abuse**
Principal presenter: Heather Lucke
Major: Experimental Psychology
Other presenters or co-authors: Eugene Mathes
Faculty mentor: Dr. Eugene Mathes
Abstract: Researchers who study self-control have found that it is generally beneficial. For

example, it correlates positively with academic and social success and negatively with a variety of psychological disorders except obsessive compulsive disorder (Tangney, Baumeister, & Boone, 2004). Given the relationship it shares with prosocial behaviors, these data suggest that self-control is morally good. However, Uziel and Hefetz (2014) suggest that self-control is neutral. High self-control individuals are able to effectively use â€œhedonic calculusâ€ to weigh the short and long-term consequences of various courses of behavior and determine which behaviors best serve to maximize their individual interests. Although this usually leads to prosocial behavior, it does not prevent high self-control people from engaging in antisocial activities if they are deemed more beneficial to the self than prosocial alternatives. Supporting their hypothesis they found that in the Dictator Game, high self-control participants followed a self-interest rather than a prosocial strategy. Elaborating on the theme that self-control can be used for antisocial purposes, Mathes, Lane, Helmers, Jamnik, Hendrickson, and Aleshire (2016) found support for the hypothesis that when high self-control individuals engage in reckless driving and academic dishonesty they are less likely to be caught and punished than low self-control individuals. The purpose of this research was to test the hypothesis that, controlling for extent of alcohol and drug use, high self-control individuals would report fewer negative consequences of indulgence. Participants were 109 (63 women, three unspecified) college students. Participants filled out the following measures online: Habitual Self-Control Scale, Alcohol Use Disorders Screening Test (AUDIT) Subscales (Frequency and Consequences), Comprehensive Effects of Alcohol Scale Subscales (Sociability, Tension Reduction, Liquid Courage, Sexuality, Cognitive and Behavioral Impairment, Risk and Aggression, and Negative Self-Perception), Drug Use Disorders Identification Test-Extended (DUDIT-E) Subscales (Frequency, Social Negative Effects, and Personal Negative Effects), and the Consequences of Drug and Alcohol Use (Frequency and Getting Punished for Illegal Alcohol/Drug Activities). The data were analyzed using multiple regression with frequency of substance use and Habitual Self-Control Scale scores as independent variables and negative consequences as the dependent variable. For all of the measures of negative effects except the DUDIT-E Social Negative Effects, controlling for frequency of use, self-control correlated negatively with negative outcomes. This means that high self-control individuals suffer far less from their use of alcohol and drugs, controlling for quantity, than low self-control individuals.

35. *Title:* **Modeling the Success of Kickstarter Projects**
Principal presenter: George Agyeah
Major: Applied Statistics
Other presenters or co-authors: Angelina Kolomoytseva, Bayarmaa Mark, and Joseph Adesiyan
Faculty mentor: Dr. Fehkhordi-Vakil
Abstract: Launched in April 2009, the stated goal of Kickstarter is to help bring creative projects to life. The company does this by modernizing a decades old way of fund raising.

The business idea of Kickstarter can be best likened to the traditional fundraiser model practised by the Girl Scouts for decades. Just like the Girls Scouts cookie selling gambit, Kickstarter provides an environment where entrepreneurs, social campaigners and activists are able to raise funds from the public by offering them tangible goods in return. The cookie that is offered in this case is often the product that the campaign is aiming to create. Unlike the Girls Scouts who are ubiquitous anywhere in the planet, the companies in these fundraisers are often new startups and part-time activists who do not have the resources and popularity of the Girls Scouts. The campaign is referred to as a project and the goal is to raise enough initial capital to ensure the successful release of the product under consideration. The success of a project depends on many factors and these provide a potent source of information in determining what factors are significant in the realization of a project funds. Fundraisers play an important role in determining the survival odds of a new company, idea or innovation. Countless examples exist of great ideas that failed as a result the inability to raise the required starting capital. It is therefore of prime importance to understand and utilize any information that gives a startup an edge in fundraising. This report highlights the important segments of fundraising on Kickstarter. It seeks to derive a model that will help decision makers, new entrepreneurs and activists understand how to better manage their fundraisers to ensure success. According to the model the strongest predictors of success are goal, amount pledged, levels of donations available and category of product. Further analysis showed that projects in Art, Dance, Theater and Music categories are more likely to succeed while projects in Design, Fashion, Games, Journalism, and Publishing are somewhat more likely to fail. Projects in all other categories, including Comics, Crafts, Film & Video, Food, Photography, and Technology, on average, have equal chances of success and failure. The model shows that projects within certain categories have better success rates than other projects. Additionally, the project manager will be content in establishing a campaign goal wisely as well as providing sufficient number of options for backers to contribute. On the other hand, unrealistic funding goals and few options to contribute do not favor success.

36. *Title:* **Zika Virus Entry into Permissive Cells by AXL receptor**
Principal presenter: Batla Alabdullatif
Major: Biology
Faculty mentor: Dr. Catherin Miller Hunt
Abstract: Zika virus (ZIKV) is an arbovirus and belongs to the Genus Flavivirus of Family Flaviviridae and is related to Dengue, West Nile, and yellow fever viruses. Since there is no vaccine or effective therapies as well as increasing the number of cases that have been infected by ZIKV, ZIKV infection recently considered an emerging disease and consequently a public health issue. Recent studies have been shown that the AXL protein is playling a significant role in endocytosis of Zika virus. This research designed to detect the infectivity and cell tropism mechanism of Zika virus via Axl-receptor and demonstrate the impact of AXL receptor on infection of ZIKA in human macrophages I and II. Cultivation

ZIKV had been conducted in order to propagate the virus and identify the viral protein expression by using the Western blotting. I conducted time Course of Infectivity Assay for Vero cells and SNB19 cells to demonstrate the morphological changes in both cells post-infectious with ZIKV. I will perform the Macrophage Sensitivity Assay and Immunostaining through isolation the monocytes from blood donors and differentiate them into M1 and M2 microphages and will then infection them by ZIKV to determine M1 and M2 - Axl dependent entry. The outcomes from this research may help to identify how the ZIKV infection host cells and to understand how the AXL â€“antibodies can block the ZIKV binding which may open new door to create effective vaccines and/or therapies.

37. *Title:* **An Economic And Demographic Analysis of Will County**
Principal presenter: John R Bannon
Major: MBA
Faculty mentor: John Gruidl
Abstract: This paper endeavors to shed light on Will County, a suburban collar county in Chicagoland in Illinois through economic and demographic analysis. The paper also seeks to provide conclusions drawn from these results as well as suggest strategies for Will County moving forward. Will County is a county that had experienced significant population, housing, and economic growth from 1970 to 2007, but this absolute growth disguised a lack of true development as issues ranging from per capita income to poverty rates, from employment rates to the inflows and outflows into and out of the County. Many of the issues in Will County might stem from the fact that to some degree the County functions as a bedroom community for the City of Chicago and other suburbs with a more developed business sector, such as Naperville, Oakbrook, and Schaumburg - although Schaumburg is largely in Cook County along with Chicago. Too often the communities in Will County have pursued growth over development. This is exemplified by the boom in warehouse construction along the I-55 and I-80 corridors. With two major interstates and multiple rail lines crisscrossing the County, Will County should be able to leverage this infrastructure into high value development. Instead, it seems that large amounts of Will County residents work outside of Will County, the employment opportunities that do exist seem to be largely in services-related positions, and most of these services-related positions offer low levels of compensation, as typified by workers in warehouses. Will County should pivot from this low value-added growth and look at ways to generate true development through transportation corporate headquarters and cultural attractions that increases the quality of life for its residents, while maintaining its advantages and strengths in the transportation and related sectors. In 2016, 8,000 jobs were added in Will County, 15.2 million square feet of new business space was built, and $751.3 million was invested â€“ so there is hope for the future (Lafferty 2017). With some vision, some hard work, and some luck, Will County should be on a sustainable path of economic development.

38. *Title:* **Gene expression in Spodoptera exigua caterpillar correlated to cannibalism rate on Methyl Jasmonate-induced tomato plants.**
Principal presenter: Adeyemi Adesanwo
Major: Biology
Other presenters or co-authors: Sue Hum-Musser and Richard O. Musser
Faculty mentor: Dr. Richard O. Musser
Abstract: Cannibalism in caterpillars may be a way for a generalist herbivore to compensate for plant defenses. Our laboratory investigated Spodoptera exigua and Helicoverpa zea cannibalism in the presences feeding on artificial diet, tomato leaves, and tomato leaves treated with methyl jasmonate (MeJA) in different cups respectively with each cup having five S. exigua caterpillars under appropriate temperature and light conditions. Preliminary results for S. exigua showed that cannibalism increased among the caterpillars in the presence of MeJA treated tomato leaves. Gene expression showed that compensatory genes such as proteases were particularly stimulated in caterpillars that fed on MeJA treated tomato leaves alone and not necessarily as high for caterpillars of other treatments. This alteration of genes and the cannibalistic feature possess a potential pathway to identifying the weaker spot of the generalist herbivore. The additional preliminary result suggests that there is a trend that some genes are correlated to cannibalism treatments and induced plant defenses compared to the untreated plants. This is one of the first studies to investigate the connection of cannibalism in relation to plant defenses. The objective of this research is to investigate the impact of induced cannibalism on the containment of this generalist herbivore on vulnerable food crops. The significance of this project is huge because of its economic and agricultural relevance.

39. *Title:* **Developing Cultural Competence Among Sport Psychologists**
Principal presenter: Jean-Marc Charles
Major: Sport Psychology
Faculty mentor: Dr. Steven Radlo
Abstract: Athletes are always striving to gain the upper hand over their opponents. Physically, daily practice is used to try to accomplish this goal. Mentally and emotionally, athletes may seek out sport psychologists (SP) or mental performance enhancement coaches (MPEC) to resolve on field/court/ice issues (e.g., anxiety, pre-game jitters, over thinking) and non-athletic situations (e.g., family issues, academic problems, issues with significant other). Selecting qualified SP/MPECs to work with is limited to athletes as they usually have one or two options at their disposal, in some cases, they have none. Unfortunately, there is another factor in the selection process that is rarely discussed, and that is race. Data collected in 1997 revealed that only five percent of American Psychology Association members were comprised of non-white ethnicities (Kontos & Breland-Noble, 2002). Seeing that the majority of SP/MPECs are white, it leaves room to think maybe sport psychology as a profession would be enhanced if athletes had options to as whom they could consult with such as choosing a SP/MPEC based on their race, gender, or skin color. Having the

option to choose a SP/MPEC similar to one's race, gender, or skin color could possibly allow for better compatibility matching with their own views and the sport they play. Research has shown that non-white athletes are uncomfortable with consulting with a white sport psychologist because of the awkwardness of the SP/PMEC trying to "act black" or forcefully trying to relate to the non-white athlete (Lee & Rotella, 1991). This awkwardness can be a symptom of having a lack of cultural competence. Cultural competence is the ability to understand and relate to races, ethnicities, and cultures that differ from your own (Kontos & Breland-Noble, 2002). This is a skill that many people lack and this can lead to unnecessary difficulties between individuals of different races, or simply misunderstandings that can negatively affect relationships between people. The purpose of this study is to gather information on which SP/MPEC student-athletes would like to consult with, considering both the SP/MPEC and student-athlete's race, gender, and skin color, and why they chose that specific individual. Participants of the study will consist of about 100 or more student-athletes from a mid-western Division I university. They will be presented with 8 images of potential sport psychologists of various gender, races, and skin color (i.e. male/female, black, white, Hispanic, Asian). Each subject will have an option of which sport psychologist they'd like to consult with and will answer questions following their selection. The questions being asked, based on a Likert scale scoring system, will be used to find out why the athlete chose that specific sport psychologist, if they feel as though the consultant will help with their issue, and if they will return for future sessions with their chosen sport psychologist. Data will be entered into a SPSS program and results are currently pending.

40. *Title:* **Can visual barriers reduce stereotypic pacing in polar bears (Ursus maritimus) and brown bears (U. arctos)?**
Principal presenter: Sierra Semel
Major: Biology
Other presenters or co-authors: Dr. Susan Meiers and Dr. Lance Miller, Senior Director of Animal Welfare Research
Faculty mentor: Dr. Susan Meiers
Abstract: Pacing, a highly repetitive and invariant behavior, is a significant welfare concern among zoological facilities. Polar bears (Ursus maritimus) and brown bears (U. arctos) commonly exhibit classic stereotypies even under professional care. It has been suggested that if individuals can see conspecifics but are not allowed to interact, they may become frustrated because natural social behaviors cannot be exhibited. Because the polar bears (n=2) and brown bears (n=2) at the Brookfield Zoo are able to see each other but not physically interact, stereotypic pacing could be a resulting variant behavior. We hypothesized that erecting visual barriers between exhibits could therefore decrease pacing behavior. During a six-week study period (three weeks before the barriers were erected, and three weeks after) we used continuous sampling to record the incidence of pacing and species-specific behaviors. Preliminary data suggest that the younger polar bear (Hudson,

11 years) increased the duration of pacing after the visual barriers were in place, while the older polar bear (Aussie, 32 years) decreased the duration of pacing afterward. Prime breeding age for male polar bears begins around age ten, a time when they become highly territorial. Therefore, Hudson may have increased pacing behavior after erecting the visual barriers because he could smell other bears, but could not see them. In contrast, Aussie has outlived the lifespan of wild polar bears (25-30 years), possibly growing weary of seeing the other bears without the ability to interact. In the absence of visual cues, he may have been no longer stimulated by the sight of other bears, thus decreasing the duration of pacing.

41. *Title:* **Prevalence of Borrelia burgdorferi and blood meal identification in Culex Mosquitoes**
Principal presenter: Nada Alzhrani
Major: Biology
Faculty mentor: Dr. C. Miller-Hunt
Abstract: Borrelia burgdorferi is spirochete bacteria that cause lyme disease or borreliosis and is normally transmitted by ticks to mammalian hosts. Recent reports have indicated that B. burgdorferi can also be found to be associated with Culex mosquitoes, which are common in the Midwestern United States. In this study, we aim to examine whether B. burgdorferi is found in lysate of Culex mosquitos that had been previously tested for West Nile Virus. The mosquitoes were sampled from summer between the year 2016 and 2017 in western Illinois. They were then tested for the presence of West Nile Virus as part of a West Nile Virus surveillance program. The presence or absence of B.burgdorferi was determined by using a PCR-based method. Results from PCR detection for B. burgdorferi in the mosquito lysates were all negative. From these results, we conclude that no B. burgdorferi is found in the mosquito populations tested. Next, we analyzed the cytochrome C gene of the West Nile Virus tested mosquitoes to determine the origin of the blood meal.. Cytochrome C is a mitochondrial gene that every eukaryotic has, including humans and mosquitoes. DNA was extracted from the mosquitoes and the cytochrome C gene was amplified by PCR. Purified amplicons were sequenced to identify the blood meal sources. The sequences will be compared to sequences in GenBank and Barcode of Life Database (BOLD) to determine the blood meal sources. Our results will show the feeding preferences of mosquitoes from western Illinois and whether this correlates with West Nile Virus positivity.

42. *Title:* **Characteristics and Social Determinants of Cigarette Smoking among Adolescents in Nigeria**
Principal presenter: Olufunke Fadahunsi
Major: Public Health
Faculty mentor: Dr. Mei Wen
Abstract: Tobacco smoking is a growing public health problem in the developing world.

Even though the health hazards of smoking are well documented, it is still challenging to tackle with smoking in Nigeria. This study aims to examine the characteristics of cigarette smoking among adolescents in Nigeria to better understand the social determinants associated with the behavior. A systematic review was conducted on the existing literature and publications using different search terms. The findings were entered in Excel table and compared. Besides identifying the risk factors and describing the main characteristics of adolescents using cigarettes, we also have analysis on the existing policies and educational efforts in Nigeria. The gender difference between male and female in the use of tobacco products is also discussed.

43. *Title:* **The Development and Analysis of Microsatellite DNA in Spiny and Smooth Soft Shell Turtles**
Principal presenter: Nasser Ben Qasem
Major: Biology
Other presenters or co-authors: Michael A. Romano
Faculty mentor: Dr. Michael A. Romano
Abstract: Conservation of wildlife biodiversity has been a major concern within the scientific community since the 1992 Convention on Biodiversity. One of the primary tasks of species preservation is maintaining genetic diversity in natural populations. On the other side, the increase in inbreeding leads to the worsening of the adaptive properties of species (Hamilton 2004). Molecular methods have been widely recognized as one of the best for assessment of genetic biodiversity. A very special issue is the conservation of long-lived organisms due to their generation times (up to 40 years, or more), which means that their population can become extinct due to external factors long before genetic characterization can be performed (McGaugh et al. 2008). That is why such studies require more informative and quicker methods of acquiring data that do not require long census-type studies. Today, the study of genetic material has been a valuable tool for acquiring such data. One of the simplest and most popular is genetic profiling with microsatellite DNA markers (Allendorf et al. 2013) . The biggest advantages of microsatellite markers is their abundance of polymorphisms, possessing bi- and multi-allelic characteristics, thus suitable for tracing the genome in an individual organism or a group (Allendorf et al. 2013; Allendorf & Luikart, 2007 ; Lougheed, et al., 2000; Pesole, et al., 1999). This study is focused on testing the DNA markers in two species of soft-shelled turtles, one of which is endangered in Illinois, in order to study their genetic structure. It is expected that the work will contribute to conservation genetics of these two long-lived organisms in terms of understanding population structure.

44. *Title:* **Equality in the Classroom: Microaggressions toward Parents that are Gay and Lesbian**

Principal presenter: Adam Morgan
Major: General/Experimental Psychology
Other presenters or co-authors: Sarah Elisabeth Nielsen
Faculty mentor: Dr. Julie Herbstrith

Abstract: Purpose: There has been an increase in the number of lesbian and gay (LG) couples raising children (Gates, 2017). As they become more visible, assessing attitudes towards them has become paramount. Prior research suggests that LG parents are underserved by teachers and are viewed more negatively than heterosexual parents (Herbstrith et al., 2013). Most research in this area has focused on overt prejudice toward LG parents. It is important, however, to evaluate the extent to which people perpetrate microaggressions, or subtle verbal or behavioral acts of discrimination (Sue, 2010), toward them. To date, there is no published research that investigates the extent to which people recognize and endorse statements that are microaggressions toward LG parents. This study examined microaggression perpetration against LG parents and the relations among microaggression perpetration, anti-LG attitudes, Social-Dominance Orientation (Pratto et al., 1994), and Right-wing Authoritarianism (Altemeyer, 1981). Procedure: A total of 655 participants (n = 204 male, n = 450 female, n = 1 other) were recruited from three pools: education majors (n = 183), psychology human subjects pool (HSP; n = 379), and teachers (n = 92). The sample was predominantly heterosexual (n = 597). Participants completed the Components of Attitudes toward Homosexuality scale (CATH; LaMar &Kite, 1998), the RWA scale, and the SDO scale. Then they rated the likelihood they would make a series of statements identified in previous studies (e.g., Shelton & Delgado-Romero, 2011) as microaggressions to an LG parent. Results: A one-way ANOVA resulted in a significant difference among pools on the microaggressions dependent variable, $F(2, 653) = 37.71$, $p < 0.001$. Pairwise comparisons indicated that HSP participants had significantly higher microaggression scores than both education undergraduate students and education professionals. A hierarchical regression was used to predict microaggression scores using the CATH (Step 1), SDO and RWA (Step 2), and participant pool (Step 3). The regression statistics are reported in Table 1. Conclusions and implications. The results of this study indicated that microaggressions were significantly predicted by attitudes toward homosexuality (CATH), SDO, and RWA. This information can be used to improve diversity training programs for educators and paraprofessionals by including discussions about gay and lesbian parents as marginalized groups, thereby improving the learning environment of children with LG parents.

45. *Title:* **Effect of CdSe Nanoparticles on the Optical Properties of Lead Borate Glasses**
Principal presenter: Niva Kumari Jayswal
Major: Physics
Faculty mentor: Dr. P. K. Babu and Dr. Saisudha Mallur
Abstract: The fluorescence emission of CdSe nanoparticles in lead borate glasses were analyzed to study the effect of glass composition on the nanoparticle sizes. Glasses with composition of xPbO: (99-x)1CdSe (where x=29, 39, 49, 59 and 69) were made by air quench method and polished for the optical studies. Nanoparticles in the glass matrix were grown by controlled annealing near the glass transition temperature. Fluorescence spectra, obtained by exciting these glasses using a 360 nm laser, were analyzed in terms of the peak intensity, full width at half maxima, area under fluorescence peak. Deconvolution of the spectra was used to estimate the average particle sizes. Fluorescence spectrum from CdSe nanoparticles can be deconvoluted into three peaks; pk1 (arising from particles of size less than 1 nm), pk2 (2-10nm) and pk3 (12-19nm). Detailed analysis shows that the concentration of smaller particles remains the same with glass composition whereas the larger size particle concentration shows a slight increase with increasing PbO content.

46. *Title:* **Optical Properties of Er-doped Lead Borate Glasses**
Principal presenter: Vishal Jayswal
Major: Physics
Faculty mentor: Dr. P. K. Babu, Dr. S. B. Mallur
Abstract: We studied the optical absorption and emission of lead borate glasses doped with Er2O3. Glasses with the composition X PbO : (99.5-X) B2O3 : 0.5 Er2O3, (X = 29.5 to X = 69.5) were prepared using the melt quench technique. Polished glass samples were studied using a Cary 5G UV-VIS optical absorption spectrometer for the optical absorption and a CCD spectrometer for the fluorescence emission. Absorption and emission spectra in the wavelength 1400 to 1600 nm were analyzed. Spectra were deconvoluted using Origin to a series of Gaussian peaks. We calculated the absorption cross-sections, emission cross-sections and their ratios from the bandwidth information. Absorption cross-section monotonically decreases with increasing PbO content whereas the emission cross-section shows an initially increase, then it reaches a minimum at 59.5 mol % of PbO. The ratio of the cross-section follows the same behavior as the emission cross-section. The variation of these cross sections as a function of the glass composition indicates that the transition probability for different Stark split levels are different and they reflect the underlying variation in the local electric field as a function of the glass composition.

47. *Title:* **Evaluating Survival and Cause-Specific Mortality of Bobcats in West-Central Illinois**
Principal presenter: Edward D. Davis
Major: Biology
Other presenters or co-authors: Tim C. Swearingen and Christopher N. Jacques
Faculty mentor: Dr. Christopher Jacques
Abstract: Increased understanding of mortality of bobcats (Lynx rufus) is a prerequisite to successful management programs, particularly as it relates to population dynamics and the role of population models in adaptive species management. Survival and cause-specific mortality of bobcats have been well documented in predominantly forested landscapes, but limited information has been collected in agriculturally-dominated Midwestern landscapes. Bobcat population trends have increased since the early 1990s and previously developed simulation models predict that bobcats occur in moderate densities across northern Illinois (i.e., north of US Route 36). Continued expansion of bobcat abundance prompted state legislators to propose a bobcat hunting season during 2014/2015 that featured limited harvest for the first time since the early 1970s. Thus, the need for quantitative assessments of bobcat population demographics (e.g., survival) in northern Illinois is timely. Our primary objective was to evaluate survival and cause-specific mortality rates of bobcats across west-central Illinois. We captured and radio-collared 36 (20 males, 16 females) bobcats from January 2016 to February 2018. We documented 8 deaths during our study; vehicle collisions was the leading cause of mortality and accounted for 4 (50%) mortality events. We attributed remaining deaths to harvest (n=3; [1 legal, 1 illegal, 1 incidental harvest]) and capture-related factors (n=1); we censored capture-related deaths from analyses. Estimated annual survival was 0.51 (95% CI = 0.37-0.65). Bobcat survival monitoring is ongoing through 2019 and will evaluate potential effects of intrinsic (e.g., sex, age) and habitat variables on seasonal and annual survival rates. A more complete assessment of survival rates and cause-specific mortality factors in regions where a paucity of information currently exists (e.g., west-central Illinois) are needed to inform harvest decisions about management programs and approaches for monitoring abundance of bobcats in Illinois.

48. *Title:* **Sonogashira and Suzuki coupling reactions of organic tellurium compounds**
Principal presenter: Bala Bharathi Mannava
Major: Chemistry
Faculty mentor: Dr. Jin Jin
Abstract: Organo tellurium chemistry that deals with organo tellurium compounds is one exciting and wide area providing many research and development opportunities. These compounds don't require specialized techniques for their synthesis. The application of these compounds became intensively attractive in organic synthesis due to their chemio, region and stereo selectivity reactions. Sonogashira cross coupling reaction is the coupling of terminal alkynes with alkenyl or aryl halides for the formation of aryl alkynes in the

presence of palladium catalyst, K_2CO_3 (base) and CuI as co-catalyst. Suzuki coupling reaction is the cross coupling of organ boranes with triflates or organic halides using palladium catalyst and KOH base. Suzuki coupling has got its importance for synthesizing biaryl compounds because of the very mild conditions, availability, and stability of its reagents. In our research, aryl iodide and tellurium (starting reagents) were reacted in the presence of KOH base and nitrogen gas under 120-140^oC to yield symmetrical diaryl tellurides. Later, the symmetrical diaryl tellurides were cross coupled with organoboronic acid in the presence of palladium catalyst, nitrogen gas and KOH base under 120-140^oC/24 hours to yield unsymmetrical biaryl compounds. Column chromatography was performed to purify the final product and then characterized by H_1 NMR and C_{13} NMR. A variety of diaryl tellurium compounds were also synthesized with terminal alkynes like phenyl acetylene, 1-hexyne, 1-octyne, 1-heptyne etc. in the presence of palladium catalyst, K_2CO_3 and CuI as co catalyst under 100^oC for 24hrs. to yield various coupling products. These coupling products were then characterized by H_1 NMR and C_{13} NMR.

49. *Title:* **Gene Expression Of Tomato Fruitworm (Helicoverpa zea) That Fed On Tomato Plants Infected With The Entomopathogenic Fungus (Beauveria bassiana)**
Principal presenter: Bashaier Alharbi
Major: Biology
Faculty mentor: Dr. Sue Hum-Musser
Abstract: Beauveria bassiana is an entomopathogenic fungus which can improve plant immunity and resistance against herbivorous insects. However, the gene expression related to induced defense and other physiological mechanisms of the tomato fruitworm (Helicoverpa zea) that fed with wounded tomato (Solanum lycopersicum) plants that were colonized by the entomopathogenic fungus has not been described. Here, we studied the effect of B. bassiana on the growth and gene expression of tomato fruitworm that fed on wounded tomato plants in the presence and absence of the fungus. Four week old, tomato plants were separated into two groups, with half sprayed with water and serving as the control treatment, while the other half were inoculated with B. bassiana GHA fungal spores on the tomato plant leaves and roots. At 8 weeks old, the plant leaves were wounded with jagged scissors and re-inoculated with fungus. After 3 days, leaves were removed and given to third instar tomato fruitworm caterpillars. There were four treatments of caterpillars feeding on: control non-wounded no-fungus (CNW) tomato leaves, control wounded no-fungus (CW), fungus non-wounded (FNW) and fungus wounded (FW) tomato leaves. After four days of feeding on the treated leaves, the tomato fruitworm larva were harvested for RNA extraction and the RNA was reverse transcription to cDNA. Real time- quantitative polymerase chain reaction was conducted on the cDNA to determine the gene expression of the fruitworm and its response to consumption of the treated tomato leaves. The results indicate statistically significant difference in the expression of specific tomato fruitworm genes that are associated with immunity, digestion, detoxification and growth and

development in the caterpillars that fed on fungus wounded or fungus non-wounded tomato leaves when compared to the no-fungus control treatments. The high and specific stimulation of these insect genes particularly in the fungus-wounded treatment shows increased insect digestion and defense compounds when they fed on fungus-treated plants. Beauveria bassiana infection has a detrimental effect on the caterpillar's overall digestive defense mechanisms and forms a protective treatment for the tomato plant. The results of this study are important to understanding how the combined fungus and plant defense affects this important agricultural insect pest.

50. *Title:* **A Critical Review of Female Athlete Triad among Female College Athletes**
Principal presenter: Molly Cockerham
Major: Health Sciences
Faculty mentor: Dr. Mei Wen
Abstract: Female athlete triad (FAT) describes a disorder that contains three connecting pieces, which include low energy availability with or without disordered eating, menstrual dysfunction and low bone mineral density. Most commonly seen in gymnastics, ice-skating, cross country and long distance track and field, the female athlete triad is often found among young female athletes. Because being thin can help them enhance their athleticism and give them the competitive edge. This study aims to examine the characteristics and psychological factors associated with female athlete triad. A critical review is conducted by a systematic search on the data and publications available online. Firstly, we describe the prevalence and the characteristics of the female collegiate athletes affected by FAT. Then we identify the psychological triggers for female collegiate athletes to develop a type of disordered eating; the relationship with the coaches and its impact to disordered eating; and the correlation and interaction between FAT and the increase of musculoskeletal injuries. Identifying the psychological factors in female collegiate athletes can help coaches, athletic trainers, physicians and additional sports staff to recognize the signs and symptoms of the FAT at the early stage, thus be able to reduce the athlete's risk of low bone mineral density and osteoporosis later in life.

51. *Title:* **Nuclear Magnetic Resonance Signals in Nanopores with Different Surface Wettability**
Principal presenter: Munirah Alsaqer
Major: Physics
Other presenters or co-authors: Dr. Jinhong Chen
Faculty mentor: Dr. Kishor Kapale
Abstract: Source Rock Reservoirs are known to have small pores that range in size from a fraction of nanometers to hundreds of nanometers with varying surface wettability. Confined fluids in these small pores are known to behave in a very different manner than bulk fluids and understanding the way this fluid behaves may give insight into better ways to extract the trapped fluid. Our aim is to determine the adsorption processes in different

types of pore systems. Nuclear Magnetic Resonance NMR can give insight into the behavior of this the trapped fluid. NMR relaxation time T2 of the condensed fluids depends on the surface wettability along with fluid type. In order to study the effects of size and surface wettability of nanopores on NMR relaxation time T2 of the confined fluids, synthetic nanomaterials are used. This should help us understand the wettability of different types of pores and absorption rate of fluids into different pore sizes. This can in turn help us develop an understanding of the behavior of different fluids in the matrix and determine where the Hydrocarbons are preferably absorbed. Moreover, it will help to understand what NMR signal of the different components may look like. These results will be used for fluid typing in nanopores in the unconventional rocks thereby. I will provide experimental data and discuss how Nuclear Magnetic Resonance was used to determine the absorption rate in different types of pore systems.

52. *Title:* **Soybean Secondary Compounds for Ovarian Cancer Prevention**
Principal presenter: Bayan Aljamal
Major: Biology
Faculty mentor: Dr. Mette Soendergaard
Abstract: Currently, ovarian cancer is the most lethal form of malignancy of the female reproductive system, and is the fifth leading cause of cancer deaths in women. The average 5-year survival rate for women who are diagnosed with ovarian cancer is 40%. In 2016, approximately 22,000 cases of ovarian cancer were diagnosed in the United States, while 14,000 died from the disease. While there is no effective treatment or adequate early detection methods of ovarian cancer, the development of tumors may be prevented by enhancing the response of the immune system to detect and suppress early pre-cancerous cells. Recently, a mechanism known as nonsense-mediated mRNA decay (NMD) has been considered an important constitutive mechanism to increase the function of the immune system. Inhibiting NMD leads to synthesis of a number of damaged proteins in the cell. Such damaged proteins are subsequently displayed on the cell surface where they are recognized by the immune system. This process triggers immune mediated cell death. As a result, inhibition of NMD may lead to enhanced immune surveillance and resulting killing of pre-cancerous cells. The main focus of this study is to determine whether soybeans contain natural compounds that inhibit NMD since the soybean plant contains bioactive compounds that prevent certain cancers. For instance, methyl-jasmonate is a plant defense hormone that activates cell death in cancer cells. Also, isoflavones prevents and stimulate cell death. Thus, the soybean might lead to preventing ovarian cancer.In order to study NMD in ovarian cancer cells, three NMD reporter plasmids (NMD-7, NMD-8, NMD-9, and pMX-puro) will be utilized. NMD-7 encodes a dual bioluminescent reporter plasmid that carries two bioluminescent proteins of red and green color, respectively. The green bioluminescent proteins will be active when NMD is both inhibited and active, while the red protein will be active only when NMD is inhibited. Therefore, the level of NMD is measured by detecting the amount of red-to-green bioluminescence. Plasmids NMD-8 and

NMD-9 are controls that each carry the red and green proteins, respectively. pMX-PURO carries a gene that gives the cells resistance to the antibiotic puromycin. First, the four plasmids were transformed into E. coli using the heat-shock method, and grown overnight on lysogeny broth (LB) plates containing 100 μg/mL ampicillin. A single colony was then picked and expanded in liquid LB overnight at 37^{o}C and 225 rpm. Plasmids were purified from the liquid culture using the HiSpeed Plasmid Midi-Prep Kit (Qiagen), and endotoxins were removed using Endotoxin Removal Solution (Sigma-Aldrich). Next, the concentration and purity of the plasmids were evaluated spectrophotometrically at 260 nm and 280 nm, respectively. Finally, plasmids were transfected into human ovarian adenocarcinoma cells (SKOV-3) by using the TransIT-LT1 transfection reagent (Mirus). Next, oybean compounds will be added to transfected SKOV-3 cells, and the levels of â€œred-to-greenâ€ bioluminescence will be measured to determine NMD inhibition. This may lead to a way to enhance immune surveillance, and result in killing of pre-cancerous cells.

53. *Title:* **Structured Population Dynamics**
Principal presenter: Shaikh Obaidullah
Major: Mathematics
Faculty mentor: Dr. Amy Ekanayake
Abstract: The Leslie model is a discrete, linear, age-structured model of population growth. However, many species have birth rates that are nonlinear, functions of their surroundings, and stochasticity plays a significant role in survival rates, particularly among newborns. We extend Leslie model by dividing the population by stage and gender, and utilizing nonlinear birth rates and newborn survival rates. We investigate well-posedness and stability properties and various numerical examples to assess the behavior of the model. The applications are far-reaching. For example, the model can be applied to: polar bears, whose birth rates depend on temperature; prairie dogs, whose birth rates depend on population density; and whitetail deer, whose birth rates can be modeled as a function of weight and region.

54. *Title:* **The effect of asynchronous music on outdoor two mile run performance in untrained young adults**
Principal presenter: Kisha Kucharek
Major: Kinesiology
Faculty mentor: Dr. Steven Radlo
Abstract: It has been suggested that music may be a viable way to positively change an individual's motivation to exercise, by enhancing the enjoyment of the activity. However, studies that report these findings have been conducted in the laboratory setting and research done in real training or in the competition setting is scarce. The outcome of previous research might be significantly different during the actual sporting environment. Another issue with current research is the lack of physiological variables measured on the use of music and exercise. Most studies examine heart rate, systolic blood pressure, and ratings of

perceived exertion. In addition to heart rate and ratings of perceived exertion, the current study will measure blood lactate levels in order to provide a more comprehensive assessment of the physiological responses to music during exercise. Results from this study will be used to show how the use of music influences running performance in an unpredictable outdoor environment. The primary purpose of this study is to examine how listening to music effects heart rate, ratings of perceived exertion, blood lactate levels, and time to completion of an outdoor two mile run. It is hypothesized that listening to music will improve the time to complete an outdoor two mile run and divert individuals attention away from the intense feelings experienced during a running task. In addition it is hypothesized that in the presence of music heart rate, blood lactate levels, and ratings of perceived exertion will be lower during an outdoor two mile run. Statistical Analyses will be performed using the Statistical Package for the Social Science (SPSS) program. Descriptive statistics will be used for the demographics of the participants. Four separate 2 (groups) x 2 (groups) repeated measures ANOVA's will be conducted to examine significant differences on heart rate, blood lactate levels, ratings of perceived exertion, and time to completion between the experimental and control groups.

55. *Title:* **Self-Awareness and the Ability to Recognize Gait from Point-Light Videos**
Principal presenter: Pratistha Maharjan
Major: Kinesiology
Faculty mentor: Dr. Randall Hyllegard
Abstract: The purpose of this study was to examine whether athletes with specific gait training had greater self-awareness of their walking patterns compared to athletes in which gait is not particularly relevant to their sport. Self-awareness was measured as accuracy of identification and visual scanning patterns or areas of interest (AOI). It was hypothesized that specific gait training would result in greater recognition accuracy while spending a greater amount of time scanning the lower rather than upper extremities. Track and Field team runners and Swim team members were recorded while walking on treadmill. Video were transformed into point-light videos and viewed. Participants were asked to identify themselves from other models and eye movement behaviors were tracked. While there was no difference between the athletes for accuracy of self-identification, there were differences in visual scanning patterns. Runners AOI values were greater for the lower extremity and swimmers for the mid-region of the body. Limitations of the study may have caused a lack of accuracy of self-identification; whereas, the AOI values found for the runners are supported by self-awareness theory.

56. *Title:* **Analysis of Rubber vis SEM-EDS**
Principal presenter: Deanna Castellon
Major: Chemistry
Faculty mentor: Dr. Brian Bellott
Abstract: Rubber is formed when bubbles from blowing agents are formed within the

matrix. Changing certain materials from the formula can change different properties. For example, to change the density of the material, different amounts of blowing agent need to be added. Surfactants are used to control the size of the air bubbles within the matrix. Other additives can be added such as a catalyst to speed up the reaction, or cross-linking agents to synthesize crosslinks between the polymer chains. Rubber is also known for having open cell structures, or closed cell structures. The different cell structures are created when the blowing agent creates the bubbles when certain temperatures are reached. The open cell structures can allow for fluid mobility which increases its absorbance, while closed cell structures are firm and prevent the flow of liquids and gases. The materials used to synthesize the rubber, as well as the different cell structure, affects the quality of the rubber. Depending on the changes, certain properties like weathering, or tensile can be improved or be diminished. I will consider how the different curing times, meaning how long the rubber is left exposed to heat to allow for the blowing agent to decompose, affects the cell structure, and how the structure affects the test results.

57. *Title:* **Antioxidant Capacity in Brewed Teas**
Principal presenter: Rachel N. Crews
Major: Chemistry
Faculty mentor: Dr. Brian Bellott
Abstract: Antioxidants are widely accepted for their ability to reduce free radicals in the human body. This is important because free radicals damage cell membranes which can lead to deadly diseases. Antioxidants are found in food such as fruits, vegetables, and drinks such as tea. Tea has long been touted for its health benefits. Tea is useful for lowering the risk of and preventing diseases. Our research interests are in determining the concentration of antioxidants in ten different teas that will be brewed hot. The total antioxidant concentration will be determined using the diphenyl-2-picryl-hydrazyl (DPPH) photometric assay. DPPH is a stable free radical that produces a violet solution when combined with ethanol. When an antioxidant molecule is present, the molecule reduces DPPH leaving an uncolored ethanol solution. In order to determine the correct antioxidant activity, a study must be done in order to determine the kinetics of the reaction between the DPPH radical and the antioxidant in addition to the colorimetric assay. The reaction mechanism between the antioxidant and DPPH is dependent on the structure of the antioxidant, thus a kinetic study is needed. Since antioxidants are primarily made up of polyphenols, a preliminary study will be done to determine the kinetics study of gallic acid, ascorbic acid, butylated hydroxytoluene (BHT), and phenol with DPPH. According to Brand-Williams et al., ascorbic acid and BHT have a very fast reaction rate while gallic acid and phenol have slower reaction rates. These results will be applied to a kinetic study of each tea analyzed. The analysis of this study will be done using the Ultraviolet-Visible Spectroscopy (UV-Vis) instrument. The kinetic study will determine the time needed for the reaction to be completed.

58. *Title:* **Solid State Synthesis of CoTe**
Principal presenter: Majed Almashnowi
Major: Chemistry
Faculty mentor: Dr. Brian Bellott
Abstract: Solid state materials are typically materials which are highly ordered and formed at high temperatures. There are many different synthetic techniques used to synthesize solid state materials. This research focused on the ceramic method to synthesis CoTe. The ceramic method used high temperatures and closed reaction vessels to complete the synthesis. Our goal is not only to synthesize materials, but also synthesize single crystals of CoTe. We examine the crystallinity of the crystals using optical microscopy. If we deem a material of high enough quality we then subject the sample to scanning electron microscopy (SEM) to get more high resolution pictures and conduct some qualitative elemental analysis of the samples using energy dispersive spectroscopy (EDS).

59. *Title:* **Solid state synthesis of Advanced ceramic materials**
Principal presenter: Mohammed Althuqbi
Major: Chemistry
Faculty mentor: Dr. Brian Bellott
Abstract: Ceramics materials have been known for many years. An important early example of a traditional ceramic material is red clay, which was and still is used to manufacture pottery and building bricks. Ceramic materials can exhibit a variety of properties; one property of ceramic materials is they are often hard materials. Current research on advanced ceramics is aimed at altering the nanostructure of the materials. These nanoceramic materials have many applications due to their hardness, wear resistance, corrosion resistance, and thermal stability. Metal oxides, metal nitrides, and metal carbides are examples of advanced ceramics. Metal carbides specially among other ceramics have unique properties. 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. Materials are characterized using a scanning electron microscope equipped with an energy dispersive X-ray spectrometer (SEM/EDS). This allows for the collection of a high resolution image and for qualitative stoichiometry of the elements.

60. *Title:* **Quantification of phenylbutazone in equine plasma for doping control in horse racing using molecularly imprinted polymer solid phase extraction followed by liquid chromatography with ultraviolet detection**
Principal presenter: Terrence Petry
Major: Chemistry
Faculty mentor: Dr. Liguo Song
Abstract: In this study, a method using molecularly imprinted polymer solid phase extraction (MIP-SPE) followed by liquid chromatography ultraviolet detection (LC-UV) for the analysis of phenylbutazone (PBZ) and its metabolite oxyphenbutazone (OPBZ) in

equine plasma has been developed. By using MIP-SPE, commonly regulated non-steroidal anti-inflammatory drugs (NSAIDs) by the United States Equestrian Federation (USEF), i.e. PBZ, OPBZ, diclofenac, flunixin, ketoprofen, meclofenamic acid and naproxen, and an internal standard, i.e. tolfenamic acid, were first selectively extracted. Then, baseline separation of PBZ, OPBZ from other NSAIDs, internal standard, and residual components of equine plasma was achieved using LC-UV. Finally, the developed method was validated with regard to its linearity, accuracy, and precision. The preliminary validation has proven that the method has met the requirements by the racing jurisdictions.
References: 1. L. R. Soma et al. J. Vet. Pharmacol. Ther., 35 (2012) 1-12. 2. B. Heffron et al. J. Anal. Toxicol., 37 (2013) 600-604. 3. V. Meucci et al. Bioanalysis, 6 (2014) 2147-2158.

61. *Title:* **The Effects of Active and Passive Imagery on Learning a Novel, Self-Paced Motor Task**
Principal presenter: Shital Joshi
Major: Kinesiology
Other presenters or co-authors: Sadie S. Van Norman and Steven J. Radlo
Faculty mentor: Dr. Steven Radlo
Abstract: Imagery is an important tool used by many athletes and those learning to acquire motor tasks of various cognitive and motor demands (Weinberg, 2008). An imagery model gaining greater popularity is the Functional Equivalence Model (Holmes & Collins, 2001). This model proposes that imagery should mirror the actual performance environment as much as possible. Specifically, it is thought that the brain stores memories in the form of a central representation that is accessed by both physical aspects of the movement and by the motor imagery used for the physical execution. To further test this model, two types of imagery were studied: active imagery (AI) and passive imagery (PI). AI is defined as imaging with the sporting/performance environment, while PI is imaging outside of the sporting/performance environment, and is known as "traditional" imagery. Three groups (n=15 per group) were tested, the task being underhand dart throwing. One group received AI (sitting in front of the dartboard imaging in first person successful throws), another group received PI (sitting in another room imaging in first person successful throws), and a Control group (sitting in another room imaging everyday objects not associated with dart throwing). Participants completed 100 throws (20 pre-test, 60 acquisition, 20 post-test/learning trials). Subject-centroid radial error (SRE) was used to determine accuracy. ANOVA test showed a Group main effect, $F(2,42)=28.14$, $p<.001$. AI ($M=6.30$, $SD=.5$) and PI ($M=6.45$, $SD=.59$) threw with less error than the Control group ($M=7.64$, $SD=1.2$). ANOVA also showed a 3(Group) x 5(Block) interaction, $F(8,168)=5.20$, $p<.001$. Both AI and PI threw with less error than did the Control group for Blocks 2, 3, 4, and 5. Furthermore, the AI group recorded significantly less SRE for Blocks 3 and 5 (Retention) when compared with the PI group. Findings support the Functional Equivalence Model and will be discussed further.

62. *Title:* **Determination of Transcriptional Changes Induced by an Ovarian Cancer Targeting Peptide**

Principal presenter: James Rudy
Major: Biology
Other presenters or co-authors: Dr. Musser, Matthew Wieskamp and Gabriela Garcia
Faculty mentor: Dr. Soendergaard

Abstract: Ovarian cancer is the fifth leading cause of cancer-related deaths among women. The treatment process is invasive, has multiple side effects, and often unsuccessful in curing the disease. There is opportunity to develop more effective drugs and treatments that minimalize the impact to the patient. Phage display selections have been used to identify a peptide (J18) that targets ovarian cancer. Not only did the results show a high binding affinity towards human ovarian adenocarcinoma cells (SKOV-3), but they also showed a to be cytotoxic to the cancer cells. The change in overall cell viability was significantly lower ($p<0.05$) for the peptide J18 when compared to a control peptide. To determine the cause of apoptosis we used qPCR (quantitative polymerase chain reaction) with specific genes essential to cell viability to see a change in the transcription in response to the cytotoxic properties of J18, cells were incubated with DMSO (vehicle), J18-scramble (control peptide) , and J18 for 48 h,. The RNA was extracted using TRIzol, and cDNA was synthesized from the purified RNA sample. Finally qPCR was preformed to determine the expression of selected genes The genes used round were SDHA, CFLAR, PPIA, HSPBI, SMAD4, MYC, CASP3 TP53, FADD, RPS13, and ELK1. Three of these genes were house-keeping genes. (SDHA, RPS13, and PPIA). Results showed that expression of CFLAR, MYC, SMAD4 and HSPBI were not significantly different for peptides J18 and J18-scramble compared to DMSO (control). We are currently revisiting the MTT assay at 24 h, 48 h, and 72 h, to determine which time will have the optimal effect involved in apoptosis and cell proliferation.

Podium Presentations

1. *Title:* **Why Do Choirs Continue to Sing about Two Men and a Bird?**
   Principal presenter: Jonathan Snyder
   Major: Choral Conducting
   Faculty mentor: Dr. Anita Hardeman
   Abstract: In America during the new millennia, a revision of language has taken place among systematic and liberation theologians. While the pronoun "He" is used instead of "God" in many books, liturgies, and songs, systematic and liberation theologians have pioneered not only gender inclusive language for God, but also expansive language for God. Many texts made the change by referring to "God as God" or Godself instead of He or Himself. While liturgies and hymn texts moved to expansive language for God, choral music lagged behind. It is now time for composers and musicians to bring choral music, both previously composed, and current compositions, to a place that properly demonstrates the vastness of who God is in relationship to God's people. The purpose of this paper is to explore why and how language has changed in other aspects of the Christian service, and then show the changes necessary for choirs to follow this same pattern. As history has demonstrated, institutional change in the Church can be slow, and today's Church is no different. Systematic theologians were among the first to understand the limiting impact that exclusively male language has on a person's relationship and understanding of God, and so the work of expansive language began. As we look at several examples of revised hymn texts to show the possibility, I will develop the same idea into the choral idiom. By the end of this study, I hope that the reader will understand, then apply, these ideals in his/her own choir in musical selections and text alterations. As the body of the Church, we are called to welcome everyone in every way - including in the language of our church choir anthems.

2. *Title:* **Financial development and domestic Investment: Case of West African Economic and Monetary Union (WAEMU) Countries**
   Principal presenter: Sylvie Sanou
   Major: Economics
   Faculty mentor: Dr. Shankar Ghimire
   Abstract: The main purpose of this study is to provide an empirical assessment of the impact of long-term credit on the domestic investment. This paper contributes to the part of financial literature that explores the idea of Patrick (1966) about "the supply-leading" role of the financial system. Indeed, this literature argues that the main role of the financial system is to transfer financial resources from the economy to entrepreneurs who will innovate and invest (Patrick, 1966). This paper is offering an innovative analysis and measure of the effect of financial development on domestic investment. In this study, the financial development is measured by the ratio of long-term credit provided by the banking system divided by the total assets of banks' balance sheet. The domestic investment is of

interest in this paper, because empirical studies have revealed that it is an important determinant of economic growth in West African Economies (Dedewanou, 2016; Nubukpo, 2003). Moreover, this study focused on the banking system because it is the main component of the financial system of the West African Economies. According to World Development Indicators data, there is an improvement of the level of development of the financial sector. However, the rate of non-performing loans was little bit high (Ouedraogo, 2011). From 1994 to 2011, the investment rate is increasing but the pattern is volatile. Then, it is primordial to evaluate the factors that can affect the investment. Finance might be one of the main factors because entrepreneurs need money to invest. Thus, what is the impact of long-term credit on the domestic investment of WAEMU countries? The main hypothesis of this study is that long-term finance will significantly contribute to the enhancement of the investment because it tends to be linked with higher productivity (Caprio and Demirguc-Kunt, 1998). Indeed a survey realized by the World Bank in 2009 and 2016, pointed out that on average, 55% of interviewed firms in WAEMU consider finance as the main factor that hinder their development. The results of the panel estimation over the period of 1996-2012 revealed that long-term credit doesn't significant affect the domestic investment. The few amounts of long-term credit offered by the banking system due to the lack of credit guaranty might explain why the long-term credit doesn't influence the level of investment in WAEMU countries. Indeed, a study realized by the World Bank showed that businesses in developing countries use significantly less long-term debt than industrialized countries firms (Caprio and Demirguc-Kunt, 1998). However, the total credit offered by the banking system does significantly affect the domestic investment. And this impact is stronger on the gross capital formation. The results of this study have confirmed that those that are investing in WAEMU countries are struggling to get long-term credit from the banking system. Thus, it is crucial to find relevant strategies that will improve the amount of long-term credit offered by the banking system.

3. *Title:* **The Effect of Political Stability on Economic Growth**
   Principal presenter: Olaniyi Ige
   Major: Economics
   Faculty mentor: Dr. Shankar Ghimire
   Abstract: The influence of Political Instability on Economic Growth has been a crucial subject of discourse and numerous studies have examined the possible relationship between Political Instability and Economic Growth. The common approach to understanding this relationship is to measure the effect of Economic Growth on the probability of Political Instability and it has been observed that an unstable political environment is inimical to Economic Growth. If Political Instability has been found to have such a profound negative impact on Economic Growth, it raises the question of what happens in the absence of Political Instability. Hence, this paper takes a different approach by investigating the effects of Political Stability on Economic Growth. This paper investigates the relationship between Political Stability and Economic growth measures such as per Capita GDP and GDP per

Capita Growth in a sample of 9 Sub-Sahara African countries for the period 2002 - 2015. A model is estimated in which Political Stability and Economic Growth are jointly determined. The main result of this paper is that Political Stability leads to an increase in output. In some cases, though, Political Stability does not seem to have a significant impact on Economic Growth by itself but when combined with other Macro-Economic variables, it produces a positive and significant result.

4. *Title:* **Prevalence and coorelates of dental anxiety among Western Illinois University students**
   Principal presenter: Chukwuebuka Ogwo
   Major: Public Health
   Faculty mentor: Dr. Jamie Johnson
   Abstract: INTRODUCTION - Dental anxiety is a subjective negative reaction to dental treatment.1,2 Fear of dental pain has been found to be the main cause of dental anxiety and a major barrier to seeking dental care.3,4 Dental anxiety has been linked with dental avoidance resulting in the deterioration of their oral health state.5,6,7 In severe cases of dental anxiety like dental phobia, the dentist-patient relation may be hampered and sometimes lead to misdiagnoses.5 OBJECTIVES - To determine the prevalence of dental anxiety, the common causes of dental anxiety and their relation to dental visit among Western Illinois University students. METHODS - This is a cross-sectional study of 670 randomly selected students on both campuses of Western Illinois University. Two pre-formed questionnaires - Modified Dental Anxiety Scale (MDAS) and Dental Concern Assessment tool (DCA) were used for this study26,57 and were delivered electronically via Survey Monkey. Data collected were analyzed both descriptively and inferentially using SPSS version 23. RESULTS - The mean MDAS is 13.41 (SD 5.42) and a prevalence rate of 63.90%. The prevalence of extreme anxiety was 19.50%. Being female increases the odds of having extreme dental anxiety by 2.41. Multiple linear regression analysis showed the frequency of dental visit to be a significant predictor of dental anxiety (p= 0.002; CI =0.018 - 0.180). There is positive correlation between fear of dental cost and dental anxiety (R= 0.157; p=0.000). CONCLUSION - There is a hidden burden of dental anxiety and a worrisome level of dental phobia among Western Illinois University students. Fear of pain and fear of dental cost were the among the major causes of dental anxiety in this population leading to the cost-pain cycle of dental anxiety. This can be addressed through oral health promotion campaigns, provision of dental insurance and preventive dental care in the school clinic and dental outreach services.

5. *Title:* **Satellite GPS Telemetry of Asian Carp in the Upper Illinois River Waterway**
   Principal presenter: Chelsea Center
   Major: Biology
   Other presenters or co-authors: Dr. James T. Lamer Andrew Mathis, Brent Knights Upper Midwest Environmental Sciences Center, United States Geological Survey, and Kevin

Irons, Division of Fisheries, Illinois Department of
Faculty mentor: Dr. James Lamer
Abstract: Monitoring the spread of Asian carp has been a priority since their introduction and particularly important in the last decade as efforts to prevent them from entering Lake Michigan gained momentum. Monitoring movement using acoustic tags (manual tracking and stationary receivers) provided a wealth of information to understand Asian carp behavior. The advent of satellite telemetry and real-time, satellite-linked GPS tags can complement current acoustic efforts by tracking multiple individuals at once without the man hour investment needed to accomplish the same goal using other technologies. Seven Asian carp (two bighead carp and five silver carp) were tagged with real-time GPS transmitters in the Dresden Reach of the Upper Illinois River between August 3 and August 30, 2017. The data is accessed through an end user interface and the initial trial indicates several trends. Six of the fish remained in the lower 6 km of the 24 km long reach. Five fish also spent time in the Kankakee River near its convergence with the Illinois River. Over a 24-hour period, one of the silver carp traveled approximately 15 km from the lower end of the reach to a hotspot identified through acoustic tracking. A total of 173 useable points have been collected from the seven tags. Real-time GPS tags could be a useful tool to identify real-time aggregations to inform contracted removal on the water, identify habitat use, spawning and feeding locations, and inform management efforts.

6. *Title:* **Impact of FDI inflow on economic growth: Do economic policies matter?**
Principal presenter: Heena Shahid
Major: Economics & Decision Sciences
Faculty mentor: Dr. Shankar Ghimire
Abstract: This paper investigates the effect of foreign direct investment (FDI) on economic growth in the presence of three things: Trade, inflation and effective government policies. The countries included in the sample are Bangladesh, Bhutan, India, Nepal, Pakistan and Srilanka. For this time period of the study is taken from 1992-2016. Panel data was used to set the growth models. The main dependent variable is GDP per capita growth and the main independent variable is FDI. Three interaction terms are included in the model i.e. FDI with trade, FDI with inflation and FDI with government debt. Labor, savings are used as control variables whereas ethnicity is used as dummy variable to study the effect of conflict in a country. Alternative dependent variable GDP annual growth is used to check the robustness. After running random effect model method of regression it was found that FDI works better in the country where economic policies are better implemented and there is a stable economy. However it may show negative results that could be because of strict government policies or due to the fact that most of the policies that are implemented in developing countries are designed by developed countries and they do not work as well in developing countries. This topic seems to be interesting because there has been disagreement about it. Some economists say that better government policies play an important role in getting desired results from FDI and some says it does not. To shed light on this disagreement this

paper will look at the determinants of FDI in the presence of government policies. FDI is correlated with economic growth and many macroeconomics variables. According to classical and neo-classical economic theory, economic growth depends on the supply of capital as well as the supply of labor and technology. Most developing countries face capital shortages that limit their investments which affects their growth. So they need FDI which can be balanced with an inflow of funds from foreign private or public sector. Since 1990s FDI has become the most important source of foreign capital for many developing countries. Research that has been done previously shows that FDI is an important tool for the developing economies for accelerating the economic growth and wealth of a country. One of the major economic problems of developing countries is that they do not have sufficient amount of their own savings which can help them in financing their investments. As a result they are dependent on foreign capital in forms of both direct and indirect investments. FDI is most frequently seen as capital flows from multinational companies (MNCs) and how these MNCs behave it depends upon how much FDI it is giving to the donor country. The contribution of FDI is necessary in accelerating the economic growth of a country. Yet, most people of developing countries live in extreme poverty. It is not possible to help people come out of state of poverty without steady economic growth and to do this implication of investment with better economic policies should be the ultimate goal.

7. *Title:* **Gene expression profile of the corn earworm after feeding on different types of corn plant tissues**
   Principal presenter: Faisal Alsubaie
   Major: Biology
   Faculty mentor: Dr. Richard Musser
   Abstract: The co-evolution of plant and herbivore insect has been demonstrated to result in the alteration of the insect gene expression due to the consumption of plants. Plants produce defensive components that are usually counteracted by the caterpillars that suppress plant defenses and the production of metabolites, resulting in an evolutionary bidirectional system. This research aims to study the performance, and the gene expression of the corn earworm (Helicoverpa zea) after feeding on corn (Zea mays) leaves and fruits compared to an artificial diet as the control. Different plant parts, fruits, and leaves were fed to the corn earworm to investigate its gene expression. In this experiment, corn leaves and fruits were used, while the artificial diet was used as the control group. Therefore, three groups of caterpillars were fed on three different diets during the 72-hour bioassay. The differences in the caterpillar's weights before and after the expression was calculated. We determinate in the caterpillars in the leaf group weights less than the fruit group and a compared to control group. Then, caterpillars in the three groups were ground using liquid the nitrogen. The RNA then was extracted using the TRIzol method. Microarray analysis was conducted to study the H. zea's gene expression. The microarray results indicate that the expression of 1,906 annotated had the significant difference in the gene expression. And, 1,334 unknown genes with lower function. In the leaf treatment, 1,973 genes were down-regulated, and

1,267 genes were up-regulated. On the other hand, 1,341 genes were down-regulated, and 1,899 were up-regulated in the fruit treatment. Results show that the gene expression of the genes responsible for digestion, immunity, growth, and detoxification was higher in the leaf group rather than the fruit group. While the insects fed on corn fruit had significant low gene expression in many categories compared to the other treatment.This study gives us a better understanding of the evolutionary interaction between an insect and its plant host.

8. *Title:* **Study of the Optical absorption, Fluorescence and Chromaticity of Sm3+ doped Lead Boro-tellurite Glasses**
   Principal presenter: Tanjina Nasreen Ahmed
   Major: Physics
   Other presenters or co-authors: Dr. P. K. Babu
   Faculty mentor: Dr. S. B. Mallur
   Abstract: Optical absorption, fluorescence and chromaticity of Sm3+ doped lead boro-tellurite glasses are studied with varying PbO content (29.5 to 49.5 mol%). These glasses are prepared using the appropriate amounts of PbO, B2O3, TeO2 and Sm2O3 of high purity (99.9%). The raw materials are homogenously mixed and melted in a porcelain crucible at 9500C.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 3 hrs to remove thermal strains and then polished to obtain well reflecting surfaces. Optical absorption spectra of these glasses are obtained using a UV-VIS-NIR spectrometer. Fluorescence spectra are obtained by using a 488 nm laser as the excitation source. The variation of intensity parameters with composition reflects the changes in the local symmetry of Sm3+ in the glass matrix as well as the covalency of Sm-O bonds. Large stimulated cross sections obtained from fluorescence measurements indicate that these glasses could be used for photonic applications. The chromaticity or color of a light source can be characterized by the correlated color temperature (CCT), which is also measured in Kelvin (K). CCT values show that the light emission from these samples corresponds to the orange-red region. Our results indicate that these glass samples are promising materials for optical applications.

9. *Title:* **The effect of Semiconducting CdSe Nanoparticles on the Optical Properties of Sm3+ in Lead Boro-tellurite Glasses**
   Principal presenter: Grija K. Thapa
   Major: Physics
   Other presenters or co-authors: Saisudha B. Mallur and P.K. Babu
   Faculty mentor: Dr. P.K. Babu
   Abstract: CdSe nanoparticles are successfully grown in a series of lead boro-tellurite glasses, doped with trivalent Samarium (Sm3+) ions and have been synthesized by conventional melt-quenching technique under different annealing times. The optical properties of the Sm3+ doped lead boro-tellurite glasses [29.5PbO: (67-x)B2O3: xTeO2:

0.5Sm2O3: 3CdSe] have been studied for two different compositions, x = 10 and 20 mol%, and also as a function of the annealing time of the glasses which impacts the nanoparticle size and distribution. The intensity parameters obtained from the optical absorption spectra measure the asymmetry of the crystal field at the Sm site and the Sm-O covalency. These parameters are also indicators of other properties of the host glass, including optical basicity, rigidity and viscosity. Furthermore, the stimulated emission cross-section has been calculated from the radiative transition probability, the fluorescence bandwidth, and the refractive index of the host glass. These cross-section values are found to be comparatively large enough to suggest the possible utilization of these materials for laser and photonic applications.

10. *Title:* **Effect of Auditory Enrichment on African Lions**
Principal presenter: Alison J. Brown
Major: Biology
Faculty mentor: Dr. Brian Peer
Abstract: Supporting positive animal welfare in a zoo setting requires continually looking for new ways to identify and assess welfare, and making opportunities to support good welfare as attainable as possible. One easily applied approach to influencing animal welfare is the management of the animal's environmental enrichment. Several studies have detailed the effects of offering a variety of enrichment types to stimulate different senses, but few include auditory stimulation, fewer explore exactly what effect the enrichment has on the individual's behavior, and fewer still have included auditory enrichment for big cats. This project is investigating the effect of using auditory playback of conspecific vocalizations and novel sounds as a potential enrichment stimulant for captive lions (Panthera leo) at the Niabi Zoo in Coal Valley, Illinois. By creating a time budget for the subject lions before, during, and after listening to a variety of sounds and comparing time spent on specific behaviors (including pacing, lying down, investigating, and vocalizing) during those periods, we hope to determine if hearing personal vocalizations and novel sounds has a positive effect on behaviors indicating good welfare.

The goals for this project are two-fold. Firstly, we would like to document exactly what changes in behavior the hearing of their own vocalizations and novel sounds causes. Secondly, we hope to suggest an experimental design that can be achieved with limited resources so as to make the application as accessible as possible for other zoos. If evidence of benefit can be shown, further research can be encouraged to explore the use of acoustic enrichment to improve zoo animal welfare.

Data collection will involve compiling recordings of the lion's own vocalizations, recordings of other lions, and recordings of other relevant species, then playing them back at random intervals to the two subjects. Video recordings will be made capturing the behavioral responses before, during, and after hearing the audio playback, and a time

budget will be formed from coding the videos using the behavioral tracking software BORIS. A Kruskal-Wallis analysis of ranks will be used to reveal any relationships between the time spent on such behaviors as pacing, vocalizing, socializing, or laying down and the act of hearing the playback. This project will include the cooperation of the keepers and zoo staff at Niabi Zoo, in addition to the advice of experts in the field of zoo animal welfare and several WIU professors. Data collection is proceeding from February to April of 2018, with expected completion and submission by May 2018. It is our hope that by providing evidence of a statistically significant pattern of positive reactions to novel acoustic playback, it can be considered valuable to suggest increasing the use of acoustic enrichment to improve welfare for a variety of zoo animals.

11. *Title:* **Impact of Information and Communication Technology on Individual Well-being: An Evidence from South Asia**
    Principal presenter: Aneel Bhusal
    Major: Applied Statistics and Decision Analytics
    Faculty mentor: Dr. Shankar Ghimire
    Abstract: This paper investigates the impact of information and communication technology (ICT) adoption on individual well-being. Adoption of ICT and its effect on society and individuals have been largely mute on the SAARC nations. Using panel data on the 7 membership countries of SAARC, this paper uses Bass diffusion to calculate the coefficient of imitation of these countries for the subscription of the each technology in the process of adoption of technology. This degree of imitation has been transformed into the dummy variable based on the average value of the coefficient of imitation for each technology. An econometric model is formed based on the panel data of the SAARC nation to explore the impact of technology subscription on the individual wellbeing of the nation along with other variables. It discusses the various ways that technology like cellphones, telephones and broadband can make markets more efficient and how the diffusion of information and knowledge plays into economic development and growth. Using random effect approaches, the ICT technology variables was found to have a negative and significant impact on countries' level of GDP growth rate. However, when ICT technology was integrated with financial system i.e. the interaction of ICT technology and financial system variable had positive and significant impact on countries' level of GDP growth rate. This paper also investigates the effect of cell phones, telephone and broadband subscription on the individual well-being and growth by performing an econometric analysis on other individual well-being variables like life expectancy and expected years of schooling.

12. *Title:* **Impact of International Tourism on the International Trade: An evidence from BRICS and NAFTA countries**
    Principal presenter: Kuixi Du
    Major: Applied Statistics and Decision Analytics
    Faculty mentor: Dr. Shankar Ghimire

Abstract: Over the past six decades, tourism has experienced continuing expansion and diversification, becoming one of the largest and fastest-growing economic sectors in the world. Many new destinations have emerged and are not only limited to the traditional favorite tourist destinations of Europe and North America. Tourism and trade are growing at an unprecedented rate. Theoretically, the link between tourism and trade could be investigated by the following arguments: when tourists leave their home country to visit a foreign country, they shift their expenditure patterns from their home country towards the foreign country. Tourists consume goods and services in the foreign country: many of which have to be imported. In this way, tourism could lead to trade. The main objective of this study is to examine the relationship between international tourist arrivals and international trade among the BRICS and NAFTA eight countries. The main analysis involved a panel set data, which includes tourism and trade data of eight countries during the period 1995 - 2015. The results for the fixed effect regression of panel data analysis indicate that: in the base model, the Service trade (Trade in service) as the dependent variable, Arrival (Departure) as the main independent variable, and the interaction term between Exchange rate and Arrival significantly influence the trade. In the robustness check model of Export, Export as the dependent variable, the main independent variables Arrival, and the interaction term between Exchange rate and Arrival are all significant. In robustness check model of Imports, Imports as the main dependent variable, the main independent variable Arrival and the interaction term between Exchange rate and Arrival are not significant, but the Departure variable is significant. Therefore, the study as a whole, there is indeed a relationship between tourist arrivals and trade, that trade predicts tourist arrivals and exchange rate together influence trade among these BRICS and NAFTA eight countries. The paper proceeds as follows. Section one is the introduction part; section two follows the purpose of the study; section three is for the literature review; follows the section four, which introduces the empirical methodology (econometric models) and data description. Section five provides results. Section six is the conclusion. Section seven is the suggestions for future researchers.

13. *Title:* **Investigation of the Physical and Optical Properties of Sm3+ doped Lead Boro-tellurite Glasses**
Principal presenter: Arup Barua
Major: Physics
Faculty mentor: Dr. Saisudha B. Mallur
Abstract: Rare earth doped glass materials are attractive materials for developing favorable solid-state lasers and optical amplifiers. Study of the 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. Using appropriate amounts of PbO, B_2O_3, TeO_2, and Sm_2O_3 a series of Sm3+ doped lead boro-tellurite glasses has been prepared by the melt-quench technique. Density, concentration of Sm3+ ions, refractive index, dielectric constant, inter-ionic distance, polaron radius and molecular-

electronic polarizability of these glasses are measured and calculated. Optical absorption measurements are carried out using a UV-VIS- NIR absorption spectrometer. Using the Mott-Davis model, the optical band gap and type of transitions are determined from the absorption edge data in the range 400 to 500 nm. This investigation shows that the absorption edge arises due to direct allowed transition (n=1/2) and the optical band gap varies from 2.96 eV to 3.02 eV as a function of the glass composition.

14. *Title:* **Comparative Analysis of Transcriptomic Alteration in Saliva, Gut, and Body Of Helicoverpa Zea 48 Hours Post Herbivore in Soybean**
Principal presenter: Mohammed Zobair Alam
Major: Biology
Faculty mentor: Dr. Richard Musser
Abstract: The magnitude of crop loss due to insect herbivore is still a pressing issue in the perspective of increasing population growth. Soybean is a solanaceous plant and an economically important crop. Aside from that, a lot of research has been performed so far on polyphagous pest Helicoverpa zea, one of the major pests in the United States. From the previous study, we know that transcriptomic alteration depends on diet. However, the molecular mechanism and how this genetic interplay affects different body parts of the insect are not precise. In our study, we focused on transcriptomic modification of Helicoverpa zea in various body parts, such as saliva, midgut, and whole-body after 48 hours herbivore in soybean. We used corn-based diet as a reference. Microarray analysis revealed in total 2222 altered genetic expression varied among these three body sites. In these alterations, 45% had a putative known function whereas 55% were unknown. Overexpressed genes dominated in saliva whereas, the most repressed genes were discovered in body site for both feedings. This suggests that Helicoverpa zea salivary enzymes have the key role in growth, digestion and dismantling of plant defense. After sequestering according to functional categories, we found the highest part (17.8%) of the annotated genes were proteinase enzymes including the highest (64.6%) up-regulation in saliva from Helicoverpa zea fed on soybean, which indicated its compensatory diversification to nail down antinutritional substances from soybean. We found less quantitative glucose oxidase in soybean diet than artificial diet post herbivore. In reverse, we got high fold presence of aminopeptidase enzyme with diverse isomers in caterpillars fed on soybean. We also found a vast difference in transcriptomic alteration either up or down regulation among saliva, midgut, and whole-body. In addition, high-fold overexpression of a unique CYP332A1 P450 detoxification gene was observed in soybean treated Helicoverpa zea midgut.

15. *Title:* **Individual Differences Associated with Caffeine Use and Caffeine Motives**
Principal presenter: Emma Fullerton
Major: Psychology
Other presenters or co-authors: Jonathan Hammersley, Kristy Keefe, Matthew Jamnik, Keith Ritter, and Micheal Waters
Faculty mentor: Dr. Jonathan Hammersley
Abstract: Purpose: Caffeine is widely used worldwide (Butt & Tauseef, 2011), with a number of motives reported for consumption (Irons et al., 2014). College students may be unaware of potential risks of caffeine misuse. Early drug use is associated with personality traits such as neuroticism, extraversion, and impulsivity, and can predict problematic misuse (Gilbert, 1995). Hence, exploring current caffeine use may help identify individuals prone to misuse. Procedure: 116 individuals (69 males, 47 females) completed assessments including the Caffeine Motives Questionnaire (Irons et al., 2014), State-Trait Personality Inventory (Spielberger & Reheiser, 2009), Big-Five Inventory (John et al., 2008), Coping Responses Inventory (Moos, 1993), Anxiety Sensitivity Index-3 (Taylor et al., 2007) and Stanford Caffeine Consumption Questionnaire (Nova et al., 2012). We controlled for co-occurring smoking/nicotine dependence and used Bonferroni corrections. Partial correlations were conducted, examing individual differences associated with caffeine use/motives. Univariate ANOVA assessed effects of gender, sexual orientation, and educational level; linear regression was used to examine caffeine motives as predictors of caffeine use. Results: Mean caffeine use was 236mg per day (equaling ~2 brewed cups of coffee). Gender, sexual orientation, or education were not significantly associated with caffeine use. However, cognitive enhancement, negative affect relief, reinforcing effects, & weight control motives were all significantly associated with caffeine use, even after controlling for smoking/nicotine dependence, ps < .01. Cognitive enhancement/weight control motives together predicted approximately 18% of the variance in caffeine use, $R2 = .18$, adjusted $R2 = .17$, $F(1,113) = 7.95$, $p = .006$. Moreover, interesting associations with caffeine use motives emerged. Negative affect relief caffeine use motive was closely related to social concerns on the Anxiety Sensitivity Index-3 (i.e., fear of publicly observable anxiety reactions), $r(112) = .25$, $p = .006$, cognitive avoidance coping style, $r(111) = .23$, $p = .015$, and trait anxiety on the STPI, $r(112) = .25$, $p = .007$. Reinforcing effects motive was also significantly associated with acceptance/resignation coping style, $r(111) = .24$, $p = .01$ as well as social concerns of anxiety sensitivity, $r(112) = .24$, $p = .012$. No significant associations were seen with the cognitive enhancement and weight control motives as expected, though an association between cognitive enhancement and trait curiosity approached significance, $r(112)= .17$, $p = .067$. Conclusion/Implications: Our results may have implications for better understanding caffeine use/misuse among college students and for designing individualized interventions or outreach. Assessing and teaching coping skills might be one avenue for intervention. Further implications will be discussed.

16. *Title:* **Rocky Run - 2D Mobile Game**
Principal presenter: Dalo Chinkhwangwa
Major: Computer Science
Faculty mentor: Dr. Justin Ehrlich
Abstract: Rocky Run is a mobile game based on the Western Illinois University school mascot Rocky, the game was created in honor of the school as well as to bring somewhat attention to the computer science department of the school. The game is currently available for download on Android mobile phones on the Google Play Store as well as on www.apkfiles.com, and is in progress of being released on the Apple Store for Apple devices. A lot of research was done as to what Rocky stands for and what the mascot means to the school. To achieve the game's completion, I used the Unity Editor game engine, which comes embedded with various programming languages for the scripting segment of the game which is a huge part of the entire game. All models (cars, buildings, Rocky etc) were created as 3D models in the Blender 3D studio, using techniques learnt from the computer graphics courses at the university. The animations(movement of the 3D objects) were also created using the Blender 3D studio and implemented in the Unity Editor. Once in the Unity Editor, the object were brought to life by scripting using the C# programming language, which is the programming language used for the entire game and all its attributes. The game was thoroughly tested before it's release, by various personnel. This acted as a survey of in game preferences, deciding extra features to add and implement into the game. The testing allowed for error checking and error fixing. Finally the game was launched unto the Google Play Store console which cost $25 to register. The achievement of completing the game, brought forth the possibility of integration between three separate components(Blender 3D, Unity Editor, C# programming language) to achieve a complete game as one.

17. *Title:* **Lack of Leadership Roles for Women in Sport**
Principal presenter: Jamie Ali
Major: Sports Management
Faculty mentor: Dr. Algerian Hart
Abstract: The purpose of this study is to explore the lack of leadership positions women have in professional and collegiate sport. Through evaluating the research on the positions that women currently hold, the next step is to find various approaches to help women move up to executive positions. International sport organizations such as International Olympic Committee and Fédération Internationale de Football Association are among the lowest in percentage for having women in leadership roles. These two organizations have never been lead by women and are still making strides to have women placed in executive board positions. In the United States the NCAA across all division levels has hired nineteen women in the first half of 2017 alone. These women hold positions as athletic directors and commissioners. The conclusion that is made is that there are women that hold leadership roles and are even leading organizations and companies. Their still needs to be

representation for women and also mentorship programs that are available in the sports industry for the current numbers to keep increasing.

18. *Title:* **Sanctuary Chicago: Efforts of the Chicago Abolitionist Movement to Ensure the Safety of Fugitive Slaves, 1840-1860**
Principal presenter: Frank Kalisik
Major: History
Faculty mentor: Dr. Timothy Roberts
Abstract: Slavery was abolished in the Illinois Constitution of 1818, but harsh Black Codes and racism present evidence that Illinois was no sanctuary for the black population. Yet there were many individuals who attempted to make it an oasis. While the state grappled with the issue of the freed black, abolitionist pockets formed across Illinois. Cook County and the surrounding area had a particularly active abolitionist movement. Most of the popular narrative discussing the abolition movement in the United States focuses in the New England and Mid-Atlantic states. While Illinois did have an active abolition movement, this paper looks at newspapers, personal letters, and local and state legislation to reexamine the role of Chicago abolitionists and their local impact. This paper will argue that Illinois abolitionists fought to ensure the rights slaves of freed blacks in the state, making it a sanctuary, welcoming of freedmen and runaways alike, despite the laws opposite their cause that existed within the state. During the 1840s and 1850s, Illinois's abolitionist community, led by the Chicago Anti-Slavery Society, demonstrated the people's desire for equality and amnesty for Negros in the state and throughout the country, hoping to escape slavery using both physical and rhetoric methods. The abolitionists in Chicago were very militant until the passing of the Fugitive Slave Act, at which time the movement became more rhetoric based. While it was less physically provocative, the Chicago anti-slavery movement still had its eyes set on becoming a haven, or sanctuary, for fugitive slaves.

19. *Title:* **The Effect of Bioinoculants on the Growth and Gene Expression of Soybean in Response to Salt Stress**
Principal presenter: Alwuthaynani Norah
Major: Biology
Faculty mentor: Dr. Sue Hum-Musser
Abstract: Soybean (Glycine max) is one of the important food sources of human and animal consumption. Plants are exposed to many environmental factors affect plant health. Many farmers and scientists are looking for different ways to increase the yield. Some microorganisms that colonize plant roots can enhance the plants growth. In this study, I treated soybean seeds with a bacterial inculant Biostart® (Bio-Cat Microbials, Shakopee, MN through Rincon-Vitova Insectaries Inc., Ventura, CA) which contains Bacillus species: Bacillus licheniformis (HB-2 strain), Bacillus mojavensis, and Bacillus laterosporus (CM-3 and CM 33 strains). The soybean seeds were also exposed to a salinity treatment. Gene

expression was determined using real-time quantitative polymerase chain on cDNA made from plant RNA. The aims of this study were determining the impact of Biostart® on the germination growth of the soybean seedlings under the salt stress, and assessing the gene expression of common growth hormones. There were changes of the seedlings length in Biostart®-treated roots under sanity stress. Several genes encoding antioxidants, metabolism, defense showed a significant difference in the gene expression.in the salt and/or Biostart®-treated seedlings compared to the other treatments. This research information may help to reduce synthetic fertilizers usage and their costs. Bioinculants may be a beneficial solution to increase growth yield. the soybean crops in more sustainable manner.

20. *Title:* **The Impact of Credit on Poverty: Does Inequality Significantly Accentuate the Effects of Poverty?**
Principal presenter: Emmanuel Asante
Major: Economics
Faculty mentor: Dr. Shankar Ghimire
Abstract: The impact of credit on poverty is the central theme of this study, bearing the premise that the accessibility and relative cost of credit in an economy plays a far-reaching role in development and poverty-alleviation. Even so, the extent to which inequality in an economy might impact the effectiveness of credit is one which this study aims to explore. For this reason, the study will seek to first examine the impact of credit on poverty, as well as consider how inequality impacts credit effectiveness in poverty alleviation schemes. Given that the problem of poverty not only impairs the fulfillment of human potential, but lends to the grave suffering and destitution of many lives and nations, the essence of this study can never be sufficiently posited. The study will employ a Panel Data Regression on 214 countries, with data from 1990-2015. From the results, it will aver that credit impacts poverty, via the presence of remittances, which in economies like Nepal, contribute to as much as 30% of GDP. In addition, the study will also posit that high inequality inebriates even the strongest economic and financial variables in especially developing economies, given that high inequality results in the inequitable concentration of funds in the hands of the rich. Suffice to say, a lack of access to credit and high inequality perpetuate the cycle of poverty, by rendering deficiencies in savings, impairing investment in capital stock and output, and ultimately, ensuing in low economic growth. In light of this, the study suggests the need for a concerted national effort at bridging inequality via social reforms, as well as the promulgation of social safety nets for the poor.

21. *Title:* **The Relationship between Openness to Experience, Personal Growth, and Purpose in Life**
Principal presenter: Alisha Steiner
Major: Psychology
Faculty mentor: Dr. David Lane

Abstract: Problem/Purpose: In recent positive psychology research there has been a rise in the interest of the relationship between personality and well-being. Although well-being has been defined in many different ways, Huta and Waterman (2013) dissected many theorists' ideas and found that the two most prevalent concepts were personal growth and purpose in life. Past research suggests that personality, purpose, and personal growth are related. Ryff (1989) stated that when an individual participates in activities and makes life choices that aid in their self-growth they gain a sense of purpose in their life. Steel et al. (2008) looked at the relationship between the components of well-being and the "big five" personality traits (emotional stability, extraversion, openness to experience, agreeableness, and conscientiousness). He found that as a whole there are strong correlations between the scores for the "big five" and the components of well-being. Openness to experience, however, may be particularly related to well-being. Salami (2011) stated that those who score high on openness may have the desire to learn new concepts and take a more curious approach to life, ultimately leading them to personal growth. This coincides with findings from Anglim and Grant (2016) that show a significant relationship between openness and personal growth. Nonetheless, no studies have simultaneously examined openness to experience, personal growth, and purpose in life. Based on past research, we predicted that personal growth would mediate the relationship between openness to experience and purpose in life. Procedure: Participants (N = 97) were students from the Psychology Human Subject Pool at Western Illinois University. The sample included 51 females, 45 males, and one other. Of the 97 participants, 48% were white, 28.6% were African American, and 18.4% were Hispanic/Latino. The age ranged from 18-29 with a mean age of 19.9. Participants completed an online survey that assessed their perceived personal growth (α = .74) and purpose in life (α = .64) using Ryff's (1989) personal well-being scale and their openness to experience using two items from Gosling, Rentfrow, and Swann's (2003) ten item personality inventory (r = .31). Results: To examine the mediated relationship, regression analyses were used. Openness to experience was first shown to be related to purpose in life (b = .30, $p < .001$). Openness was also related to personal growth (b = .31, $p < .001$). When purpose in life was simultaneously regressed on to both openness and personal growth, the relationship between openness and purpose in life was not statistically significant (b = .02, p = .68), while the relationship between personal growth and purpose was significant (b = .90, $p < .001$) Using the statistical technique recommended by Hayes (2013), the indirect effect of openness on purpose was statistically significant (b = .28, confidence interval = .19, .38). This suggests the relationship between openness and purpose in life is mediated by personal growth.

22. *Title:* **Watch Your Step!: A Ragtime Musical?**
Principal presenter: Robbie Segars
Major: Musicology
Faculty mentor: Dr. Anita Hardeman
Abstract: In the early twentieth century, American composers began to incorporate popular

song into larger scale works. Perhaps the most successful song writer to do this was Irving Berlin. In fact, Berlin's first musical, Watch Your Step, is considered by scholars as the first stage work written entirely in ragtime; however, after a close evaluation of genre, the life of the composer, and score examples, I will identify the critical moments in Watch Your Step that fall outside of the traditional ragtime genre. This paper addresses the stylistic origins of ragtime, the moments in Berlin's life that shaped his writing style, and examines sections of the score that present problems when attaching the ragtime label to Watch Your Step. Interestingly enough, the association of ragtime with Watch Your Step is in part due to the composers reputation with the genre. Indeed, Berlin was a key figure in bringing ragtime to mainstream audiences. Contemporaries and scholars praised his abilities to adapt to dozens of genres, labeling him as a "chameleon" type of composer. Furthermore, his relationship with music from moments in his childhood provide valuable insight into the compositional style of his theatre works. After reviewing the musical elements of ragtime, understanding the Irving Berlin approach to music, and evaluating score, I conclude the crux of discourse as to whether Watch Your Step was written entirely in ragtime derives from factors that complicate audience perception of genre.

23. *Title:* **A Data Retrieving Framework for stock data and product reviews**
Principal presenter: Vamshi Krishna Katukuri
Major: Computer Science
Faculty mentor: Dr. Zheng Li
Abstract: Almost all businesses today need right data at the right time in an efficient manner, you can stay ahead of the competition, and it's important that we have the relevant and accurate data. And the data also changes at a very rapid pace. So, we need to keep updating changes in data about a product or service. A lot of the data is available as information on many websites. For example, when we look at historical stock prices of different companies, they change from time to time, every minute and every hour and another example is the performance of a product is usually measured by how the customer rates it or how it is being talked about online. The data we need for correct analysis changes every time and we need to keep track of the latest trends. So, we wanted to design a framework that can help the user get data with ease, taking a few simple inputs about what they want the data about. So, we chose to use the most used sites for finance data i.e. Google Finance and Yahoo Finance, and most used for customer reviews Amazon, Best Buy and eBay shopping websites to get the data about the respective companies and products. We can get data on a regular basis from companies that sell data but the subscription usually is charged at 1000's of dollars a month for good quality data and there are web services which can compare products but many powerful features (like in the case of buying an iPhone, many websites are compared and the best deal is brought for us by a third party website, but premium features like depth analysis and timely updating the comparisons) would generally be available for only premium users. And when we were searching for some website which could do multiple data retrieval like extracting data from

finance websites and product comments from e commerce websites at a single stop, there wasn't a single solution. So, our framework helps users to get good quality data for different products at one place.

24. *Title:* **Description of aquatic yeasts and their interactions with plants and Aedes mosquitoes**
Principal presenter: Terri Billingsley Tobias
Major: Environmental Studies
Other presenters or co-authors: Jason Hunt- Institute for Environmental Studies, Roger Viadero- Institute for Environmental Studies, Catherine Miller Hunt, Andrea Porras-Alfaro
Faculty mentor: Dr. Andrea Porras-Alfaro
Abstract: Yeasts play important roles in food webs, degradation of organic matter, and nutrient cycling in aquatic ecosystems. The diversity and abundance of yeasts in aquatic systems remains poorly characterized. In addition, their functional roles and interactions with other aquatic species are becoming increasingly important. The purpose of this project is to describe fungal communities in urban streams and examine potential endophytic links between aquatic yeasts and riparian trees and the role of mosquitos in yeast dispersal. Fungal traps containing apples, pears, and cherries were placed in an urban stream in west central Illinois from April through November. Fungal communities were characterized using cultured-based methods and DNA sequencing. Three hundred and seventy-three fungal isolates were cultured. ITS rDNA indicated 71 OTUs and further multigene phylogenies will be conducted to determine species level identification. Seventy-eight percent of the fungi were isolated from traps containing pears and 53% of all fungi cultured were yeasts. The greatest yeast diversity was cultured from traps set in November with 19 OTUs (50%). Yeast identified as the same species using ITS rDNA showed wide variation in morphology and color. Tremellomycetes (39%) and Saccharomycetes (29%) were the most frequent fungal classes. Both classes were represented by seven genera. Preliminary phylogenetic analysis indicated that 40% of the OTUs were closely related to plant endophytes or associated with insects. The most abundant genera cultured was Meyerozyma, Candida, Pichia, and Cryptococcus. These yeasts are commonly associated with mosquito microbiota. Yeast bioassays will also be conducted to determine potential mosquito-fungal interactions including the role of yeasts in oviposition, egg hatching, and larval growth. Mosquito eggs will also be examined using microscopy to determine potential fungal interactions. To test potential endophytic life stage, leaves from the most abundant trees were collected at the same sites where fungi were trapped and will be isolated and characterized using molecular methods. The nature of the interactions between mosquitoes and yeasts and their effects on the abundance of populations remains mostly unknown.

25. *Title:* **Role of Fungal Volatiles Produced by Trichoderma on Plant Growth**
Principal presenter: Shruti Ojha
Major: Biology
Faculty mentor: Dr. Andrea Porras-Alfaro
Abstract: Microbial volatile organic compounds (VOCs) play important roles in plant communities influencing their physiology and development. However, fungal VOCs production and the nature of their effects on plants are still poorly understood. The objective of this research was to evaluate the effect of fungal VOC production on plant growth. Fungi were isolated from rhizosphere and soil samples across the USA. Trichoderma strains were identified using ITS rRNA, and tested on the dominant arid grass, Bouteloua gracilis (blue grama) in a closed chamber experiment. Volatiles emitted by different species of Trichoderma exhibited a wide range of effects on plant growth and development. Trichoderma gamsii (CK71) and Trichoderma saturi (CK1108) showed the greatest growth promoting abilities in B. gracilis, with a significant increase on seed germination, plant size and root development compared to the controls. Trichoderma strains were also tested in direct contact germination experiments. The association of the fungi with plant roots was analyzed using microscope. B. gracilis seeds inoculated with Trichoderma strains showed an increased root length and proliferation of lateral roots compared to the controls. Microscopy examination of stained roots revealed small round fungal-like structures in cortex and intercellular hyphal growth. Plant responses to the VOCs will be evaluated under different conditions including temperature, media type, and fungal growth stage. Plant-fungal interactions offer potential new strategies to improve agriculture.

Performance Presentations

1. *Title:* **Suite N5: Differences of Interpretations**
   Principal presenter: Giorgi Khatalev
   Major: Music Performance
   Faculty mentor: Dr. Istvan Szabo
   Abstract: There is nothing as different in this world as the variety of interpretations of Bach's pieces. The same piece could be performed in very different tempos, with different colors and articulations. However, some people truly believe that the only right way of performing Bach's music exists. By reviewing two different interpretations of Prelude from Bach's fifth Cello Suite, I am going to show that the practice of the historically informed performance and its stylistic limitations might restrict a performer from using different kind of bowings and articulations, which might impair the overall perception of the music. I will analyze Pablo Casals' and Sebastian Dörfler's interpretations, explain the roots of the historically informed performance tradition, and present my own interpretation. Some people claim that Bach and generally all the baroque music should be performed in a historically right way, as it would be performed during Bach's life. The characteristics of the historically informed performance (aka HIP) are avoiding vibrato, sustained notes, and going to higher position. Also, it is common to play open strings whenever possible, and making diminuendo on every down-bow. However, I believe that a performer has the right to perform Bach's music in the way he prefers. Bach did not put any kind of tempo or dynamic markings into his music, and it is not possible to identify exactly the way of performing in baroque era. Therefore, instead of restricting themselves into some kind of historical frames, performers should be happy because they have the opportunity to become 'co-writers' and try to work their musicianship by exploring as many different interpretations as possible.