Poster Presentations

1. **Title:** Improving Breast Self-Examination among Women: An Application of Health Belief Model  
**Principal presenter:** Tara Bhandari  
**Major:** Public Health  
**Faculty mentor:** Dr. Fetene Gebrewold  
**Abstract:** Breast cancer is regarded as the major public health problem among women in both developed and developing nations. The incidence of breast cancer varies from the highest rate in the United States to the lowest rate in the Asia (Shrivastava et al. 2013). A report from the American Cancer Society indicates that one out of eight women in the United States develop breast cancer over the course of their lifetime (American Cancer Society, 2013). Since there are no clear cancer prevention strategies, early detection of breast cancer can play an important role in reducing the number of deaths from breast cancer among women. There are only three methods for early detection of breast cancer including mammography, clinical breast examination (CBE) and breast self-examination (BSE) (Aghamolaei et al., 2011). While mammography and CBE may help detect breast cancer more accurately, these methods are costly, inconvenient, and potentially embarrassing to some women. On the other hand, BSE is a relatively simple, economical, and safe method which helps detect breast cancer even in very early stage (Tastan et al., 2011). In addition, previous studies have reported that the women who were diagnosed with breast cancer in an earlier clinical stage had consulted with the doctor after they discovered abnormal changes in their breast during BSE (Aghamolaei et al., 2011) In this study, we will conduct a systematic review of literature to identify how the health belief model can be used to improve breast self-examination among women. The health belief model is the most widely used conceptual framework in health behavior research and it has been
commonplace in examining beliefs related to breast cancer screening behaviors among women (Tavafian et al., 2009). The model predicts that women will be more likely to adhere to breast screening behaviors if they feel susceptible to breast cancer, think breast cancer is a severe disease, perceive barriers to screening as lower than perceived benefits, have higher self-efficacy, and receive cues to action (Glanz et al., 2008). The main objective of this study is to explore and identify various ways of applying the primary concepts of the Health Belief Model (HBM) to promote monthly practice of breast self-examination among women. Conclusion The literature reports that although 92% of women have heard of BSE, only about 29% of women practice BSE monthly (Holwerda, 2000). In addition, studies have found that there are important associations between health beliefs of women and their early diagnosis related attitudes and behaviors (Tastan et al., 2011). A large body of evidence suggests that HBM predicts and explains health behaviors by focusing on the attitudes and beliefs of individuals and it explains the link between exposure to convincing health messages and behavior (Glanz et al., 2008). Therefore, we conclude that health educators and health professionals may find it worthwhile to employ the primary concepts of health belief model to improve monthly practice of BSE among women.

2. **Title:** A Habitat Analysis of Illinois' Imperiled Turtles in the Upper Mississippi River Basin  
   **Principal presenter:** Victoria Livingston  
   **Major:** Biology  
   **Faculty mentor:** Dr. Roger Viadero  
   **Abstract:** The proposed dissertation research explores the current population status of four endangered turtle species in Illinois and seeks to determine if there are possible correlations to historical changes and anthropogenic effects along the immediate bank of the river system. Species included are the Alligator Snapping turtle (Macrochelys temminckii), Ornate Box turtle (Terrepene ornate), Yellow Mud turtle (Kinosternon flavescens), and Smooth Softshell turtle (Apalone mutica). Turtle species in this region of the Midwest are important for a variety of reasons, including their ties to water quality and contamination, economics, and health of the riverine and wetland ecosystems. Previous research suggests turtles require more suitable habitat area than other species in groups that tend to get more attention in conservation, species like birds and butterflies. By following the turtle populations through history, we can determine possible conflicts between anthropogenic uses in a heavily traveled river system and conservation efforts. At this point in time, conservation and economics are going to have to compromise and work together for the benefit of the native species and the people who also inhabit the area. Trapping will take place at several locations along the Mississippi River, stretching from Rock Island to Grafton, IL, as well as locations on the Illinois River, Rock River, Banner Marsh State Fish and Wildlife Area, Emiquon National Wild Life Refuge, and other conservation sites. Additionally, special attention will be paid to the confluences of these rivers to determine if the habitat is more or less suitable due to the confluence itself. Trapping will be done with
traditional two and one half inch mesh hoop nets, and also with a bask trap, relying on the turtle's natural desire to bask in sunlight. Traps will be baited with fish, preferable fresh when possible. Traps will be placed in the evening and emptied in the early morning. Trapping will take place from late April into August, depending on weather and flood conditions, for the next three seasons. Any bycatch species of turtle will be recorded, to allow comparison of successful populations to be compared for any possible effects of competition. An underwater drone will also be utilized in the efforts to find the Alligator Snapping turtle, due to its typical habits and reluctance to approach the surface of the water. It is anticipated that DNA samples will be taken to determine the genetic health of these populations. Select individuals will be fitted with GPS tags to monitor the territory reach that the population has, helping to ensure trapping is in the best possible location for realistic and accurate sampling. GPS data can also be used to monitor potential for gene flow, as well as habitat that may need more regulation. It is expected that these species will be found in small clusters in specific regions known for their rehabilitation, but not throughout the entire study area. This study will provide additional data for the endangered species plans of these turtles, and possibly indicate if changes should be made to those plans.

3. **Title:** Adapting the IDL Arecibo Library to the Open Source GDL Compiler for Data Reduction of Radio Astronomical Observations  
   **Principal presenter:** Wei Siang Tan  
   **Major:** Physics  
   **Other presenters or co-authors:** E. D. Araya  
   **Faculty mentor:** Dr. E. D. Araya  
   **Abstract:** Interactive Data Language (IDL) is a programming platform for data analysis. IDL is used in a wide range of areas, from medical imaging to astronomy. However, the IDL license is expensive, which precludes installation in multiple computers. The Gnu Data Language (GDL) is an open source incremental compiler compatible with IDL code. The aim of this project is to implement the Arecibo Observatory AOIDL library in the GDL environment. The AOIDL library contains the set of programs used to reduced radio astronomy observations obtained with the 305m Arecibo Telescope in Puerto Rico. We tested the implementation by reducing observations of formaldehyde (H2CO) toward the low mass star forming region L1521F. The observations were conducted with the Arecibo Telescope in remote mode from the WIU Astrophysics Research Laboratory on October 24, 2015. The data were reduced in both IDL and GDL and we obtained consistent results. We show that most of the data reduction can be done successfully in GDL. We conclude that the Arecibo IDL library can be successfully implemented in GDL, although some compatibility issues still remain.
Title: Analysis of Movement Patterns of a Rehabilitated Antillean Manatee (Trichechus Manatus Manatus) in Response to Resource Availability During Soft Release and Post Release in Sarteneja, Belize

Principal presenter: Amanda Deardeuff

Major: Biology

Other presenters or co-authors: Dr. Jeff Engel

Faculty mentor: Dr. Jeff Engel

Abstract: Manatees are herbivorous marine mammals in the order Sirenia. The order Sirenia is comprised of two families: Dugonidae, which includes the Dugong (Dugong Dugon) and Trichechidae which includes the West Indian manatee (Trichechus manatus), the Amazonian manatee (Trichechus inunguis), and the African manatee (Trichechus senegalensis). The conservation and protection of manatees has been a growing concern for a number of years, with all species currently listed as Vulnerable under the IUCN Red List and the two subspecies of West Indian manatees listed as Endangered. With the increase in annual manatee deaths from urbanization, habitat loss, boating accidents, and entanglement in fishing gear, it is of great importance to ensure rehabilitated manatees thrive upon release back into the wild. Antillean manatees, Trichechus manatus manatus, are an endangered subspecies of the West Indian manatee, with their largest population in Belize. Identifying resources that drive manatee movement patterns is a valuable tool in conservation efforts, especially for manatees that face habitat destruction, such as those in Belize. Data were collected from two areas in Belize: Shipstern Lagoon, one of the largest inlet lagoon systems in Belize, and Corozal Bay Wildlife Sanctuary (CBWS), an estuarine system that is an important corridor between watersheds and the Belize Great Barrier Reef. Using satellite tracking data from a rehabilitated male T. m. manatus, sites of no visitation, low, medium, and high frequency of visitation were surveyed for benthic vegetation (particularly seagrasses), salinity, water temperature, and water depth to determine which, if any, was strongly correlated with site visitation frequency. 48 GPS locations were chosen using a random number generator, with some occurring during soft release (lagoon) and some during post release (CBWS). This study had three main objectives: (1) determine movement patterns related to resource availability by analyzing biological, chemical, and geographical variables in correlation to visitation frequency, (2) assist in strengthening conservation management goals in the Corozal Bay Wildlife Sanctuary (CBWS), and (3) to provide feedback in the rehabilitation process at Wildtracks Manatee Rehabilitation Centre, in order to continue improving rehabilitation success. Analysis should indicate a strong correlation between benthic vegetation present and site visitation frequency, where sites with an abundance of sea grass should have a higher frequency of visitation. There should also be a strong correlation between visitation frequency and salinity due to the ideal growing conditions of Turtle grass (Thallassia testinudum) and Shoal grass (Halodule wrightii), two of the main food sources for T. m. manatus.
5. **Title:** Analytical Analysis of Atrazine in Spring Lake: Method Development and Implementation  
*Principal presenter:* Shelby Crawford  
*Major:* Chemistry  
*Faculty mentor:* Dr. Brian Bellott  
*Abstract:* One of the major challenges in improving our agricultural yields is use of pesticides. Whether direct or indirect, residue from harmful chemicals used on crops can cause water contamination, leading to hazards throughout the food chain. Depending on the class and properties of the pesticide formulation used, the level of toxicity and routes of prevention can be accurately hypothesized. This study delves into a few important questions determining if and when levels of hazardous pesticide chemicals are high enough to harm organisms including aquatic life, wild life, and ourselves. The Environmental Protection Agency (EPA) sets standards and methods to determine legal limits for drinking water in the area. Numerous analytical methods including gas chromatography (GC), high-performance liquid chromatography (HPLC), ultraviolet-visible spectroscopy (UV-Vis), and mass spectrometry (MS) have been utilized to test water sources for pesticide contamination. Research at Western Illinois University is interested in the amount of atrazine contained in Spring Lake during the high-range summer months and if it is above a legal limit set by the EPA. Results will be discussed from data collected on available instrumentation in the department using a certified method. Extraction procedures following Method 8141 from the Illinois EPA allow atrazine to be detected on a GC with a flame ionization detector (FID). A novel method and results will also be presented. Reported data includes method development techniques, chromatograms, and concentration levels in Spring Lake.

6. **Title:** Improving Contraceptive Use in Sierra Leone Using the Health Belief Model  
*Principal presenter:* Olanike O. Idowu  
*Major:* Health Sciences  
*Faculty mentor:* Dr. Fetene Gebrewold  
*Abstract:* This paper applied the Health Belief Model and its six constructs to Contraceptive use in Sierra Leone. Sierra Leone is a West African country popular for its role as the main slave trade center. The country ranked among the first five and top ten producers of rutile and diamond respectively, among many other mineral resources the country is blessed with. However, despite all the wealth of mineral resources, Sierra Leone is one of the poorest countries in the world ranking 203 out of 206 countries, the country also have one of the highest maternal mortality rates in the world. Pregnancy in Sierra Leone is tagged "A Ticket to death" (VOA, 2009), because one out of every eight pregnant woman stands the risk of dying form pregnancy related causes. This as a result of poor maternal and child health services in Sierra Leone as there is a ratio of 1 midwife per 1000 births. Family planning services/contraception like every other healthcare service in the country is very poor with only 8.20% prevalence in a population with average fertility of 4.71 per woman (World
The Health Belief Model is a conceptual framework that describes a person's health behavior as an expression of health beliefs. The model was designed to predict a person's health behavior, including the use of health services, and also to justify intervention to alter maladaptive health behavior. Its six constructs (Perceived Risk, Perceived Severity, Perceived Benefits, Perceived Barriers, Cues to Action and Self Efficacy) are its main tool for achievement of behavioral change. The HBM suggests that a person's belief in a personal threat of an illness or disease together with the person's belief in the effectiveness of the recommended health behavior or action will predict the likelihood that the person will adopt the recommended behavior.

The purpose of the study is to apply the Health Belief Model to enhance improvement in contraceptive behavior and use in Sierra Leone. This involves utilizing all the constructs of the model and giving health education with emphasis on the health threats, susceptibility of non usage and the benefits (including non contraceptive benefits) of adopting contraception and other family planning services. It also involves identification of actual and potential barriers and implementing strategies to break/overcome such barriers, encouraging formal education and testimonies of contraceptive users to build self efficacy as well as implementing cues to motivate and stimulate taking actions to use contraceptives. Health Belief Model is an effective tool to improve contraceptive use if all its constructs are employed.

7. Title: Attention during Emotional Cueing Associated with Mood and Personality Factors

Principal presenter: Matt Winter
Major: Psychology
Other presenters or co-authors: Bradley Jackson
Faculty mentor: Dr. Jonathan J Hammersley

Abstract: Purpose: We examined roles of personality traits and mood in emotionally cued spatial attention and found individuals with high trait depression had quicker reaction times than those with low trait depression on this task. Implications are discussed in terms of possible deficits in complex cue processing in trait depression. Procedure: A modified covert orienting of attention task (COAT; Posner 1980) used emotional or neutral pictures as delayed or non-delayed visual cues. Images correctly predicted locations of subsequent targets (valid cues; 80% of targets), or appeared in the opposite visual field (invalid; 20% of targets). Performance was examined in relation to states and traits on the State-Trait Personality Inventory (Spielberger, 1979) in 66 participants. Trials consisted of: 1000 ms blink prompt, 500 ms central fixation cross, 800 ms image presented to the left or right visual field (VF), 100 ms asterisk target in LVF or RVF, and 700 ms blank screen to reset the sequence. Analyses were based on correct responses between 100 and 1000 ms post-target measured in mean response times (RTs). Affective images are from the International Affective Picture System (Lang et al., 2001). Results: Mixed-design ANOVAs involving
STPI States and Traits and Validity × Visual Field × Image Valence × Delay were conducted. A significant main effect of Trait Depression, $F(1,62) = 5.18, p = .026, = .077$ indicates that individuals higher in trait depression performed significantly faster. There were significant interactions between Visual Field × Trait Depression, $F(1,62) = 7.75, p = .007, = .11$, such that individuals higher in trait depression responded significantly faster to LVF (right hemisphere) targets, and Validity × Delay × Trait Depression, $F(1,62) = 8.42, p = .005, = .12$, with those higher in trait depression significantly faster for both valid-immediate and invalid-delayed targets. Finally, there was a Validity × Valence × Trait Depression interaction, $F(1,62) = 3.38, p = .037, = .052$, such that trait depression was associated with faster responses to valid neutrally and negatively cued targets as well as to invalid positively cued targets. Conclusions and Implications: Overall quicker reaction times were found in people with higher trait depression. These findings were somewhat surprising since symptoms of depression can include psychomotor and cognitive slowing and delayed responses. However, other reasons for quicker reaction times in higher trait depression could include decreased processing associated with more complex visuospatial cues, leading to less interference with task performance. Effects of trait depression may also depend on target visual field and delay, cue validity, and emotional cue valence.

8. **Title:** C-H Bond Chalcogenation of N-containing Heterocycles  
**Principal presenter:** Al-Mohammed Baqer Osamah  
**Major:** Chemistry  
**Faculty mentor:** Dr. Jin Jin  
**Abstract:** During the past few decades, the field of C-H bond functionalization in organic chemistry has flourished. The approach is very attractive to organic chemists because C-H activation and functionalization is "greener" than conventional methods. Because the vast majority of organic molecules and materials is derived from nonrenewable feedstocks such as crude oil and natural gas and making them usable involves transforming their C-H bonds into targeted functional groups. C-H bond activations with subsequent functionalizations provide a new approach to introducing functional groups. In our research, we are going to explore the C-H bond chalcogenation reactions based on nitrogen-containing heterocycles. We are going to activate C-H bond in N-containing heterocycles by using some transition metal catalyst and to introduce chalcogen atoms such as sulfur, selenium and tellurium to the ring. The rationale to select nitrogen-containing heterocycles is because nitrogen is very reactive towards transition metal catalysts and would thus direct the following chalcogenaton reaction to a certain C-H position. We are interested in introducing chalcogen atoms to the heterocycles because chalcogens take very important roles in the biological world. All animals need significant amounts of sulfur. All animals and some plants need trace amounts of selenium and humans consume on average between 6 and 200 micrograms of selenium per day. Mushrooms and brazil nuts are especially noted for their high selenium content. Selenium and tellurium can both protect against heavy metal poisoning. We will develop a method for C-H chalcogenation of N-containing heterocycles
such as quinolines and indoles. Various metal catalysts will be screened such as palladium and copper catalyst. Diaryl dichalcogenides will be used as the chalcogen source. The reaction condition will be optimized in order to obtain the best reaction yields.

9. **Title:** Can an Investor Gain Big Using the Dow Theory Forecasts?
   
   **Principal presenter:** Jill Kelso  
   **Major:** Business Administration  
   **Other presenters or co-authors:** Anthony J Ricco  
   **Faculty mentor:** Dr. Peppi Kenny

**Abstract:** Many small investors subscribe to investment advisory newsletters looking for that piece of investment advice that will win big for them. The Dow Theory Forecasts is one such service. There have been studies before that examine portfolios made up of analysts' recommendations. As two examples, Borghsi and Pencek (2010) studied recommendations in Kiplinger's Personal Finance and found the monthly return after being adjusted for risk was -2.58%. Jaffe and Mahoney (1999) found recommendations made in Hulbert Financial Digest did not outperform benchmarks. The Dow Theory Forecasts newsletter maintains a "monitored list" of approximately 170 stocks. The organization uses a proprietary Quadrix score to determine whether a particular stock is a recommended holding (having a Quadrix score of 80 or better). From the stocks the Dow Theory Forecasts monitors, the analysts recommend stocks for purchases in each newsletter. These stocks are suggested to allow investors to find stocks that will have good 12 month returns and those that will have good 24 to 48-month returns. Within its list, analysts identify stocks which are considered to be the best which they refer to as FOCUS stocks. Research Questions Can the proprietary Quadrix scores be used by investors to earn an excess return? Can investors invest in the portfolio FOCUS group stocks and perform better than the market? Data and Methodology Company names will be collected from the January 2014 Dow Theory Forecasts newsletter. The FOCUS group stocks will be collected. Second a random sample of stocks which have Quadrix scores above 80 and below 80 will be collected. Finance.yahoo.com will be used to collect the monthly prices of the sample of stocks from January 2014 through January 2016. Monthly returns can then be calculated for each stock. The Dow Theory Forecasts uses the Wilshire 5000 as its benchmark portfolio. Given this, the Dow Theory Forecast securities and portfolios of securities identified for this research will be compared against each other and against the Wilshire 5000. With the collected data, the Sharpe risk-adjusted return measure will be calculated as: \((R^-i-(R^-f)) / \sigma_i\) where \(R^-i\) = mean monthly return on asset i, \(R^-f\) = mean monthly return on the risk-free asset, and \(\sigma_i\) = standard deviation of asset i's returns. The abnormal returns will also be calculated using the single-factor Capital Asset Pricing Model: \(R_{it} - R_{ft} = \alpha_i + \beta_i (R_{mt} - R_{ft}) + e_{it}\) where \(R_{it}\) = return on stock i in month t, \(R_{ft}\) = return on the U.S. Treasury bill in month t, and \(R_{mt}\) = the return on the market proxy in month t. This will then allow conclusions to be drawn regarding the ability to use the Dow Theory Forecasts to beat the market by using the selected investment advisory newsletter advice. Sample

10. Title: Changes to Injured Student-Athletes' Academic and Athletic Identities During the Injury Experience: a Case Study

Principal presenter: Ryan Krzyzkowski

Major: Kinesiology

Faculty mentor: Dr. Mark Cole

Abstract: With the increased pressure and demands of college sports, more focus has been given to understanding the psychological components of student-athletes. However, minimal research has focused on how the injury phenomena can affect the athletic identity of student-athletes. Injuries occur on a continuum with four different phases; pre-injury, in the moment of an injury, post-injury, and re-injury. Before an injury occurs there are psychological precursors that can increase the injury risk for an athlete. It has been shown that athletes primarily experience three different reactions when they are initially injured; relevant processing or awareness, emotional reaction, and coping attempts (Udry, Gould, Bridges, & Beck, 1997). Post-injury there are three components (cognition, affect, and behavior) that affect injury outcomes (Wiese-Bjornstal, 2010). Psychological consequences of athletic injuries can impact future sport participation and re-injury risk. Many athletes experience nervousness, anxiety, and cautiousness post-injury while preparing to return to competition (Clement, Arvinen-Barrow, & Fetty, 2015). There is no clear description of what the injury experience is or as it is being perceived by injured student-athletes. Few studies focus on variety of factors throughout the whole injury timeline as the athletes are experiencing them. This leads to a lack of understanding what the injury experience is and how it impacts student-athletes. The purpose of this study is to examine how injured student-athletes' academic and athletic identities change during the injury experience through a longitudinal perspective and appreciation for injured student-athletes. Following IRB approval, a qualified participant was asked to complete the Academic and Athletic Identity Scale (AAIS) and participate in a semi-structured interview. After initial data collection the participant was asked to return approximately two weeks later for further data collection and continued to do so in two week intervals until participant returned to athletic competition. Data collection methods were identical for each interview. Data analysis is currently ongoing with approximately 11 interviews to be conducted and analysed by study completion. The interviews are being recorded, transcribed and inductive analysis is being obtained by coding the transcripts and creating themes for interpretations of the data.
11. **Title:** Combustion Analysis of Humic Acid Substances  
*Principal presenter:* Naga Janaki Manikonda  
*Major:* Chemistry  
*Faculty mentor:* Dr. J. Scott McConnell  

**Abstract:** Soil organic matter is the fraction of soil that consists of plant or animal tissue in various stages of decomposition. Organic matter comprises an average of 1% - 6% of productive agricultural soils. The amount of organic matter in soils is influenced by rainfall, temperature, moisture and soil aeration. The components of organic matter are grouped into: plant residues, living microbial biomass; detritus, active soil organic matter; and humus, stable soil organic matter. The humus fraction consists of humic substances which are subdivided into humic acid (HA) and fulvic acid (FA). Humic acids are organic acids which are usually soluble in water under alkaline conditions. HA precipitates from aqueous solution when the pH is below 2. Combustion analysis is used to determine elemental composition of a pure organic compound by burning the sample under conditions where the resulting products can be quantitatively analyzed. The molecular formula and empirical formula of the original compound can be calculated from the number of moles of each combustion product. The elemental composition of Fluka humic acid by combustion analysis was found to be 48.36% C, 26.91% O, 4.24% H, 0.78% N and 0.78% S.

12. **Title:** Comparative Analysis of Helicoverpa Zea Gene Expression and Growth based on the Host Plant  
*Principal presenter:* Donald A. Bath  
*Major:* Biology  
*Faculty mentor:* Dr. Richard O. Musser  

**Abstract:** Annually millions of dollars are spent reducing crop damage from insect herbivores. One such culprit is Helicoverpa zea, commonly known as the 'corn earworm' or 'tomato fruitworm', a moth species whose caterpillar stages feed on a variety of plants. My research is to understand how these caterpillars may grow and compensate on a assortment of plants with different defense tactics. Caterpillars that grow slower and are smaller in size often have diminished fitness. I performed a series of growth assays with Helicoverpa zea on several plants: control diet and leaves from corn (Zea mays), tomato (Solanum lycopersicum), soybeans (Glycine max), and tobacco plants (Nicotiana tabacum). The results compared 3rd instar caterpillars with their weights taken 72 hours after herbivory on their respective plant's period. Additional testing was performed under conditions where tomato and tobacco plant defenses were altered using the plant hormones jasmonate and salicylic acid. Results from the bio assay were quantified and compared to molecular data obtained through qPCR analysis. This data focused on similarities and differences between growth and digestive genes. Further information will be collected using more qPCR tests and potentially adding microarray analysis. With the results obtained, I hope to present a picture of how natural plant defenses influence growth potential and fitness of the attacking insect pest, Helicoverpa zea.
13. **Title:** Detection of Thermophilic Fungi in Corn Fields and their Potential Role in Mycotoxin Production  
*Principal presenter:* Adeyemi Olanrewaju  
*Major:* Biology  
*Other presenters or co-authors:* Andrea Porras-Alfaro, Terri Tobias  
*Faculty mentor:* Dr. Andrea Porras Alfaro  

**Abstract:** Thermophilic fungi can grow at high temperatures between 450°C to 550°C and represent an important component of the microbial community in soils. The diversity and distribution of these fungi in corn fields and corn-derived food products and their potential role on mycotoxin production have not been studied. High incidence of lung infections has been recorded among corn farmers but the etiology of these infections has not been clearly determined. We hypothesized that high numbers of thermophilic/thermotolerant fungal spores can be isolated from corn fields and isolation rates varied seasonally influencing rates of lung infections/allergic reactions on farmers. Fungi will be isolated from soil samples and corn-based products. Corn meal flour was sampled and tenfold serial dilution of the product was prepared and cultured on Emerson media and incubated at 500°C for two weeks. Fungal identification was carried out using Polymerase Chain Reaction (PCR) and DNA sequencing. From samples cultured, up to 50% yielded thermophilic fungi. Aspergillus was the most abundant genus based on morphological identification and microscopy: 4 different morphotypes from corn flour and 3 morphotypes from corn starch. These preliminary results indicate the presence of thermophiles in corn products which may have significant implications on human health.

14. **Title:** Development of a Green Chemistry Laboratory Experiment for Undergraduate Curriculum  
*Principal presenter:* Samson A. Adeleke  
*Major:* Chemistry  
*Other presenters or co-authors:* Dr Thottumkara K. Vinod  
*Faculty mentor:* Dr. Thottumkara K. Vinod  

**Abstract:** Most, if not all, of the traditional oxidizing agents covered in an undergraduate lecture course are transition metal based reagents which are toxic and are also potential environmental pollutants. While the ease and efficiency (% yield) of the oxidation reactions using these reagents are highlighted during the lecture class, the deleterious health and environmental aspects of these reagents are often ignored or omitted in classroom discussions. A green oxidation procedure for oxidation of alcohols using catalytic amounts of in-situ generated o-iodoxybenzoic acid (IBX) in presence of Oxone as a stoichiometric oxidant is developed. Catalytic amount of commercially available 2-iodobenzoic acid is used as the organoiodine precursor for IBX in the reaction. This convenient procedure for the oxidation of alcohols, completed in a 2.5 h laboratory period, is carried out in aqueous solvent mixtures. Students are introduced to several pedagogically relevant green chemistry
principles including the use of aqueous reaction medium, nonextractive product isolation procedure, and use of benign and catalytic reagents through this convenient oxidation experiment. Finally, this experiment also allow instructors to discuss the use of IBX and other hypervalent iodine reagents as benign alternatives to commonly used and frequently discussed transition metal based reagents.

15. **Title:** Discrimination During The Hiring Process In Law Enforcement  
**Principal presenter:** Nicholas Hesford  
**Major:** LEJA  
**Faculty mentor:** Dr. Kimberly D. Dodson  
**Abstract:** The general purpose of this study will be to examine the hiring process in policing. It will look at specific topics such as the discrimination that could happen based on body type, age, physical ability, and gender, during the hiring process. There are many ways to look at this issue, it could be from an executive standpoint or from the applicant stand point. The main idea that I want to find out is what kind of discrimination occurs during the hiring process and how we can make changes to these issues. I would also like to find out how many percent of people report this misconduct, being already hired by a department of being passed over for a new job opportunity.

16. **Title:** Do We Need It? - A Look into the Influenza Vaccination  
**Principal presenter:** Kelsie Schoonover  
**Major:** Health Sciences  
**Other presenters or co-authors:** Mei Wen  
**Faculty mentor:** Dr. Mei Wen  
**Abstract:** This research aims to explore the impact of influenza vaccination and provide suggestions to people to protect themselves from the disease. This involves conducting a health policy analysis by assembling evidence from the past literature reviews and reports from different organizations and research institutes, constructing possible alternatives, selecting the evaluation criteria, projecting the outcomes, confronting the trade-off. We also looked at the advantages and disadvantages of taking the influenza vaccination. Recommendation is given to people to help them make an informed decision on whether or not to get the influenza vaccination.

17. **Title:** Drug Use and Mental Health Related to Emotional Abuse  
**Principal presenter:** Bradley Aleshire  
**Major:** Psychology  
**Faculty mentor:** Dr. Jonathan J. Hammersley  
**Abstract:** Problem & Purpose: Research demonstrates that individuals with an abuse history (psychological/physical/sexual abuse) have a higher likelihood of drug addiction (Fernández-Montalvo et al., 2015). Reported childhood maltreatment (physical, sexual, & emotional abuse, neglect) is also associated with early adolescent smoking (Mills et al.,
However, little research has examined whether involvement in emotionally abusive relationships during college is associated with increased risk for drug use or other negative mental health outcomes. The current study reviews the associations of reported emotional abuse with drug use and mental health by utilizing a nationally representative sample of 111,153 college students. We hypothesized that individuals exposed to emotionally abusive relationships would have a higher likelihood of drug use and worse mental health.

Procedure: A sample was obtained (approximately 64% women, 34% men, and 0.2% transgender) from the American College Health Association - National College Health Assessment-II (ACHA-NCHA-II) dataset. The ACHA-NCHA-II is a national survey measuring students' health habits, behaviors, and perceptions. We analyzed participants who answered "Within the last 12 months, have you been in an intimate (partnered) relationship that was: Emotionally abusive (e.g., called derogatory names, yelled at, ridiculed)?" Results: ANOVAs involving effects of an emotionally abusive relationship on reported drug use and reported mental health were conducted. Results were analyzed for overall drug use and specific use of cigarettes, alcohol, and marijuana as well as reported mental health. There was a significant effect of an Emotionally abusive relationship on total drug use $F(1,107593) = 1585.17, p < .001$, such that individuals reporting emotional abuse reported higher overall drug use. There were also significant effects of emotionally abusive relationship on cigarette use, $F(1,107337) = 1084.47, p < .001$, alcohol use, $F(1,106967) = 529.26, p < .001$, and marijuana use, $F(1,107207) = 756.37, p < .001$, such that individuals reporting emotional abuse indicated higher rates cigarette, alcohol, and marijuana use. For reported mental health, there was also a significant effect of emotional abuse, $F(1,103592) = 1446.80, p < .001$. Conclusions & Implications: Substance use and worse reported mental health were associated with reported emotional abuse in an intimate relationship. Clearly, experiencing emotional abuse from an intimate partner is related to negative outcomes in college students and should be further examined. Related factors and mediators/moderators (e.g. sexual orientation, gender, living situation, relationship commitment) that may impact emotional abuse from intimate partners will also be discussed.

18. **Title:** Effects of Elevated Peroxidase Levels and Corn Earworm Feeding on Gene Expression in Tomato Fruit  
**Principal presenter:** Ammar Al-Furaiji  
**Major:** Biology  
**Other presenters or co-authors:** Alanna Griffin, Maha M Alzaben  
**Faculty mentor:** Dr. Richard O. Musser  
**Abstract:** Plants can form defenses to caterpillar feeding. Most research has focused on the leaves of plant versus their fruits. I am investigating the response of tomato fruits (Solanum lycopersicum). In addition, I am looking at tomato plants that have elevated peroxidase levels due to a transgene added. I will initially investigate well known plant defense genes such as proteinase inhibitors, polyphenol oxidase, arginase and threonine deaminase with quantitative real time PCR to determine differences in gene expression in tomato fruits in 2013. However, little research has examined whether involvement in emotionally abusive relationships during college is associated with increased risk for drug use or other negative mental health outcomes. The current study reviews the associations of reported emotional abuse with drug use and mental health by utilizing a nationally representative sample of 111,153 college students. We hypothesized that individuals exposed to emotionally abusive relationships would have a higher likelihood of drug use and worse mental health.
wild type tomato plants versus transgenic plants and with and without caterpillar (Helicoverpa zea) feeding. I expected to see the highest amount of gene expression difference due to caterpillar herbivory and for the transgenic tomato to alter these responses in both a positive or negative manner. The exceptional high peroxide activity in transgenic plants appear to up-regulate pathogenesis-related (PR) genes as well growth and flowering genes. Suggesting multiple regulatory pathways are interacting due to the treatments. Additional studies I will use the microarray analysis to understand the global changes that are altered.

19. Title: Environmental Concerns of Estrogen in Streams and its Determination by Standard Analytical Method  
   Principal presenter: Srikanth C. Pidikiti  
   Major: Chemistry  
   Other presenters or co-authors: Amanda L. Hagen, Deanna P. Valdebenito, Megan J. Long  
   Faculty mentor: Dr. J. Scott McConnell  
   Abstract: There is a concern regarding physiological functions of humans and wild life around the world due to the influence of endocrine disrupting chemicals (EDCs) in water bodies. Endocrine disrupting chemicals (EDCs) are either natural or synthetic and may mimic the role of endogenous hormones produced by the organism. EDCs in water bodies originate as effluents from confined animal feeding operations (CAFOs) and wastewater treatment. Estrogen is one of the endocrine disrupting chemicals found in water sources. CAFOs use synthetic estrogens for increase in milk and meat productivity by cattle, swine and poultry. Manure from feedlot is stored in lagoons for anaerobic degradation of organic compounds. Leakage from lagoons results in polluting underground water and nearby water bodies with estrogen. Sex reversal was observed in U.K Rivers with sewage effluents. There is a widespread feminization of cyprinid fish (Rutilus rutilus). Research began to determine levels of estrogen in water bodies. Several methods were developed for determining estrogen content in water. Current analytical methods are bioassays, gas chromatography (GC-MS) and liquid chromatography (LC-DAD, LC-MS) for analyzing the estrogenic content in water samples.

20. Title: Estimating Density of Bobcats with Capture-Mark-Recapture Data from Camera Traps  
   Principal presenter: Tim Swearingen  
   Major: Biology  
   Other presenters or co-authors: Christopher Jacques  
   Faculty mentor: Dr Christopher Jacques  
   Abstract: Bobcats in Illinois were protected when the Illinois Endangered Species Protection Board declared them a state threatened species in 1977. By the early 1990s, reports of bobcat sightings increased substantially across Illinois (e.g., sightings in 99 of 102 counties). Despite the recovery of bobcat populations across Illinois, previous research
has been limited to southern Illinois where the largest area of suitable habitat (i.e., forested cover) exists. Regions across northern Illinois are characterized by intensive agricultural land and lower availability of forested habitat. Nevertheless, bobcat population trends have increased since the early 1990s across northern Illinois. Continued expansion of bobcat abundance has prompted state legislators to propose a bobcat hunting season during 2015 that would feature limited harvest for the first time since the early 1970s. Thus, the need for quantitative information on bobcat population demographics in other regions of the state is timely. Use of remote cameras is less invasive, less labor intensive, less costly than other long-term census techniques, and especially useful to record nocturnal, secretive species that occur in low densities and landscapes that are difficult to access by humans. Because bobcats are individually identifiable, the opportunity exists throughout northern Illinois to obtain population abundance estimates within a capture-recapture framework using remote cameras. Our objective is to evaluate the efficacy of camera traps for estimating bobcat abundance across northern Illinois. We will conduct camera trap surveys using passive infrared-triggered remote cameras for 3-month seasonal sampling intervals; a camera trap spacing of 3.5 km will be used. We will place two cameras per station opposite each other on both sides of known travel corridors to increase the likelihood of obtaining photographs of both sides of an animal. We will construct encounter (e.g., capture) histories for each individual bobcat identified by camera trapping. We will analyze encounter histories using Program MARK software, which was developed to implement closed-population capture-recapture models. This study will identify relationships between camera density, variation in habitat types, and bobcat detection probabilities. A greater understanding of factors influencing bobcat detection probabilities will be used to develop efficient camera sampling protocols, and subsequent validation of established protocols across the state where habitat types and bobcat densities vary. Further, this study will contribute to a greater understanding of potential spatial effects (i.e., habitat) on home range use by bobcats across northern Illinois landscapes, which in turn will aid in refining camera survey protocols (e.g., sampling intervals, size of sampling area) for subsequent use in estimating bobcat abundance across Illinois.

21. **Title:** Evaluating Capture Techniques for Southern Flying Squirrels in Hardwood Forests of West-Central Illinois  
**Principal presenter:** James S. Zweep  
**Major:** Biology  
**Other presenters or co-authors:** Christopher N. Jacques, Sean E. Jenkins, James T. Lamer  
**Faculty mentor:** Dr. Christopher N. Jacques  
**Abstract:** Selecting an effective capture method is important for collecting reliable, unbiased information on small mammals. Despite numerous investigations of capture methods, there exists a paucity of information comparing the effectiveness of trapping methods for arboreal and semiarboreal mammals. Most notably lacking in the ecological literature are direct comparisons of capture rates among traps placed at different tree
heights, despite evidence that trapping success is higher in trees than at ground level. Moreover, no studies of G. volans have attempted to develop a portable (and thus more efficient) trap design for use in future research studies evaluating the ecology of this species. Thus, the primary objective of our study was to evaluate the efficacy of modified (e.g., Sherman traps) capture techniques for southern flying squirrels. From October 2014 to October 2015, we systematically placed Sherman traps (n = 120) every 15-m along transects throughout the Alice L. Kibbe Life Science Station to evaluate potential effects of height above ground on capture success; traps were placed at ground level (0 m), 3 m and 6 m above ground. We fitted adult flying squirrels (≥ 60 g) with radio collars and subsequently monitored survival and movement status 2-3 times per week. We used Pearson's chi_square analyses to evaluate the effectiveness of Sherman traps placed at varying heights above ground; we set α at 0.05 when conducting analyses. We capture 41 individuals (17 males, 22 females, 2 unknown) using Sherman traps, of which 1 (2.5%) died of capture-related mortality. Additionally, we documented 36 recapture events, of which 1 (3%) died of capture-related mortality. Of 77 capture/recapture events, 1, 32, and 44 occurred at 0-, 3-, and 6-m above ground, respectively. Capture success was significantly lower (c² = 77, P < 0.001) at ground level than above ground (i.e., 3- and 6-m) treatment groups, though we documented no difference (c² = 1.89, P = 0.17) between 3- and 6-m treatment groups. Our modified trap design was a cost-effective, efficient, and safe method for capturing flying squirrels, and will provide a valuable tool for future research evaluating natural history and ecology of this species. To minimize time spent deploying traps, we recommend that traps be placed at 3-m above ground. Similarly, we recommend that traps be checked between 0600-0800 hr and that trapping activities be suspended during unfavorable climatic conditions (≥ 32°C) to minimize capture-related mortality events.

22. **Title:** Exploratory Chemistry of Selenostannates  
**Principal presenter:** Rebecca Corbett  
**Major:** Chemistry  
**Other presenters or co-authors:** Dr. Brian Bellott  
**Faculty mentor:** Dr. Brian Bellott  
**Abstract:** Exploratory solid state chemistry offers the potential for innovation in technology through the creation of new materials with unique electrochemical, magnetic, and thermoelectric properties. Present research is focused on incorporation of the complex tin selenide anion [Sn₄Se₉]²⁻ into crystal structures containing a variety of transition metals. The unique structure of this anion imparts greater thermoelectric efficiency to the overall crystal structure, allowing for the more efficient conversion of waste heat into useful electrical energy. Incorporation of the anion into structures of diverse metallic character may allow for the creation of materials with improved semiconducting characteristics. Because solid state reactions are diffusion limited, the flux-based method of crystal synthesis was employed in this research. Salts, with lower melting temperatures than the solid state reactants, used as flux serve to enhance the diffusion of reactants at lower
temperatures. Reaction preparation consisted of loading reaction tubes with stoichiometric amounts of various transition metals, selenium, tin, and a eutectic flux mixture comprised of NaBr and NaCl. Reaction vessels were then vacuum sealed and heated in accordance with a temperature program for two weeks at 750°C. Resulting crystals will then be characterized via optical microscopy, SEM, SEM-EDS, and single crystal X-ray diffraction in order to elucidate crystal structure and overall physical properties.

23. **Title:** GIS Hotspot Analysis of Green Commuter Population in Washington State  
**Principal presenter:** Jane Simkins and Amber Davis  
**Major:** RPTA  
**Other presenters or co-authors:** Amber Davis, Jane Simkins, and Rob Porter  
**Faculty mentor:** Dr. Rob Porter  
**Abstract:** The purpose of this analysis is to locate the levels of green commuter concentration in the state of Washington using a hotspot analysis. We hypothesized that statistically significant hot spots would be found closer to urban areas. The hotspot analysis tool which uses a set of weighted features to identify statistically significant hot spots and cold spots using the GiZ score. The GiZ score identifies those clusters of points with values higher in magnitude than one might expect to find by random chance. For the polygon features in this hotspot, centroids were calculated prior to analysis. The Z Score tested the statistical significance of the data (hot and cold spots) that helped determine whether or not to reject the null hypothesis. It is important to note that the hot spot does not assume everyone in the hot spot (red area) walks or bikes to work. Rather, the hot spot symbolizes areas that have a high concentration of people who walk or bike to work. Results were expected to pinpoint Seattle as the primary hotspot for the total percent of green commuters. Our hypothesis is partially supported since we expected Seattle to be a hotspot for biking and it was not. The second and third map supported our hypothesis as people who walk and green commuters are clustered around urban areas. The hotspot for the total percentage of people who bike to work are located near Walla Walla. Furthermore, the total percent of people who walk to work are located at various locations, such as: Walla Walla, Winthrop, Olympia, Everett, and Longview. After reviewing our results, we concluded that hotspot analyses are particularly helpful for identifying clusters of frequent activities. This information could be especially helpful for open space managers, city managers, or park district staff who could use hot spot analysis when determining proper locations for multi-use spaces and trails.

24. **Title:** Holograms  
**Principal presenter:** Yousef Alanazi  
**Major:** Physics  
**Other presenters or co-authors:** Dr. Pengqian Wang  
**Faculty mentor:** Dr. Pengqian Wang  
**Abstract:** Holograms is a three-dimensional image that is created by interference of beams
from a coherent light source, and holography is the creation of holograms. Holograms could be made easily by students or teachers in school or home. Holograms requires some holography materials to make in a dark room. The process of making holograms takes three to four minutes to be done. In this project, we made holograms using a laser light source, an object and film plate. We created holograms by recording the interference pattern of a beam from a stabilized laser and another beam that reflected from the object. A contact copy is created by leaning the holographic plate on the chosen object directly. As a result of that, the holograms was created. After that, we just need to expose the film plate by the laser light to see the holograms. However, capturing the microscopic interference pattern exactly as it is at a moment of time is affected by the movement of any part of the apparatus and noise or vibrations in the lab. Actually, holograms could by affected a very tiny movement in the apparatus. Generally, only recording the interference pattern of beams of coherent light source is required for making holograms. It does not require expensive apparatus and is safe and easy for young people.

25. Title: Identification of Novel Mycoviruses in the Phytopathogenic Fungi Fusarium  
   Principal presenter: Sangya Paudyal  
   Major: Biology  
   Other presenters or co-authors: Dr. Catherine Miller-Hunt  
   Faculty mentor: Dr. Catherine Miller-Hunt  
   Abstract: Mycovirus, virus infecting fungus was first identified in 1962, in cultivated button mushroom Agaricus bisporus. While mycoviruses often cause symptomless infections in their host, some confer advantage to the host, like the killer yeast system and some have negative effect on the normal functioning of the host, like Cryphonectira hypovirus 1 of Cryphonectria parasitica. Fungal genera of Fusarium, which includes important plant pathogens, are known hosts of dsRNA mycoviruses. These fungi are well known mycotoxin producer, as well as opportunistic human and animal pathogen. Found worldwide in all climate zones, soil, plant or plant debris, Fusarium species cause diseases like vascular wilt, head and seed blights, stem rots, root and crown rot and canker disease in a wide range of host plants. Of the 101 most economically important disease of crop plants, the American Phytopathological Society attributes at least 81 to Fusarium species. These fungi have been associated with soybean sudden death syndrome (SDS). Various double-stranded RNA viruses have been successfully isolated from F. poae and F. solani. A 7.5kb dsRNA virus DK21 isolated from F. graminearum and three mycoviruses from F. oxysporum have been associated with altered fungal morphology and hypovirulence. FgV1 (Fusarium graminearum virus 1) was the first Fusarium mycovirus associated with a decrease in fungal pathogenicity as well as morphological changes like reduced mycelial growth. With the increasing concern of resistance to fungicides and potential environmental pollution and food safety issues, alternative methods for fungal control are being sought. Biological control of fungi using mycoviruses that cause fungal hypovirulence represents a safe and effective biocidal method for control of phytopathogens. My objective is to screen and
identify novel mycoviruses present in Fusarium samples taken from local soybean crops experiencing SDS. Identification of new mycoviruses will provide more insight into the world of mycoviruses, and may help identify novel mycoviruses specific to west-central Illinois crops.

26. **Title:** Impact of Lipooligosaccharide (LOS) Mutations and Two-component Regulatory Systems on Neisseria Gonorrhoeae Interactions with the Innate Human Immune System  
   **Principal presenter:** Samantha Cuthbert  
   **Major:** Biology  
   **Other presenters or co-authors:** Dr. Catherine Miller-Hunt and Jason Hunt  
   **Faculty mentor:** Dr. Catherine Miller-Hunt  
   **Abstract:** Neisseria gonorrhoeae is a highly contagious sexually transmitted disease that causes gonorrhea. Gonorrhea is associated with inflammation of the urethra or cervix, and is capable of causing permanent health problems when left untreated. Inflammation is a response by the innate immune system upon recognition of N. gonorrhoeae by lipooligosaccharide (LOS). Although there are antibiotics to treat N. gonorrhoeae, they are less effective as the pathogenic bacteria has become increasingly drug-resistant. Two mutants of the isogenic wild-type N. gonorrhoeae have been constructed in the lab to better understand the role of specific genes, and their interactions with the human innate immune system. A mutation and its complement was made to the two-component regulatory system that knocks out the internal response regulator gene (MisR). Two-complement regulatory systems are commonly used in bacteria to manage environmental changes and responses. The exterior sensor kinase sends signals to the response regulator gene which is then capable of making changes in transcription and gene expression. Mutations with MisR were carried out in a similar experiment with Neisseria meningitidis halting phosphorylation. The mutated strain interacted with the innate immune system differently than the wild type strain causing a weakened meningococcal infection in mice. The second mutation is in the acetate kinase (ackA) gene of N. gonorrhoeae that has been shown to produce an increase in acetylated proteins such as MisR. Our experiment is interested in how these mutations interact with human serum and human innate immune cells neutrophils, monocytes, and macrophages. We will carry out bactericidal assays as well as neutrophil, monocyte, and macrophage killing assays with the wild type, and each mutant strain of N. gonorrhoeae. The data collected should show either an increase or decrease in killing of N. gonorrhoeae by the human innate immune system.

27. **Title:** Imperiled Paddlefish: A Biogeomorphic Investigation into an Ancient Species' Rapid Decline  
   **Principal presenter:** Jennifer Sandrik-Rubio  
   **Major:** Environmental Studies  
   **Faculty mentor:** Dr. Roger Viadero
Abstract: This research aims to study American Paddlefish genetics (Polyodon spathula) in the Illinois, Iowa, and Missouri sections of the Mississippi River; to identify possible breeding activities in this stretch of the river, as well as determine how competitive these fish are with non-native introduced filter feeding species such as Asian Bighead (Hypophthalmichthys nobilis) and Silver Carp (Hypophthalmichthys molitrix). This fish is important economically, as it is caught by recreational and commercial fishermen for sport and for its caviar, and the habitat it prefers is also utilized by other sport fish, birds, and mammals, and recreation. Commercially this fish and its sturgeon relatives bring in billions of dollars per year in legal profits through meat and caviar, and much more in illegal poaching. The American Paddlefish is endangered or declining throughout much of its historical range, with most studies being done in the critically endangered populations of the north or the more stable populations in the south. This research aims to fill a gap about the fish’s population and stability in the largely unstudied Midwest region of the Mississippi River. Areas to be studied include above and below Lock and Dams 20, 19, and 15 on the Mississippi River, the confluences of the Illinois, Missouri, Des Moines, and Rock Rivers and the Mississippi River, above and below the LaGrange and Peoria Locks and Dams of the Illinois River, and the Great River National Wildlife Refuge. A 5-6 inch gill net will be used to catch Paddlefish. Body condition, sex, weight, length, frequency, and location of paddlefish will be gathered. An estimation of age will be made based on weight and length, and some fish will have the primary pectoral ray removed for accurate aging. Bycatch will documented. Water data collected includes conductivity, salinity, temperature, turbidity, and depth. Genetic information will be gathered via a fin clipping. Stomach contents will be examined to determine if their diet includes invasive Asian carp fry. Sites will be sampled 3-4 times a year, sampled 9 times in 3 days. I expect that the American Paddlefish populations along the Illinois, Iowa, and Missouri reach of the Mississippi River and its tributaries have found alternative, less desirable breeding location, such as the Rock River and Des Moines River. It will aid other research currently being done to determine if native species can compete with and help control the numbers of invasive species, and it is expected that the paddlefish are preying upon carp fry and are able to actively compete for food resources. I expect to find the most significant numbers of paddlefish at the base of lock and dam 19, in pool 19, and at the confluence of the Mississippi and Missouri Rivers. I expect to find limited genetic diversity with hatchery stocked fish or the fish are spawning at the less desirable locations where eggs cannot hatch.

28. Title: Molecular Cloning and Expression of an Oleate Hydratase from Nocardia Cholesterolicum NRRL 5767
   Principal presenter: David R. VanDerway
   Major: Chemistry
   Other presenters or co-authors: Hekmat B Alhmadi, Joshua D. Diaz, Dr. Jenq-Kuen Huang, and Dr. Lisa Wen
   Faculty mentor: Dr. Jenq-Kuen Huang
Abstract: The production of household cooking oils in an industrial setting yields soapstock as a byproduct during the refining process. Soapstock contains a significant amount of oleic acid and due to soapstocks very low price, it serves as a cheap source of oleic acid. Oleate hydratase (Ohase) converts oleic acid to the industrially useful product 10(R)-hydroxystearic acid (10-HSA), in a regioselective manner. Classically, 10-HSA is utilized to thicken grease, but it has potential to be used in the production of plastics, lubricants and other various industrially relevant materials. Barring the use of biocatalytic microorganisms containing Ohase, this reaction would take place under unfavorable conditions involving the use of high temperatures/pressures, strong acids or metal catalysts, and all of these methods lead to little regioselectivity in the final product. Therefore, the use of a biocatalyst that catalyzes the conversion of oleate hydratase to 10-HSA is extremely desirable for industrial applications. The bacterium Nocardia Cholesterolicum NRRL 5767 (NRRL 5767), converts 95% of oleic acid added into the bacterial culture to 10-HSA. Ohase has never been isolated or characterized at either the protein level or DNA level from NRRL 5767. This work is the first report of molecular cloning of the Ohase gene from NRRL 5767 genomic DNA into the pET28a expression vector. Functional recombinant Ohase enzyme has been expressed and purified. Enzyme activity of Ohase was determined by the conversion of oleic acid to 10-HSA or by spectrophotometrically through a coupling reaction.

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

30. **Title:** Obstacles to the Use of Insecticide Treated Nets for Malaria Prevention in Nigeria  
**Principal presenter:** Hilary Okitia  
**Major:** Public Health  
**Other presenters or co-authors:** Crystan Wilson  
**Faculty mentor:** Dr. Fetene Gebrewold  
**Abstract:** Malaria is a major public health concern in Nigeria. According to the World Health Organization (2014), about 29% of malaria prevalence in the Sub-Saharan Africa occurs in Nigeria. For a single country to record more than one-fourth of the malaria prevalence rate in Sub-Saharan Africa buttresses how huge a public health issue it is in the country. Efforts to curtail the scourge of malaria in Nigeria have been heightened since year 2000 with the "Abuja Declaration" to support the "Roll Back Malaria" project that was declared by the Organization of African Union in Harare on the 4th of July, 1997. This declaration was to help prevent and control malaria infection in the continent (World Health Organization, 2000). One of the major plans adopted by the Nigerian government from the "Abuja Declaration" was to increase the use of Insecticide Treated Nets (ITNs) across the country. Children under the age of 5 and pregnant women were the major focus for free ITNs distribution across the country. This focus was not out of place since it was found that 25% of global children death due to malaria occurs in Nigeria (Abdullahi et al., 2012). In addition to this unpleasant report, 50% of outpatient visits, 40% of hospital admissions, 30% of infant mortality, and 10% of maternal mortality in Nigeria are caused by malaria (Okafor & Amzat, 2007). From years 2007 to 2010, approximately 50 million nets were freely distributed by the Nigerian government with the aim of making at least one net available for a household. With this effort, 42% of households had at least one net in 2010; a massive improvement compared to previous years (WHO, 2012). Despite the free ITNs distribution and sensitization by the government and well-meaning bodies, so many persons have been found not to use the ITNs in the country. The objective of this research therefore, is to ascertain the barriers associated with the use of ITNs in Nigeria. The knowledge of these barriers will provide the platform for effective programs and interventions that would increase the use of ITNs to help prevent malaria infection. This retrospective research was conducted using expert findings from electronic databases like PubMed and ResearchGate. Despite the improved sensitization and distribution of ITNs across the country, the rate of ITNs possession does not correlate with the rate of its usage (Aderibigbe et al., 2014). Some of the major reasons for this are people’s unawareness and poor knowledge of ITNs (Ankomah et al., 2014; Musa et al., 2009). On the other hand, some persons that are aware of the net complained of the discomfort associated with feeling hot while sleeping under the net (Abdullahi et al., 2013). Also, lack of access to ITNs due to its unavailability in some places and the cost of purchase have prevented some people from using it. With the challenges of using ITNs made obvious, intervention planners should therefore pay more
attention to ways these barriers can be reduced for onward increase in the use of ITNs and subsequent reduction of malaria

31. **Title:** Optical Absorption and Fluorescence of Sm$^{3+}$ Ions in Lead Borate Glasses Containing ZnSe Nanoparticles  
**Principal presenter:** Sandip Singh Bista  
**Major:** Physics  
**Other presenters or co-authors:** P. K. Babu and Saisudha B. Mallur  
**Faculty mentor:** Drs. P. K. Babu and Saisudha B. Mallur  
**Abstract:** We studied the optical absorption of Sm in PbO-B2O3-Sm2O3-ZnSe system as a function of the base glass composition. We prepared two glass samples PbO-B2O3-Sm2O3-ZnSe with composition (36.55%-60.00%-0.50%-3.00%) and (56.5%-40.0%-.0.50%-3.00%) and varied the annealing times to create ZnSe nanoparticles with different sizes. To make the glasses, starting materials for each composition were weighed and mixed thoroughly and melted at a temperature 900°C. The melt was then poured onto heated brass plates to produce glass disks. In order to get circular glass samples with uniform thickness, we used brass rings during quenching. The as-prepared glass samples were annealed in a Tube Furnace at 350°C. Finally, we polished the samples and carried out optical absorption and fluorescence measurements at the Materials Research Lab, University of Illinois (Urbana-Champaign). We measured the thickness and density of each sample to find the Sm$^{3+}$ ions concentration. The refractive index of the sample was measured using Brewster Angle technique. The optical absorption and fluorescence data were analyzed to study the effect of ZnSe nanoparticles on the oscillator strength of each transition of Sm$^{3+}$ ions, intensity parameters, radiative transition probabilities and stimulated emission cross sections in these glasses.

32. **Title:** Optical Microscopy of Solid State Materials  
**Principal presenter:** Erik Sarnello  
**Major:** Chemistry  
**Faculty mentor:** Dr. Brian Bellott  
**Abstract:** This research utilizes the visualization and photographic capabilities of optical microscopes to investigate crystalline solid-state materials. There has been a great deal of interest in tin-tellurium metal compounds due to their distinct photoelectric properties. In order to best identify and quantify these properties, single crystals of these materials must be obtained. Using carbon coated fused quartz tubing to house the reactions, various metals (V, Fe, Co, Cr, Mn) were combined with tin and tellurium in various stoichiometric ratios and sealed within the quartz tubing at a pressure of 40-60 microns of Hg. These reactions were placed in a furnace and allowed to take place for two weeks while undergoing a temperature program which tops out at 750°C. Each sample was then opened and sorted.
33. **Title:** Optical Properties of Bismuth Boro-Vanadate Glasses  
**Principal presenter:** Muaid Algarni  
**Major:** Physics  
**Other presenters or co-authors:** P. K. Babu and Dr. Mallur  
**Faculty mentor:** Dr. Saisudha B. Mallur  
**Abstract:** V2O5 doped glasses have potential applications in optoelectronic devices and electrochromic display devices. We studied the optical properties of bismuth boro-vanadate glasses as a function of glass composition. Glasses were prepared using vanadium oxide (V2O5), bismuth oxide (Bi2O3) and boric acid (H3BO3). Starting materials were weighed in the appropriate amounts and then melted by heating them in a furnace at 900°C. Glasses were produced by quenching the melt on a brass plate. These glass samples were then annealed in a tubular furnace by heating at 300°C for 3 hours. Annealed glass samples were smoothed and polished using an Inland SwapTop Machine. The refractive index of this sample is measured by using a Brewster's angle set up with a diode laser (632 nm). Refractive indices show variation with glass composition. Optical band gap of these glasses were calculated from optical absorption measurement and they found to decrease with increase in vanadium content.

34. **Title:** Optical Properties of Samarium Doped Bismuth Borate Glasses Containing CdSe Nanoparticles  
**Principal presenter:** Suman Rijal  
**Major:** Physics  
**Other presenters or co-authors:** Dr. P. K. Babu Dr. Saisudha B Mallur  
**Faculty mentor:** Dr. P. K. Babu  
**Abstract:** We prepared a series of bismuth borate glasses containing CdSe nanoparticles by varying the annealing time and studied density and refractive index of the glasses. The rare-earth-ion-doped bismuth borate glass samples containing CdSe were prepared using appropriate amounts of Bi2O3, H3BO3, Sm2O3 and CdSe of high purity (99.9%). These raw materials were homogenously mixed and melted in a porcelain crucible, in the temperature range 900-9500C. The melt was air quenched by pouring it on a thick brass plate and covering it immediately with another brass plate. The glass samples obtained were annealed at 3000C for different times i.e. 3, 6, 11, 16, and 26 hrs to grow CdSe nanoparticles and to remove the thermal strains. Annealed glass samples were first smoothed to make the glass surface flat and then polished using a lapping machine to obtain well reflecting surface. The sample density was measured by the Archimedes method using xylene. The refractive index of the glasses is measured by the Brewster angle method using a PASCO set up (OS-8170) with a diode laser operating at 632 nm as the source. Here we report density and the refractive index of glass samples as a function of the annealing time.
35. **Title:** Overexpression of a Putative Oleate Hydratase Isozyme From Nocardia Cholesterolicum NRRL 5767  
**Principal presenter:** Hekmat B. Alhmadi  
**Major:** Chemistry  
**Other presenters or co-authors:** David R. VanDerway, Cole A Hoerner  
**Faculty mentor:** Dr. Jenq-Kuen Huang  
**Abstract:** Nocardia Cholesterolicum NRRL 5767 is well-known for the ability to transform about 95% of added oleic acid to value-added product, namely 10-hydroxystearic acid. This biotransformation reaction is catalyzed by oleate hydratase. Nocardia Cholesterolicum NRRL 5767 genome contains two annotated oleate hydratases both of which have been cloned recently. The objective of this research was to overexpress, purify, and characterize one of the putative recombinant oleate hydratases. Overexpression of the recombinant oleate hydratase has been achieved by IPTG induction. The recombinant protein has been purified to near homogeneity by the use of Ni affinity chromatography. Preliminary results have shown that the enzyme is able to convert oleic acid to 10-hydroxy stearic acid. The ability to produce large quantities of the protein will permit characterization and evaluation of its suitability for use in immobilized enzyme for the production of 10-hydroxy stearic acid, an industrial useful product.

36. **Title:** Overlapping Molecular Clouds in the Low Mass Star Forming Region L1521F  
**Principal presenter:** Emmanuel Adebayo  
**Major:** Physics  
**Other presenters or co-authors:** Michael B. Ferry, Christopher N. Haertel, Wei Siang Tan, E. D. Araya  
**Faculty mentor:** Dr. E. D. Araya  
**Abstract:** We present observations of formaldehyde (H2CO) in the low mass star forming region L1521F. In 2014, Tokuda and collaborators reported a bipolar molecular outflow in this region based on observations conducted with the ALMA interferometer. We observed the 6 cm transition of H2CO with the 305 m Arecibo Telescope in Puerto Rico to further investigate the outflow. The 6 cm H2CO transition has a hyperfine structure with two main spectral components separated by the equivalent of 1.13 km/s and an expected line ratio of 19/4. We detected a lower line ratio, which in addition to a broad line profile, suggests extended and overlapping molecular clouds within the velocity range of the putative outflow. Our results cast doubts on the interpretation of a molecular outflow in the region, given the limitations that interferometers have in imaging extended structures.

37. **Title:** Oxidative Transformations of β di-carbonyl Compounds using hypervalent Iodine Reagent.  
**Principal presenter:** Shashidhar Poreddy  
**Major:** Chemistry  
**Faculty mentor:** Dr. T. K. Vinod
Abstract: The use of hypervalent iodine reagents has been dramatically increased in synthetic organic chemistry over past two decades due to their mild and selective oxidative properties. Hypervalent iodine reagents can transform several oxidation reactions such as $\alpha$-oxidation of alcohols, ketones and spirocyclization of phenols, etc. The prototypical substrate 2 was tautomerized into its stable enol form. Then, the catalyst IBX 1 reacts with the bromide ion of KBr to form an acetyl bromide intermediate 3, which proceeds to undergo the oxidative transformation reaction on the $\alpha$ proton to form a cleaved halo product 4. Oxidative transformations of a series of 1, 3-dicarbonyl compounds in various solvent systems yet to be identified. Differences in the ease of these transformations using different batches of catalysts will be described. A common mechanistic path leading to the products will also be discussed. The present oxidative transformation reactions of 1,3-dicarbonyl compounds features mild reaction conditions, readily available oxidizing agent IBX, metal free mediated processes, higher yields than alternative protocols and applicable to both milligram to gram scale oxidations. These reactions also have economic and environmental advantages as well.

![Chemical structure](image)

References:

38. **Title:** Palladium Catalyzed Sonogashira Reactions of Tellurium-Containing Compounds
**Principal presenter:** Parvinlal Siraswal
**Major:** Chemistry
**Other presenters or co-authors:** ALINENI.CHANDRA KIREETI
**Faculty mentor:** Dr. Jin Jin
**Abstract:** Sonogashira reaction is a Pd-catalyzed cross-coupling reaction of terminal alkynes with aryl or alkenyl halides in the presence of co-catalyst cuprous iodide and a strong base. Sonogashira coupling is the main pathway for the synthesis of aryl alkynes and
conjugated enynes. It gained its importance because of its simplicity and mild reaction conditions. In our research we developed a new optimized method to perform Sonogashira coupling reaction of diaryl tellurides and divinyl tellurides with terminal alkynes. The coupling reactions were performed using Pd(dpdpf)Cl2 as a catalyst, CuI as a co-catalyst in the presence of K2CO3 in DMSO. The reactions were carried out at room temperature and completed within 2 h when phenyl acetylene was used as a terminal alkyne. For other alkynes, such as 1-hexyne and 1-octyne, an elevated temperature and longer reaction time were needed for the completion of the reactions. This process resulted in good yields of Sonogashira coupling products at mild reaction conditions.

39. **Title:** Police and Public Perceptions of Deaths during Police-Citizen Contact: A Test of Bad Apple Theory  
*Principal presenter:* Andrey Mojica  
*Major:* LEJA  
*Faculty mentor:* Dr. Kimberly D. Dodson  
*Abstract:* Michael Brown, Freddie Gray, Temir Rice, Walter Scott, and Sandra Bland have one thing in common - they were black and died during contact with the police. Research shows that blacks are about four times as likely as whites to die while being arrested or in police custody. High-profile in-custody deaths of blacks prompt disparate reactions. Blacks point to systemic corruption and call for police reform. A common refrain among police is that these cases are the result of a few "bad apples." The purpose of this study is to compare public and police perceptions of in-custody deaths of minorities.

40. **Title:** Preliminary Investigation: Upper Extremity Power Output via Seated Medicine Ball Assessment in Females  
*Principal presenter:* Shelby Assmus  
*Major:* Kinesiology  
*Other presenters or co-authors:* Timothy J. Piper  
*Faculty mentor:* Dr. Timothy J. Piper  
*Abstract:* Power testing measures an individual’s rate of force development. Professionals use power tests to predict athletic performance, in both the upper and lower extremities. Limited research has been developed to test upper body power, and typically consist of implement throws to indicate power output for the upper extremities (Aussprung et al., 1995; Collins & Hedges, 1978; Cronin & Owen, 2004; Ikeda et al., 2007; Mayhew et al., 1991; Mayhew et al., 1997; Mayhew et al., 2005; Salonia et al., 2004). The purpose of this preliminary research is to develop normative data for a novel medicine ball test to assess upper extremity power in untrained and after 12 weeks of moderate training in college-aged individuals. The results from the paired sample t-test found a statistical difference between the pre-training and post-training seated medicine ball test scores (t (109) =10.01, p < 0.05, d=0.54, r=0.26). Even though the purpose of the study was to identify normative values for college-age students, this study also demonstrates the effects of a structured power-training
program on power performance. Because there is limited research of normative upper extremity power output (Aussprung et al., 1995; Collins & Hedges, 1978; Cronin & Owen, 2004; Ikeda et al., 2007; Mayhew et al., 1991; Mayhew et al., 1997; Mayhew et al, 2005; Salonia et al., 2004), this preliminary investigation gives researchers insight regarding the power performance of college females.

41. **Title:** Race and Gender In Collegiate Sport: Carla Wilson's Leadership Journey  
   **Principal presenter:** Alaina Di Giorgio  
   **Major:** Sports Management  
   **Faculty mentor:** Dr. Algerian Hart  
   **Abstract:** Women in general are still discriminated as the weaker sex, and race is very much a real issue even today. This research explores the history of both race and sexual discrimination along with stereotypes in society as well as in sport. This study is viewed through the lens of gender and race. It focuses on the Athletic Director of the University of Missouri- Kansas City, Carla Wilson.

42. **Title:** Self-Control as a Predictor of Cell Phone Addiction and Deviance  
   **Principal presenter:** Alex Rogers  
   **Major:** LEJA  
   **Faculty mentor:** Dr. Kimberly D. Dodson  
   **Abstract:** Cell Phone ownership is at an all-time high with estimates showing that 91 percent of United States adults own cell phones (Pew Research Center, 2015). Two-thirds of cell phone users own smartphones, which facilitates instant communication and social interactions. However, cell phone users also run the risk of addictive and deviant behaviors. A nonrandom sample of 212 undergraduate students completed surveys assessing two roles of self-control, addictive and deviant. Suggestions for reducing addictive and deviant cell phones use are discussed.

43. **Title:** Study of Antidepressants and it's Increasing Risk to Obesity  
   **Principal presenter:** Rial Das  
   **Major:** Public Health  
   **Faculty mentor:** Dr. Fetene Gebrewold  
   **Abstract:** Depression is widely recognized as a major Public Health problem around the world (WHO). Major Depressive Disorder affects approximately 14.8 million American adults, or about 6.7 percent of the U.S population age 18 and older, in a given year (CDC, 2008). Antidepressants play a major role in the treatment of the moderate to severe depression or mild depression persisting for a longer period of time. It is found that 2.4 billion drugs prescribed in visits to doctors and hospitals of those 118 million are Antidepressants (CDC, 2014). Antidepressant prescribing has risen nearly 400% since 1988. Recent reports state that more than 1 in 10 Americans over age 12 now take Antidepressant (CDC, 2014). Weight gain is an adverse effect of Antidepressants.
the patients using Antidepressants are overweight and 26% are moderate to extremely obese (Seretti, A., Mandelli, L. 2010). The prolonged use of Antidepressants over the years for treatment and maintenance causes weight gain which in turn continues to signify a high risk to Obesity. More than one third (34.9%) of the adult population is obese in USA (CDC, 2011-2012). So it becomes important to consider the increase in the threat to obesity caused by the use Antidepressants. Aim/ Objective: The main objective of the study is to find the rate and the tendency of weight gain in a population under consideration aged 18- 50 years undergoing antidepressant treatment for a minimum of 6 months or more. Method: A survey will be conducted on patients, who are under Antidepressant treatment regimen by using a semi structured questionnaire. Conclusion: This study will spread awareness among people regarding the weight gain caused by the long term use of Antidepressants. It will identify the group of people who are at risk to Obesity and thus help to decrease the risk of Obesity among the population. The study will guide and motivate people to adopt other forms of psychological treatment to avoid weight gain caused due to Antidepressants.

44. **Title:** Suzuki Coupling of Diaryl Tellurides for the Synthesis of Unsymmetrical Biaryl Compounds

**Principal presenter:** Changchi Yen  
**Major:** Chemistry  
**Faculty mentor:** Dr. Jin Jin

**Abstract:** The biaryl scaffold has received increased attention as a privileged structure by the pharmaceutical industry. This motif has shown activity across a wide range of therapeutic classes, which include antifungal, anti-inflammatory, antirheumatic, antitumor, and antihypertensive agents. It also has shown the potential to treat infertility as a follicle-stimulating hormone (FSH) receptor agonist. Palladium catalyzed cross-coupling of organoboranes with an organic halides or triflates is known as the Suzuki coupling reaction. In our research we developed a new method to synthesize unsymmetrical biaryl compounds by the cross-coupling of symmetrical diaryl tellurides and organoboronic acids. The synthesis of symmetrical diaryl tellurides was carried out first. It is a one-pot reaction without using any catalyst. It used aryl iodides and elemental tellurium as starting materials in the presence of KOH. The diaryl tellurides then coupled with a series of organoboronic acids under palladium catalysts to give the unsymmetrical biaryl products. The reaction conditions and the palladium catalysts were screened in order to find the yield. The new method to make unsymmetrical biaryls will lead to a more benign alternative to the synthesis of biaryl containing drug molecules.

45. **Title:** Temperature Control of Tunnel Diode Resonator Experiment (Low Temperature)

**Principal presenter:** Trey Bruton  
**Major:** Physics  
**Other presenters or co-authors:** Dr. Ryan Gordon
Faculty mentor: Dr. Ryan Gordon

Abstract: A tunnel diode resonator (TDR) circuit is a specially designed radio frequency LC oscillator circuit that is capable of measuring electromagnetic properties of materials with extreme sensitivity (parts-per-billion) over a very wide temperature range. The focus of this work is on the temperature control of the resonating circuit, which is crucial for maintaining a stable circuit resonance. The TDR circuit is mounted inside of a closed-cycle helium refrigerator, where the lowest temperature that can be achieved is approximately 10 K. Samples interface with the circuit for measurement by being mounted on a small sapphire stage and inserted into the inductor coil, L, of the TDR. The sample is heated during the experiment to probe its electromagnetic properties, but the TDR circuit must stay at a constant temperature to maintain its steady resonance frequency. In my presentation, I will outline the experimental design of the TDR experiment and I will explain the details of the control loops that are used to regulate the temperature of various parts of the experiment. I will also discuss programming techniques in LabVIEW, which is used for control of electronic instrumentation during the TDR experiment.

46. Title: The Decision to Store Corn or Market Out of the Field
Principal presenter: Ryan Ricketts
Major: Business Administration
Faculty mentor: Dr. James Franken

Abstract: All farmers are faced with the tough decision regarding whether to store grain from harvest and expose themselves to price volatility outside of harvest or to sell all of their grain off the combine and be done marketing for the year. Many farmers store grain or have the option to store grain either on farm or at the local elevator. However, predicted gains/losses and realized gains/losses from storing differ each year and, in many cases, these differences are notable. The objective of our research is to pinpoint how frequently the projected and realized revenue from storing grain justifies the activity. Commodity markets are low and are predicted to be low in the next couple of years. In order to maximize revenue, it is essential that the grower makes the correct decisions when it comes to marketing.

47. Title: The Effectiveness of a Closed Baset Weave Ankle Taping With Neutral Heel Locks vs. Eversion Heel Locks in Limiting the Amount and Rate of Inversion
Principal presenter: Chelsea Davis
Major: Kinesiology
Faculty mentor: Dr. Jennifer Plos

Abstract: Ankle injures account for 10 to 30% of all sport injuries and 77% of all ankle injuries are ankle sprains (Fong, Hong, Chan, Yung, & Chan, 2007). Approximately 85 to 95% of these injuries are inversion (sole of the foot roles up and in toward midline of body) ankle sprains; while 5 to 10% are defined as eversion (sole of the foot roles up and away from midline of body) ankle sprains (Prentice, 2011; Robins & Waked, 1998). Due to the
high occurrence rate (85-95%) of inversion ankle sprains and their associated ligamentous
damage and laxity, the return to play protection for this type of ankle injury has been of
interest to athletic trainers for many years (Wilkerson, 2002). Ankle taping is highly utilized
for supporting the ankle joint during exercise after an injury. The most prevalent ankle
taping technique used by athletic trainers is the Closed Basket Weave (CBW) ankle taping
(Perrin, 2012; Quackenbush et al., 2008; Ricard et al., 2000; Wilkerson, 2002). Following
an ankle sprain, the CBW ankle taping’s purpose is to support and protect the damaged
ligaments and reduce inversion range of motion so the athlete can return to play (Abell,
2010; Beam, 2012). To achieve joint stability and ligamentous protection, the CBW taping
consists of various strips of tape applied in a methodical series around the lower leg and
ankle region. The heel lock is one of the tape strips necessary for controlling inversion of
the ankle joint. Currently, there is a void in the literature and discrepancy amongst certified
athletic trainers on whether the heel lock should be applied to maintain the heel in a neutral
or an everted position to effectively inhibit ankle inversion. Therefore, the purpose of this
study was to determine the effectiveness of a CBW ankle taping with neutral heel locks vs.
eversion heel locks in limiting the amount and rate of ankle inversion. Twenty-five college
students, recruited from Western Illinois University's Kinesiology Department, participated
in this study. The testing procedures consisted of: 1) participants' right ankle being taped
with either neutral only or eversion only heel locks; 2) participants undergoing 5 trials of
sudden ankle inversion while standing on an inversion platform; 3) participants completing
a 30 minute exercise protocol consisting of stationary biking, treadmill running, and a
specified skip, jog, side shuffle exercise sequence; and 4) participants completing 5 more
trials of sudden ankle inversion on the inversion platform. Test trials were recorded and
analyzed using a Peak Motion Analysis System. Statistical analysis is currently being
completed using a 2 x 3 factorial repeated measures analysis of variance (ANOVA) to
identify significant differences by levels of exercise (before exercise and after exercise) and
condition (untaped, CBW with eversion heel locks, CBW with neutral heel locks) among
the five-trial averages for amount and rate of ankle inversion. A Tukey's post-hoc test with
alpha set at 0.05 will be used on significant interactions or main effects.

48. **Title:** The Effects of Fire Disturbance on Terrestrial Gastropod Distribution and
Species Composition

*Principal presenter:* Andrea Hauk

*Major:* Zoology

*Other presenters or co-authors:* Tyler Gebel, Kenneth McCravy, Charles Lydeard,
Stephanie Clark, and Sean Jenkins

*Faculty mentor:* Dr. Kenneth McCravy

*Abstract:* Terrestrial gastropods (land snails and slugs) are important to temperate forest
ecosystems because of their role in decomposition and nutrient cycling (Hauk et al. 2015).
Since terrestrial gastropods are small and have limited dispersal capabilities, populations in
areas that experience habitat modification such as prescribed burning may be negatively
affected. These effects may be extended because of the gastropods' limited dispersal capabilities; therefore this will be a long-term study. Prescribed burning has proved to be beneficial to forest health. It removes hazardous fuels by removing leaf litter and woody debris which also reduces the spread of pest insects and disease and unwanted species that may threaten native fire tolerant species. Fire also promotes the growth of trees and wild flowers, by recycling nutrients back into the soil. However, the decaying woody debris and leaf litter are prime microhabitats for terrestrial gastropods, so these animals could be greatly affected by fire. The purposes of this study are to 1) see if there is a significant difference in terrestrial gastropod species composition, diversity or population size in areas that experience fire disturbance versus areas that are left unburned 2) examine terrestrial gastropod diversity one year post burn and 3) examine long-term (beyond one year) effects of burning on terrestrial gastropod diversity. The study is being conducted in West-Central Illinois at the Alice L. Kibbe Life Science Station. The fifteen plots under study are 300 m2 geo-referenced plots in deciduous forest habitat. Ten of the plots are managed with prescribed fire; five were burned in spring 2014 and five were burned in spring 2015. The other unburned plots are used as controls. Within the plots we are sampling two different fifty meter transects, every ten meters. We use a m2 quadrant that allows us to collect all leaf litter within that sample subplot. The litter is sifted through two sieves (6.3 mm and 1.6 mm diameter) and then examined with a magnifying glass through each layer. Species are identified using keys provided in Burch (1962), as well as a reference collection from previously collected Kibbe gastropods (Hauk et al. 2015). Single classification analysis of variance will be used to compare the mean number of gastropods in treatment and control plots. Simpson's diversity index, which is a measure of the number of species and their relative abundances, will be used to measure gastropod diversity in treatment and control plots. The Moriseta index of community similarity will be used to compare species composition among treatment and control plots. References Burch, J.B. 1962. How to know the eastern land snails. Wm. C. Brown, Dubuque, Iowa. 214 pp. Hauk A., S.A. Clark, K.W. McCravy, S.E. Jenkins, C. Lydeard. 2015. A Survey of Terrestrial Gastropods of the Alice L. Kibbe Life Science Station in West-Central Illinois. Northeastern Naturalist 22: 299-306.

49. Title: Tight and Efficient Geodesics in the Curve Complex
Principal presenter: Ming zhu Wang
Major: Mathematics
Faculty mentor: Dr. Doug LaFountain
Abstract: The curve complex of a surface is a simplicial complex with vertices denoting isotopy classes of closed loops (henceforth referred to as curves) on the surface. Two vertices are joined by an edge if their corresponding curves are disjoint, and the distance between two curves on the surface is then defined to be the length of the geodesic (shortest) edge path connecting the corresponding vertices. In general between any two fixed vertices there is an infinite set of geodesics, but two finite subsets of geodesics have been identified, namely tight geodesics by Masur and Minsky and efficient geodesics by Birman, Margalit
and Menasco. The latter group of researchers have shown that these two finite subsets do not precisely coincide; specifically, via a finite list of examples they show there exist geodesics that are (1) efficient and tight, (2) tight but not efficient, and also (3) efficient but not tight. We show that in fact there are infinite families of geodesics satisfying these three conditions, and prove a general theorem whereby these infinite families can be generated.

50. Title: Trace Detection of Isoeugenol in Local Water Samples via GC Analysis
   Principal presenter: Dillon E. Huff
   Major: Chemistry
   Faculty mentor: Dr. Brian Bellott
   Abstract: The detection of contaminants in water samples and biological samples is a primary function of a clinical or forensic toxicology lab. Water samples collected from local sources are often contaminated with trace amounts of compounds. The compounds that are present and their concentration can be determined by means of gas chromatography (GC) and mass spectrometry (MS). A reproducible signal appeared in all of the water samples, but the identity of the compound responsible for the signal was unknown. Liquid Chromatography/Mass Spectrometry (LC/MS) analysis was carried out on the water samples at Bradley University. The unknown signal was confirmed to be isoeugenol by comparison to an isoeugenol analytical standard. Liquid Chromatography/Mass Spectrometry (LC/MS) analysis was carried out on the water samples at Bradley University. The unknown signal was confirmed to be isoeugenol by comparison to an isoeugenol analytical standard. A common technique used in trace detection analysis is solid-phase extraction (SPE). SPE is a sample preparation process that separates compounds that are dissolved or suspended in a liquid mixture via their physical and chemical properties. For this research, samples were collected from Spring Lake in Macomb, IL, based upon the EPA certified collection method using SPE to extract the samples and utilize GC for analysis of the samples. Development of an optimized GC method was conducted by adjusting variables to effectively detect the isoeugenol standard signal to ensure calibration of the instrument. The limit of detection for isoeugenol in lake water was determined and the reported coefficient of variation (r^2) was determined to be 0.992. Results will be presented on the optimization of the extraction procedure and development of the GC method. Further statistical analysis will provide information regarding the variation among sample sites of the lake and additional contaminants that may be present in the collected samples.

51. Title: Unconscious Solution
   Principal presenter: Anton Lebed
   Major: Psychology
   Other presenters or co-authors: Olga Lebed
   Faculty mentor: Dr Virginia Diehl
   Abstract: Consciousness is not equally involved in different types of problem solving; "insight" problem solving is widely known for its unconscious incubation. For example, Metcalfe and Wiebe (1987) found that while solving an insight problem, subjects could not report their progress. However, eye-tracking data revealed that people pay more attention to
the correct answer prior to solution of anagrams (Ellis, Glaholt, & Reingold, 2011). Bowden, Jung-Beeman, Fleck, and Kounios (2005) found that EEG and fMRI data revealed specific change in brain activity immediately prior to solution of insight problems. The current study is based on the semantic priming and mere exposure effects. Based on the notion that people "have" the answer to an insight problem before they are consciously aware of it, we hypothesized that people who are close to solution, when subliminally presented with the insight problem, will respond to it faster and will like it more than a random word. Method Subjects (n = 32) received course credit for participation. Six participants' data were not used due to procedural problems. Thirty compound Remote Associate Task (RAT) items, consisting of lines of three words that have an unknown solution word that ties the other three together (e.g., man/glue/star - superman/superglue/superstar). A database of affective norms for English words (Bradley & Lang, 1999) was used to determine the affective status of words used for the priming task. Participants were asked to solve thirty items of RAT. Seven seconds after an item was presented, participants who had not solved the problem were interrupted with the priming test, which consisted of brief exposure to two subliminal words (150 milliseconds mask followed by 19 milliseconds prime followed by 150 milliseconds mask). One word was the actual solution, and one was a random word. The participants evaluated each of the presented priming words by pressing either the "Like" or "Dislike" button as quickly as possible. Then the participants continued solving the task for up to 1 minute. Time to solution was recorded. Data Analysis All responses within each participant were divided into Close to (10 seconds and less) and Far from (more than 10s) the Solution. For the Close to the solution group, the proportion of liked items was significantly higher for the solution words, t(25)=2.55, p = .017, d=1.04; the reaction time, however, was significantly lower for the random words, t(25)=2.68, p = .013, d= 0.37 No significant differences were found for the Far group. Discussion The results have shown that when people are close to the solution, they tend to like the solution word more than the random word, while responding slower to it. This finding provides evidence that people have some degree of awareness of the answer even before they explicitly realize it. This partial awareness may begin a verification process upon subliminally seeing the correct answer, leading to higher reaction time. Once the verification is successfully done, people tend to like the solution word. References available upon request.

52. Title: Water Masers in the Star Forming Region G23.71-0.20
Principal presenter: Mark Tyler Smith
Major: Physics
Other presenters or co-authors:
Faculty mentor: Dr. E. D. Araya
Star forming regions are sites where favorable physical conditions lead to gravitational collapse of molecular cores, resulting in the formation of protostellar systems and eventually new stars and planets. Masers have been found in star forming regions. Masers
are characterized by intense microwave radiation due to population inversion and stimulated emission. Examples of maser species in massive star forming regions are water and formaldehyde. G23.71-0.20 is one of seven massive star forming regions in the Milky Way where both H2CO and H2O masers have been found. Han et al. (1998) reported a H2O maser at a velocity of -40.3 km/s in G23.71-0.20, in contrast, the formaldehyde maser in the region is found at a velocity of 79.2 km/s. The velocity difference between the two masers is quite significant (~120 km/s) and suggests a high velocity outflow. We report a study intended to investigate water masers in G23.71-0.20. We did not detect the Han et al. (1998) maser, instead, H2O masers at 67.8 km/s and 79.6 km/s were found. We discuss the association of the water masers relative to the H2CO and other molecular masers in this region. Comparing our data with H2O maser measurements reported by Bartkiewicz et al. (2011), we find that H2O masers in this region are highly variable. 

53. **Title:** West Nile Virus Surveillance in Rural Western Illinois  
**Principal presenter:** Michele Rehbein  
**Major:** Biology  
**Other presenters or co-authors:** Catherine Miller-Hunt, Jason Hunt, Rhiannon Pyle  
**Faculty mentor:** Dr. Catherine Miller-Hunt  

**Abstract:** Arboviral diseases, including West Nile virus (WNV), are a continued and growing public health concern affecting both humans and animals in urban and rural locations. In rural settings, information on the distribution of the vector that transmits WNV is lacking. Rural areas frequently face obstacles because of poor socioeconomic conditions, being medically underserved and containing growing elderly and minority populations. These factors suggest that rural residents may represent a population that is especially vulnerable to WNV. To determine the public health risk posed by potentially infected mosquitoes in non-urban areas, this study monitored mosquitoes throughout four rural western Illinois counties in collaboration with local county health departments. The field sites were located within McDonough, Cass, Fulton, and Schuyler counties. Gravid traps were used to collect adult mosquitoes from 6/19/15 to 10/02/15. Captured female Culex mosquitoes were analyzed by using RAMP? WNV Test. RAMP uses cartridges with WNV specific antibodies embedded on them to detect viral protein which may be present within a mosquito sample. If present, the viral proteins will attach to the antibodies and cause a fluorescent reaction which can be quantified and displayed by a number of RAMP units on the machine. A total of 9,131 Culex mosquitoes were collected for this study. 17 samples from McDonough County, 6 samples from Cass County, 3 samples from Fulton County, and 5 samples from Schuyler County were found to be positive for WNV. Other mosquito species also captured from all four counties last season have been identified as invasive mosquito species Aedes japonicus and two native species Ae. triseriatus and Ae. trivittatus. In 2014, these Aedes species had never before been known to inhabit Fulton County, and represented a new distribution record in this county. In 2015, this research was able to expand the distribution records even more. Our goal is to continue to assist local rural
county health departments to trap and test both Culex and Aedes mosquitoes to better understand the distribution of vector-borne diseases and vectors in western Illinois.

54. **Title**: What's in your school? A Content Analysis of School Persona Creation using Online Messages

*Principal presenter*: Dakota Horn  
*Major*: Communication  
*Faculty mentor*: Dr. Bree McEwan

**Abstract**: Message framing is a key part of designing a message to influence a potential buyer or even a potential citizen within a community system. This study examines "about us" pages on school district websites within the state of Illinois to gain incite as to how and why school districts craft messages to create a certain online persona. The evaluations of this online content will breakdown goal creation of the district and execution through message features: structure, content, style, as well as the potential efficacy of the audience member. A quantitative content analysis was performed to show a common theme of message design in comparison of several school districts. The content analysis developed a theme among content creation in online messages. School districts face the daunting task of having to provide a glimpse into the districts values in a brief statement about what they do and how they do it. The amount of research on organizational personas, especially that of school districts is extremely limited. The creation of this study is to break down the main features of persona creation in school districts and the context in which scholars can look at future messages and message creation. The importance of non-profit message evidence is the fact that participants do not have the ability to monitor actual production from the organization without extensive research. A potential citizen can find school grade reports and similar material on the state board of education website but that will not provide a narrative to what is held to be valuable to the organizations culture. The poster presentation developed from this research provides a quantitative data mapping that answers the following three questions: 1) What types of messages are commonly posted in terms of message content, message structure, and message style? 2) Does a common theme become evident due to message framing characteristics? 3) How are these differences between users? message feature practices related to other user characteristic variables (structure, content, style, and efficacy)? This study allowed the opportunity to map out potential results from created messages. Message features provide the groundwork for the construction of a message in all facets of life. In turn that groundwork determines what type of frame will be put up on top of the groundwork. The simple analogy of this study could be the construction of a house. The foundation (features) determines the framework/walls (framing), which then determines the interior design (fit). Again, just like any study that has no theory to test but ideas to generate, this model is simply to help understand how these simple, yet very important message production characteristics coincide.
Title: Application of the Health Belief Model in the Prevention and Control of HIV Infection among Nigerian Adolescents through increased condom use  
Principal presenter: Ife Olusegun Oyebode  
Major: Health Sciences  
Faculty mentor: Dr. Fetene Gebrewold  
Abstract: The surging global population of adolescents has reached over one billion, the largest in human history, accounting for 18% of the world's population. The high magnitude of risky sexual behavior among adolescents as they transit from adolescence to adulthood has added a new dimension to the plethora of challenges confronted by the healthcare system in the prevention and control of HIV/AIDS in Nigeria. In an effort to curtail this frightening issue, several approaches have been employed by both government agencies and non-governmental organizations. One of the most pronounced methods utilized is the promotion of condom use. However, condom use in terms of frequency and consistency is still relatively low among Nigerian adolescents. The Health Belief Model (HBM) is a cognitively based model developed by social psychologists of the US Public Health Service that focuses on mental processes as they pertain to changes in health behaviors. The Health Belief Model is the most commonly used behavioral theory by researchers in Nigeria to design interventions addressing the issue of risky sexual behavior. This review paper examines the degree of the application of the Health Belief Model - its six constructs: perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action like reminders or prompts, ranging from advertising to personal communications from health professionals, family members and/or peers and self-efficacy; modifying factors such as age, sex, race, religious beliefs, socio-economic status personality and intelligence and the graphical pathway showing the relationships between the constructs and factors - in the prevention of HIV/AIDS infections among Nigerian adolescents through increased condom use campaigns. Key words: Risky sexual behavior, Condom use, Adolescents, Health Belief Model

Title: Raising Prison Babies: A Look At Mother-Infant Bonding Programs  
Principal presenter: Victoria Bailey and Anna Nieto  
Major: LEJA  
Other presenters or co-authors: Anna Nieto  
Faculty mentor: Dr. Kimberly D. Dodson  
Abstract: The idea of nursery programs within prisons has gained popularity over the last few decades. As mothers are being incarcerated the need to care for their children grow with that. Mother-Infant bonding programs strive to build the bond between mothers serving a shorter sentence for a non-violent crime and their babies. There has been a considerable amount of research on prison nursery programs, no one has collectively assessed whether these programs do increase mother-infants bonds and reduce recidivism among program participants. The current study uses the Mary Scientific Methods Scale to evaluate mother-infant bonds and whether prison nursery programs show success in
reducing recidivism.

57. **Title:** Identification of Leuconostoc Genes Involved in the Regulation and Metabolism of Sucrose  
*Principal presenter:* Soumya Saha  
*Major:* Biology  
*Faculty mentor:* Dr. Scott Holt  

**Abstract:** Leuconostoc are gram-positive, lactic-acid fermenting bacteria that grow on milk, dairy products, fermenting vegetables, meats and wines. They are facultative anaerobes and ferment sugars to lactic acid through the heterofermentative pathway. In addition to their involvement with fermented foods, Leuconostoc citreum species can produce $\alpha$-glucan polymers (dextran and alternan) from sucrose. Dextran is a commercially valuable $\alpha$-glucan polymer that is composed of $\alpha$-1,6 glycosidic linkages and has applications in manufacturing of Sephadex chromatography columns, in plasma substitutes, and also in industries like food and cosmetics. Alternan is different from dextran in that it is composed of alternating linkages of $\alpha$-1,3 and $\alpha$-1,6 glucan units. Alternan derivative oligosaccharides are used in the composition of Glucerna and marketed as carbsteady. When grown in a nutrient source containing sucrose, Leuconostoc produce sucrose glucosyltransferases which catalyze the synthesis of the $\alpha$-glucan polymers. In spite of the commercial applications, specific mechanisms involved with sucrose metabolism and regulation is unknown. Sucrose is the only known inducer of glucosyltransferase enzymes and conventional biochemical and Northern blot data indicate that sucrose metabolism may be controlled by a unique regulatory circuit. Surase induction in Leuconostoc is not controlled by carbon catabolite repression which is highly unusual in bacteria; consequently, the objective of this study is to identify Leuconostoc genes associated with surase enzyme induction and sucrose metabolism. Global differential gene expression method called microarray technology will be used in this study to help identify Leuconostoc genes associated with surase induction and sucrose metabolism. Briefly, Leuconostoc citreum B-1355 was grown using two analogous nutrient conditions with the exception that each culture will contain a different carbohydrate source. Growth curves covering 12 hours were prepared for Leuconostoc cultures containing different sugars. The mid-log growth phase was identified for each culture condition. Leuconostoc reach the mid-log growth phase quicker when sucrose and a mixture of maltose & sucrose were used during cultivation. Total RNA was then extracted from mid-log growth cells for each culture using RNeasy Mini Kit. Total RNA yield varied and was dependent on carbohydrate source. Total RNA will then be enriched for mRNA, amplified (aRNA), and labelled with fluorescent dyes. The labelled aRNAs from each culture condition will be used for differential gene expression analysis using microarray technology. Leuconostoc genes that are upregulated during growth on the sucrose culture relative to the glucose culture will be identified and gene function will be predicted using bioinformatics tools.
Title: Synthesis of Symmetrical Biaryl Compounds by Detelluration Reactions

Principal presenter: Lalitha Deepti Kolluru

Major: Chemistry

Other presenters or co-authors: Souseelya K Vedula

Faculty mentor: Dr. Jin Jin

Abstract: Biaryls are organic compounds containing a substrate that is an assembly of two aromatic rings or aryl groups if joined by a single bond. Aryl-aryl bond forming is one of the most important goals in the organic chemistry field. The methodology for the formation of aryl-aryl bond has challenged organic chemists for over a century. Biaryl compounds are widespread in many natural products including alkaloids, terpenes, flavonoids, Peptides, etc. For example, a lot of natural pigments and several glycopeptide antibiotics contain biaryl structures. In the past few years, methods for preparing biaryls have relied predominantly on cross-coupling—a method in which two differentially pre-functionalized benzene rings are connected together in the presence of a catalyst. The power of this method was recognized in the 2010 Nobel prize in Chemistry. Despite major advances in this area, most direct couplings still only operate under undesirable conditions, for example strongly acidic solvents, high temperatures, high concentrations of toxic metal catalysts, large excess of one reactant, and so on. The appeal of the new direct process is increased still further by the ease with which it can be performed. In our research, a highly efficient new protocol for C-Te bond formation leading to symmetrical diaryl tellurides has been developed. Utilizing this new protocol, a variety of aryl and heteroaryl iodides are reacted with elemental tellurium to afford the corresponding diaryl tellurides in good to excellent yields. These synthetic diaryl telurides will be used as the starting materials to generate biaryl compounds under exceptionally mild conditions. The biaryls will be produced by the detelluration reaction. Our method for the synthesis of biaryls by detelluration occurs in good yield at a very mild reaction condition such as room temperature, in the presence of catalytic amount of palladium and a mild base sodium carbonate. The new method will lead to a more benign alternative to the synthesis of biaryls.
1. Title: A Forgotten Youth: The Legacy of German Children at the end of the Second World War  
   Principal presenter: Joshua Spence  
   Major: History  
   Faculty mentor: Dr. Ute Chamberlin  
   Abstract: This research paper discusses the fate and legacy of German children in Germany proper and in former German territories following the end of World War II in 1945. For these children, the final months of the war and the postwar years were a time of great upheaval and trauma. At the end of the war, thousands of children were homeless, orphaned, abandoned, and on the run during the postwar expulsions from Eastern Europe. Many did not comprehend how their world had seemingly changed overnight and struggled to understand the world that they now faced. Yet, children are often forgotten as historical subjects, including in history's deadliest conflict. The significance of this study is to highlight the particular circumstances of children as victims of the war and to analyze the unique dangers and challenges they faced. This research paper attempts to reconstruct how German children survived as infrastructure and family life crumbled around them in the waning days of the Third Reich. How their lives changed, why the international community refused aid to them, and how the experience of the war years affected the children in the years to come are all questions that will be addressed in this project. Memoirs of surviving German children, relief workers' personal accounts, and relevant secondary literature will be analyzed to answer these questions. The sources reveal the ways in which children coped with hunger, cold, physical abuse, sickness, and loneliness, and the difficulties international relief organization and German aid organizations encountered in their attempts to help children and reunite them with surviving family members. At the same time it becomes clear that many children's attempts to come to terms with Germany's guilt by moving on with their lives and suppressing the memories of their youth resulted in trauma that stayed with them for decades. The insights won from analyzing the plight of children at the end of World War II are particularly relevant today as current global conflicts are resulting again in mass displacements of populations similar to those during and after World War II.

2. Title: Affectively Effective: Affect Regulation Motive Styles Predict Individual Differences  
   Principal presenter: Alec Stinnett  
   Major: Psychology  
   Other presenters or co-authors: Bradley Aleshire  
   Faculty mentor: Dr. Scott Hemenover  
   Abstract: Affect regulation (AR) constitutes a crucial thread in the fabric of civilization. AR allows for the control of emotional states that would otherwise dictate thoughts and behaviors (Gross & Thompson, 2007). Accordingly, AR has been linked to success in a
number of spheres; thus, a deeper understanding of the underlying mechanisms of AR is highly desirable (Tamir, Chiu, & Gross, 2007). Researchers have identified a variety of regulatory motives, and recent work has focused on moderators of when and how these motives drive regulatory action (Augustine & Larsen, 2014; Ford & Tamir, 2012). The current study sought to elaborate upon the relationship between AR motive style and individual differences across a number of domains. Participants completed a version of the Affect Regulation Motive Scale (ARMS; Hemenover, 2015), a measure designed to assess AR motivation style. The ARMS evaluated individual differences in two AR motive styles: hedonic (enhance positive/attenuate negative affect) and antihedonic (enhance negative/attenuate positive affect). Participants then completed a battery of questionnaires to investigate a number of individual difference variables. Component scores for hedonic and antihedonic AR motive styles were computed and entered simultaneously in a series of multiple-regression analyses. Results revealed numerous significant relationships between AR motive style and personality variables. Personality traits: antihedonic negatively and hedonic positively predicted extraversion, openness, and conscientiousness; antihedonic positively predicted neuroticism and negatively predicted agreeableness. Psychological distress: antihedonic positively and hedonic negatively predicted anxiety and hostility; antihedonic positively predicted depression and interpersonal sensitivity. Positive functioning: antihedonic negatively and hedonic positively predicted environmental mastery, personal growth, positive relationships, purpose in life, self-acceptance, and life satisfaction; antihedonic negatively predicted autonomy. Personality trait results suggest links between hedonic AR motives and extraversion, openness, and conscientiousness, while antihedonic AR motives are related to neuroticism, and low extraversion, openness, conscientiousness, and agreeableness. These findings support a self-verification account of AR motive styles; neurotics and extraverts have strategies that promote states commonly experienced, and reject less familiar states. Psychological functioning results show that antihedonic AR motives are associated with emotional distress, while few links between hedonic AR motives and distress were observed. Moreover, hedonic AR motives positively and antihedonic AR motives negatively related to positive functioning, suggesting positive states may indicate progress towards important life goals while negative states indicate the opposite.

3. **Title:** Analysis of Fluorescence and Optical Absorption of Nd+3 Doped Lead Boro-Tellurite Glasses  
**Principal presenter:** Manoj K. Jamarkattel  
**Major:** Physics  
**Other presenters or co-authors:** Dr P. K. Babu, Dr. Saisudha Mallur  
**Faculty mentor:** Dr. P. K. Babu  
**Abstract:** The optical absorption and fluorescence properties of Nd+3 ions in lead boro-tellurite glasses are studied by varying the concentration of lead oxide from 19.5 to 69.5 mol%. Glasses with different lead oxide content are prepared by melt quenching technique.
Glasses are annealed at 300°C for 3 hours to remove thermal strains and then smoothened and polished for optical measurements. Density of the glass samples were measured to find the number density of rare earth ions. Using the number density and the absorption coefficient measured from the optical absorption spectrum of the rare earth ions, the oscillator strength, intensity parameters and radiative transition probability are obtained using Judd-Ofelt method. Stimulated emission cross section which determines the lasing property of the fluorescence transitions is obtained from effective fluorescence line width, position of the fluorescence bands, refractive index and the radiative transition probability determined from the absorption measurements.

4. **Title:** Biotic and abiotic properties Lower Illinois Subregion of the Mississippi River watershed that impact the survival and disease carriage of the invasive mosquito *Aedes japonicus* in western Illinois.

*Principal presenter:* Jason R. Hunt  
*Major:* Environmental Studies  
*Other presenters or co-authors:* Michele Rehbein, Rhiannon Pyle, Imtiaz Khalil, Catherine Miller-Hunt  
*Faculty mentor:* Dr. Roger Viadero

**Abstract:** The spread of invasive mosquito species as potential vectors for exotic and endemic diseases poses significant challenges to public health agencies worldwide. In particular, the genus *Aedes* possesses a number of species capable of transmitting lethal arboviruses. In Illinois, *Ae. triseriatus* is the primary vector for La Crosse encephalitis virus (LACV), the leading cause of neuroinvasive arboviral infections in children. The majority of LACV cases in Illinois are centered in Peoria, Woodford and Tazwell counties, with case distribution extending into the western Illinois counties of Fulton, McDonough, and Hancock. In collaboration with state and local health departments, we sought to assess the abundance and distribution of potential *Ae.* arboviral vectors. From June to September of 2014 and again in 2015, mosquitoes were collected using gravid traps and *Ae.* mosquitoes were identified to species level. In 2014, *Ae. triseriatus* represented the most abundant *Ae.* species collected. *Ae. japonicus,* a dangerous invasive species from East Asia, was collected in three western Illinois locations. These results represent the first record of *Ae. japonicus* in Fulton County, and implicate the presence of active, breeding *Ae. japonicus* populations in McDonough and Cass Counties. Preliminary results from 2015 surveillance demonstrate an increase in the percentage of *Ae.* species collected at locations examined during 2014. *Ae. japonicus* is a potential vector for a number of arboviruses, including LACV, West Nile Virus, St. Louis encephalitis virus, Eastern equine encephalitis virus, Rift Valley fever virus, Dengue virus, and Chikungunya virus. Discovery of this species suggests the potential for arboviral transmission to humans in western Illinois. Further studies will determine arboviral disease carriage status of the collected *Ae. japonicus* mosquito species. Experiments are also planned to examine the role of microbial diversity and host-preference (biotic) and environmental and land use (abiotic) factors in invasive
mosquito presence and abundance in the Lower Illinois Subregion of the Upper Mississippi River watershed.

5. **Title:** Capitalism and Slavery: A historical comparative analysis of the abolition of West African slavery between Jamaica and the United States of America in the nineteenth century.

*Principal presenter:* Shyan R. Edwards  
*Major:* Sociology  
*Faculty mentor:* Dr. Davison Bideshi

*Abstract:* P. M. Sherlock (1973) points to the fact that, Slavery as an institution, is as old as mankind. It has existed in almost every part of the world and amongst most peoples (p. 95). In light of this, the incidence of West African chattel slavery was not a novel phenomenon. However, the movement towards emancipation began the very moment the West Africans were captured and enslaved. Historiography has presented several accounts justifying the abolition of West African slavery in the Western hemisphere. These arguments range from social, to political to economic. With the exception of the fledgling United States of America, all the territories in the West were European colonies that reflected the colonial powers of Britain, France, Spain, Portugal and The Netherlands. In light of this, each European territory governed their territories differently, which resulted in an uneven distribution pattern of emancipation. In Jamaica and the rest of the Anglophone Caribbean, slavery was abolished as early as 1838. While the United States abolished slavery in 1865. Eric Williams advanced the "Decline Thesis" which will be used as a foundation in examining the social and economic forces that led to the decline and subsequent abolition of slavery in the West.

6. **Title:** Characterization of a Novel Early Lineage in the Mucoromycotina

*Principal presenter:* Terry Torres Cruz  
*Major:* Biology  
*Other presenters or co-authors:* Terri Tobias, Maryam Almatruk, Cedar Hesse, Alessandro Desir?, Cheryl Kuske, Gregory Bonito, Jason Stajich, Christopher Dunlap, Andrea Porras-Alfaro  
*Faculty mentor:* Dr. Andrea Porras-Alfaro

*Abstract:* Fungi are one of the largest kingdoms of eukaryotes with fundamental biological functions in terrestrial and aquatic ecosystems. The great fungal diversity in soils makes these ecosystems valuable for the discovery of new species. This study seeks to characterize a potential new fungal species in the Mucoromycotina. Isolates were obtained from the Duke Forest Free Air Carbon Enrichment Site by soil dilutions on PYG+ media at 25°C. Morphological characteristics were described and a phylogenetic analysis was conducted using multiple genetic regions and a draft genome. Bacterial symbionts were also analyzed using 454-sequencing to describe the bacterial community associated to this fungus. The closest BLAST results for the isolates belong to uncultured soil fungal sequences obtained
from metagenomic analyses and an isolate from endophytic fungi in mosses. Characterization of the fungus on different growth media reveals colony morphology differences that are likely associated to the growth of specific groups of bacteria promoted by the different media. Light and electron microscopy showed coenocytic hyphae, yeast like structures, and potential chlamydospores. Using electron microscopy, the bacterial communities were observed on the fungus surface. Analysis of SSU and phylogenomic analysis using a partial genome showed that these isolates represent a new clade closely related to Endogone as an early lineage in the Mucoromycotina.

7. **Title:** Community Health Needs Assessment; Pike County as a case study  
**Principal presenters:** Akinwale S. Akingbule and Chikodili Faith Obi  
**Major:** Health Science  
**Other presenters or co-authors:** Chikodili Faith Obi  
**Faculty mentor:** Dr. Cynthia B. Struthers  
**Abstract:** A health needs assessment is a systematic method of identifying current health and health care needs of a population and making changes to meet these unmet needs ([www.ncbi.nih.gov](http://www.ncbi.nih.gov)). The purpose of a community health needs assessment is to involve the community in examining local data to gain local perspectives on the health needs in a place. In February through June 2015 we conducted a community health needs assessment of Pike County in cooperation with the Health and Wellness Foundation of Pike County and the Pike County Health Department. This was a multi-method project that included paper and pencil surveys with health care providers, phone interviews with local social service providers, and focus groups with Pike County Residents. Overall, 15 health care providers, 38 social service providers with school administrators, and 69 residents of Pike County participated in the assessment. This presentation will discuss the purpose of a community health needs assessment, the process we used to collect data, and the findings from the study. Pike County has a long history of coming together to creatively address the health and wellness needs of its residents. As state funds, programs, and initiatives have been eliminated, local groups face the same needs in the county with fewer resources with which to address them. The good news is that the residents who participated in the health needs assessment prefer to live in Pike County for a variety of reasons. These include the presence of family, good schools and a positive perception of the larger community. It is this context in which the 2015 community assessment took place. Positive findings from the study include improved access to health care, familiarity with the new dental clinic, and awareness of the expansion of the public transportation system. Residents' self-reports of general health are positive, they have access to some form of health insurance, and they have a health care professional they see regularly. The problems that Pike County residents face are, an inability to access prolonged care or specialty care for cancer or accidents that require surgery. Mental health services especially for children are lacking. Where residents live in Pike County affects their access to services, Pittsfield residents report more access to care while those outside of Pittsfield have experienced little improvement over time. Access
to health care and satisfaction with services varies across social class. Those with steady employment and/or higher income are able to secure goods and services within and outside of Pike County. Lower income residents are more dependent on local services from gas to health care. The Pike County Health Department and the Health and Wellness Foundation along with the PCCHP, Illini Community Hospital, and other health and social service partners continue to improve and provide programs in Pike County. Unfortunately, the need for services is growing in spite of all these efforts.

8. Title: **Comparative analysis of Helicoverpa zea gene expression and growth based on the host plant**
   *Principal presenter:* Donald A. Bath  
   *Major:* Biology  
   *Faculty mentor:* Dr. Richard Musser
   
   **Abstract:** Annually millions of dollars are spent reducing crop damage from insect herbivores. One such culprit is Helicoverpa zea, commonly known as the 'corn earworm' or 'tomato fruitworm', a moth species whose caterpillar stages feed on a variety of plants. My research is to understand how these caterpillars may grow and compensate on an assortment of plants with different defense tactics. Caterpillars that grow slower and are smaller in size often have diminished fitness. I performed a series of growth assays with Helicoverpa zea on several plants: control diet and leaves from corn (Zea mays), tomato (Solanum lycopersicum), soybeans (Glycine max), and tobacco plants (Nicotiana tabacum). The results compared 3rd instar caterpillars with their weights taken 72 hours after herbivory on their respective plant's period. Additional testing was performed under conditions where tomato and tobacco plant defenses were altered using the plant hormones jasmonate and salicylic acid. Results from the bio assay were quantified and compared to molecular data obtained through qPCR analysis. This data focused on similarities and differences between growth and digestive genes. Further information will be collected using more qPCR tests and potentially adding microarray analysis. With the results obtained, I hope to present a picture of how natural plant defenses influence growth potential and fitness of the attacking insect pest, Helicoverpa zea.

9. Title: **Correlates of Inhalant Use in a Sample of College Students**
   *Principal presenter:* Natalia Kazakova  
   *Major:* Psychology  
   *Other presenters or co-authors:* Jonathan Hammersley, Jeffery Batis, professor at Indiana University  
   *Faculty mentor:* Dr. Jonathan J. Hammersley
   
   **Abstract:** Inhalants are the chemical vapors found in common household items, such as glue, paint, spray aerosols, and cleaning supplies (NIDA, 2012). Unlike other drugs, initiation of "huffing" begins quite early, at 12-13 years of age (Oklan & Henderson, 2014). Risk factors for inhalant use include being male (Chen & Jacobson, 2012), non-
heterosexual (Newcomb, Birkett, Corliss, & Mustanski, 2014), and having experienced intimate partner violence (Howard & Wang, 2003; Kalichman et al., 2001) and other forms of physical and psychological abuse (Sakai et al., 2004; Tharp-Taylor, Haviland, & D'Amico, 2009). However, to the authors' knowledge, inhalant use has not been studied extensively in a large sample of college-age students. Because being a member of a Greek life organization is typically associated with increased drug use (Scott-Sheldon et al., 2008), it was expected that members of fraternities and sororities would report greater use of inhalants, as well. In accordance with previous research, students who report using inhalants were predicted to be males, sexual minorities, having been victimized and abused in romantic relationships, and to be part of a fraternity/sorority. The present study analyzed a sample of 107,919 undergraduate college students who met inclusion criteria and had complete data (66% female, 33.9% male, .01% other) from the American College Health Association - National College Health Assessment-II (ACHA-NCHA-II) dataset during Fall 2008 and Spring 2009. To assess experience with inhalant use, students were asked "Within the last 30 days on how many days did you use inhalants (glue, solvents, gas)?" Following Bonferroni corrections, analysis of variance (ANOVA) indicated that inhalant use was associated with gender, sexual orientation, intimate partner abuse, and fraternity/sorority membership, as predicted (all p's < .001). Females and heterosexual participants were significantly less likely to report inhalant use than males, F(2, 106856) = 355.241, and non-heterosexuals, F(3, 106856) = 319.504. Individuals who experienced intimate partner violence were significantly more likely to report inhalant use, F(1, 107477) = 88.084, as were members of a fraternity/sorority, F(7, 105775) = 87.986. Inhalant use was also associated with having been in a recent physical fight, F(1,106856) = 747.371, and the perception that other students are using inhalants, F(7, 105239) = 94.986. These findings indicate that inhalant use is more likely to be reported by individuals possessing certain characteristics that are traditionally associated with increased drug use in general: for example, being male, belonging to a Greek campus organization, being of a non-heterosexual orientation, and having experienced physical and psychological abuse. Additional interpretations of findings, which may include using inhalants to cope with increased stressors and having more opportunities to engage in the use of debilitating drugs, will be further addressed.

10. **Title:** Counter ISIS Strategy  
**Principal presenter:** Hashim Al-Rikabi  
**Major:** Political Science  
**Faculty mentor:** Dr. Vincent Auger  
**Abstract:** The declaration of a "Caliphate" after the ISIS assault on Mosul has proved their critical capabilities, wishful objectives, and brutal dynamics. As it conquered most Sunni cities in Iraq and attempted to advance towards Kurds' populated cities, the U.S. launched its strategy to "degrade and ultimately destroy ISIS". This strategy didn't achieve its objectives after more than one year. Scholars have suggested several strategies as best
alternatives to the existing strategy. This research tries to answer the question: What is the best strategy for destroying ISIS? In order to answer this question, we need to identify the nature of ISIS: whether it's a terrorist organization, an insurgency, or even a state. Also, we need to analyze the environment within which ISIS rose. Then, we will assess the current counter-ISIS strategy, discussing some strategies suggested by scholars. I argue that an offensive military campaign is the optimal strategy to destroy a powerful terrorist group like ISIS, but with the reluctance of the international community and the existence of limited domestic capabilities, significant tactical changes in the existing strategy would be more foreseeable. Finally, we will make some policy recommendations that address the uniqueness of the Iraqi case.

11. **Title:** Cut Piece: A Wunderkammer  
   **Principal presenter:** Laura Winton  
   **Major:** English  
   **Faculty mentor:** Dr. Christopher Morrow  
   **Abstract:** In 1964, performance and Fluxus artist Yoko Ono performed her now-legendary Cut Piece for the first time in Japan. In that piece, members of the audience were invited to come and cut pieces of her clothing off of her until she was rendered nude or nearly nude. In 1997, Shelley Jackson published a piece of digital literature entitled My Body: A Wunderkammer (or cabinet of curiosities). While obviously there are different contexts in each piece, different methods of delivery, and even different goals for each piece, there are some very important similarities between the two. The text of My Body is inherently performative while Cut Piece also has can also be read as a text, since as Barthes tell us, everything can be read as a text. Both of these pieces function as both text and performance, endurance performances, as gifts, and as games while at the same time exposing the dangers of the gendered body in both text and performance. This work is cross-disciplinary between Performance Studies and English and uses theories from theatre and performance studies, English and new media studies, and feminist theory. It draws connections between performance art and the performative possibilities of new media.

12. **Title:** Detection Rates and Disturbance of Waterfowl During Aerial Surveys  
   **Principal presenter:** Andrew Gilbert  
   **Major:** Biology  
   **Faculty mentor:** Dr. Jacques  
   **Abstract:** Aerial surveys of waterfowl have been conducted in the Illinois and Mississippi River floodplains since 1948. These traditional surveys provide an index of waterfowl population size and are used to track migration events, set harvest regulations, and for research purposes. New methods are being evaluated to estimate population size by randomizing survey locations and estimating detection probabilities. We used double sampling to determine a correction factor for waterfowl estimates during fall aerial surveys. Immediately before an aerial survey, a ground observer conducted an intensive survey of
waterfowl in predetermined locations from an elevated, unobstructed location where probability of detection was assumed to be 100%. Aerial counts were divided by ground counts for all common species and foraging guilds to determine detection probability. Preliminary results indicate that mean detection rate for all waterfowl was 96.0% (SE=7.1). Mean detection rate was 94.4% (SE=8.2) for ducks, 105.2% (SE=11.0) for dabbling ducks, 74.8% (SE=10.5) for diving ducks, 53.3% (SE=7.5) for mergansers, and 92.4% (SE=8.6) for geese. While conducting ground surveys, observers also documented any disturbance to waterfowl caused by aerial surveys. Our preliminary findings indicated that on average 18.4% (SE=2.4) of waterfowl, 12.2% (SE=2.1) of ducks, 11.5% (SE=2.1) of dabbling ducks, 4.5% (SE=1.4) of diving ducks, 13.0% (SE=2.6) of mergansers, and 28.6% (SE=4.0) of geese exhibited a negative response (i.e., flew short distances, swam away, changed behavior significantly) to aerial surveys. Our preliminary findings indicated that on average 5.5% (SE=1.6) of waterfowl, 2.0% (SE=1.0) of ducks, 1.2% (SE=0.8) of dabbling ducks, 0.7% (SE=0.4) of diving ducks, 4.3% (SE=1.4) of mergansers, and 15.1% (SE=3.0) of geese abandoned the survey site and did not return following aerial surveys. With our findings, traditional aerial surveys conducted in the Mississippi and Illinois River floodplains can be used to minimize bias in population estimates associated with aerial survey techniques.

13. **Title:** Effect of Host Glass and Nanoparticles on the Stimulated Emission Cross-Section of Dy3+ ions in Lead Borate Glasses  
**Principal presenter:** Hio Giap Ooi  
**Major:** Physics  
**Faculty mentor:** Dr. Saisudha B. Mallur  
**Abstract:** Optical properties of Dy3+ ions in lead borate glasses were analyzed using Judd-Ofelt theory as a function of glass composition with PbO content varying from 29.5 to 69.5mol%. We also studied the effect of semiconducting nanoparticles on the fluorescence emission of Dy3+ ions in lead borate glasses. Absorption coefficient at each wavelength was obtained from the optical absorption spectrum of a glass sample and number density of rare-earth (RE) ions was calculated from the measurement of the glass density. These two parameters were then used to calculate the oscillator strength of each transition using Judd-Ofelt theory. Using the oscillator strength for each transition, we obtained the intensity parameters which represent changes in the asymmetry of the ligand field at the RE site (due to structural changes) and to changes in RE-O covalency. Radiative transition probabilities, the radiative lifetime of the excited states and the branching ratios are then obtained from these intensity parameters. The fluorescence spectra, obtained using 355nm laser excitation, were analyzed by determining the area ratio of yellow/blue (Y/B) peaks and the wavelength of the hypersensitive transition (HST). The compositional dependence and effect of nanoparticles on the stimulated emission cross-section (σp), is then evaluated using radiative transition probability, the refractive index of the host glass, effective fluorescence linewidth, and position of the band.
14. **Title:** Egg Crypsis within the Host Nest Environment by the Brood Parasitic Brown-headed Cowbird (Molothrus ater)  
**Principal presenter:** Michael Mandru  
**Major:** Biology  
**Other presenters or co-authors:** Brian D Peer  
**Faculty mentor:** Dr. Brian Peer  
**Abstract:** Avian brood parasitism is an alternative breeding strategy used by cowbirds (Molothrus). Because brood parasitism is costly to host reproductive success, hosts often evolve defenses to parasitism, and in turn, brood parasites evolve adaptations to counter host defenses. One way brood parasites circumvent host egg rejection is by laying eggs that resemble host eggs. Our research investigated whether cowbird eggs mimicked the visual and ultraviolet (UV) spectrum of eggs and nests of grassland hosts that have had the longest history of parasitism including the Dickcissel (Spiza americana), Red-winged Blackbird (Agelaius phoeniceus), and Field Sparrow (Spizella pusilla). Just Noticeable Differences (JNDs) were used to investigate similarities between cowbird eggs, host eggs, and host nests. Cowbird eggs matched host nests as well or better than host eggs in all but one comparison, however, there was no evidence that cowbird eggs directly mimic host eggs. These results suggest that while cowbird eggs do not directly match the eggs of the hosts we examined, they do blend in with (or match) the nest substrate better than host eggs, which may increase the likelihood that cowbird eggs will be accepted by hosts and less likely to be taken by predators.

15. **Title:** Evaluating the Effects of Prescribed Forest Burnings in Relation to Tick Species Diversity  
**Principal presenter:** Sarah Warren  
**Major:** Biology  
**Faculty mentor:** Dr. Sean Jenkins  
**Abstract:** Oak woodlands, in Eastern North America, have developed under variation in the magnitude and extent of anthropogenic and "natural" fire for thousands of years (Abrams 1992, 2003). Fire suppression and landscape fragmentation have greatly altered the dynamics of these woodlands. These changes have affected the composition, diversity and abundance of both the flora and fauna. Recently prescribed burning has been used to manage and restore oak woodlands. The purpose of this study is to evaluate how prescribed burning affects vegetative structure and thereby influences the diversity and abundance of ticks. To evaluate the effect of burnings on vegetation dynamics, tick diversity and abundance, we collected abundance and composition data on sites that were burned in spring of 2015, in spring of 2014, and sites that have not burned since 2004. Thirty 40 m transects were initiated and sampled every 2 weeks over a 7 month period from April 2015 through October 2015 using the sweep method. Vegetation data (overstory canopy cover density, vegetation cover, maximum vegetation height and course woody debris) was
recorded every 5m on each transect. Preliminary data shows that there are 3 different species present and listed in terms of their descending abundance; lone star tick (Amblyomma americanum) American dog tick (Dermacentor variabilis) and black legged tick (Ixodes scapularis), respectively. All three species were found in all three life stages-larva, nymph and adult. Future data analysis will be used to elucidate differences in the distributions of species and life stage in-terms of the time since burning. Further work will incorporate presence of disease as public interest. Ticks are known as the number one vector for disease. Because of this, it is not only important to record how changes in oak woodlands affect their population dynamics but how it changes the presence of disease. Using extraction kits to obtain nucleic acid each tick will then prepped for PCR. The presence of several diseases will be tested for every tick collected. From the data collected we will be able to extrapolate the degree of disease present, the risk for infection, and determine if changes to the landscape alters the presence of disease.

16. **Title:** Fluorescence and Optical Absorption Studies of Sm3+ in Bismuth Telluro-Borate Glasses  
*Principal presenter:* Ting Chean Khoo  
*Major:* Physics  
*Faculty mentor:* Dr. Saisudha B. Mallur  
*Abstract:* Glasses doped with rare-earth ions are important materials for lasers and optical fibers. Telluro-borate glasses have characteristic features such as high refractive index, good rare-earth ion solubility and excellent transparency in a wide wavelength range. Heavy metal compound bismuth helps to improve the fluorescence of rare-earth ions. We studied the fluorescence and optical absorption of Sm3+ in bismuth telluro-borate glasses. Optical absorption measurements were carried out using a UV-VIS-IR absorption spectrometer and fluorescence spectra were obtained by exciting the glass samples with laser radiation at 488 nm and 457.8 nm. The optical properties of Sm3+ ions in bismuth telluro-borate glasses were analyzed using the Judd-Ofelt theory. The density of the glass was measured to calculate the number density of rare-earth ions. The number density of rare-earth ions and the thickness of glass were then used with the intensity of the absorption band to calculate the oscillator strength for each transition. These oscillator strengths are analyzed using the Judd-Ofelt theory to obtain the intensity parameters which were then used to calculate the radiative transition probabilities. Combining optical absorption and fluorescence results, we investigated the variation of the intensity parameters, hypersensitive transition, wavelength shift, and the stimulated emission cross section as a function of glass composition.

17. **Title:** Gene Expression in Chronic Wasting Disease Infected White-Tailed Deer  
*Principal presenter:* Emma Trone  
*Major:* Biology  
*Other presenters or co-authors:* Christopher N. Jacques¹, James T. Lamer¹, Paige Zick¹, Guoqing Lu², Jun Wang², Paul Shelton³  
¹ Western Illinois University, ² University of
Nebraska-Omaha, 3 Illinois Department of Natural Resource

Faculty mentor: Dr. Christopher Jacques

Abstract: Chronic wasting disease (CWD) is a type of transmissible spongiform encephalopathy (TSE) which affects cervid species throughout North America. The disease is both communicable and transmissible and there is no treatment currently available. This research evaluated gene-expression in CWD-infected and non-infected white-tailed deer collected by Illinois Department of Natural Resource game managers during annual population reduction (e.g., sharpshooting) and disease monitoring efforts throughout the CWD-endemic area of northcentral Illinois and established a timeline for RNA viability. We collected tissue (liver and retropharyngeal lymph nodes) samples from 43 hunter-harvested deer in Hancock County, Illinois during the 2014 and 2015 annual firearm seasons to estimate RNA stability; tissue samples were sent to the University of Chicago for analysis. Preliminary results from deer harvested in 2014 show that RNA is stable through a minimum of 24 hours. However, while integrity was stable, quality of the samples was low; average RIN value ranged from 2.84-5.67. Though uncertain, low RIN values may have been associated with variation in RIN values by tissue type, method of storage, internal body temperature and, ambient temperature. We used next generation sequencing (NGS) to analyze tissue samples from CWD-infected deer euthanized by IDNR sharpshooters during winter 2015 (February - March 2015). Specifically, we used the Illumina HiSeq 2500 Sequencing System (Illumina Inc., San Diego, CA, USA) to quantify and map the transcriptomes, and identify novel and known genes from CWD-infected (n=5) and non-infected (n=5) deer. Preliminary results show 59 differentially expressed genes, 15 of which can be annotated using the Uniprot database. Molecular functions of these genes include binding, catalytic activity and receptor activity. Identification of differentially expressed genes involved in the pathogenesis of CWD may enable researchers and wildlife managers throughout Illinois to predict the infectious status of harvested deer using gene expression (transcriptome) profiles developed from this study.

18. Title: Gene Expression Observed from the interaction between Corn Earworm (Helicoverpa zea) caterpillars and Corn (Zea mays) tissues

Principal presenter: Kayleigh R. Diveley

Major: Biology

Faculty mentor: Dr. Richard O. Musser

Abstract: By understanding the genetic interaction of plant defense systems to insect pests such as caterpillars and in understanding how caterpillar digestive systems attempt to overcome these plant defenses, research may help to find novel methods in protecting our agricultural crops and limit the use of pesticides. This experiment aimed to observe the changes to gene expression caused by the interaction between Corn Earworm (Helicoverpa zea) caterpillars and Corn (Zea mays) tissues. In the first objective of the experiment, corn leaves were collected after being fed upon by caterpillars. The treatments of caterpillars included those with salivary glands (mock ablated - MA) and those without salivary glands.
against non-wounded (NW) corn leaves. The parameters of this experiment allowed us to ascertain the importance of salivary factors in altering plant defenses beyond chewing damage caused by the caterpillar. The second objective of this experiment observed changes to caterpillar growth and gene expression by feeding third instar caterpillars several treatments of corn tissues such as Corn Leaves, Corn Husk, Corn Silk, and Corn Fruit against an artificial diet. A total of 10 to 15 distinct genes were observed for each experimental objective to represent the direct defenses of the corn as well as the digestive genes altered as a result of feeding on the tissues using real-time qualitative PCR. Our results revealed that plant defenses such as protease inhibitors appeared suppressed in the leaves due in part to the caterpillar salivary factors. In the bioassay we found the caterpillar grew the greatest on the Corn Fruit in relation to other corn tissues. Also, the caterpillar digestive genes correlated to this increased growth on the Corn Fruit in comparison to the other tissue by less expression for protease genes than if the caterpillar fed on leaves or other tissues.

19. Title: Habitat Preferences of Den Locations for the North American River Otter (Lontra canadensis)
   Principal presenter: Shanna E. Pikora
   Major: Biology
   Other presenters or co-authors: Dr. Susan Romano
   Faculty mentor: Dr. Susan Romano
   Abstract: Historically, the North American River Otter (Lontra canadensis) were more abundant, but over-trapping and habitat degradation caused their near extinction in the Midwest. As an indicator species, they signify a healthy and stable environment. Not much is known about certain habitat preferences, particularly for choosing den locations. The purpose of this research is to identify habitat preferences related to den location selection, particularly water stability and landscape features. This research was conducted at Spring Lake at the Upper Mississippi River National Wildlife and Fish Refuge in Savanna, Illinois and private property near Industry, Illinois. Den sites were found through scouting and tracking and were observed to identify the different characteristics of habitat. Each den was assigned GPS coordinates to be used in ArcMap programing. A Suunto clinometer was used to for measuring the slope of the landscape, and water stability was based on the number of flood events per year. Slope will be analyzed using a t-test, and trend analysis will be used to determine the impact of water stability. Preliminary observations have indicated that man-made landscape structures, particularly levees, are currently providing the slope and water stability in the river system, similar to landscapes found prior to river modifications by navigation dams. Habitat preferences will provide information to help sustain and improve American River Otter populations.
20. Title: How Corruption Undermined the Effectiveness of Somali Federal Government  
   Principal presenter: Abdirizak Diis  
   Major: Political Science  
   Faculty mentor: Dr. Jonathan P. Day  
Abstract: Since the outbreak of civil war in Somalia in 1991 and the collapse of government institutions, the international community including neighboring countries attempted several times to restore peace and stability in Somalia from the perspective of a tribal conflict. But these efforts were unsuccessful due to clan-oriented warlords who were making a lot of money at the expense of the poor in a lawlessness state. However, the conflict in Somalia was not only due to tribal conflicts, but, it was a combination of power struggle, control of resources, and tribal fighting. In other words, it is a political corruption and theft of public resources. This work will study how these phenomena evolved and its adverse effects on the government. The current situation of Somalia for the last two decades and the role of the international community in restoring peace and stability in Somalia is complicated, therefore, this work will attempt to assess the role of corruption and how it undermined the effectiveness of the internationally backed government. According to International Crisis Group, both grand and petty corruption exist in Somalia. The work will utilize latest international aid organizations' reports about Somalia, journal articles, news sources and other relevant documents to evaluate the impact of corruption on the effectiveness of the Federal Government of Somalia. This work will conclude that the establishment of an efficient and effective device to fight, eradicate, and uproot the entrenched corruption in Somalia is imperative to win the battle against terrorism. There is considerable literature about corruption in Somalia that identify its negative impact, but the writer is arguing that corruption is the main challenge in restoring peace and stability in Somalia. Unless corruption is eradicated, clan-warlords and terrorism will never be defeated.

21. Title: International Development through the Images of International Relations and American Foreign Aid Policy  
   Principal presenter: Daniel R. Ramirez  
   Major: International Relations  
   Faculty mentor: Dr. Vincent Auger  
Abstract: In studies of international relations, a topic not widely discussed in the literature is the relationship between international development and the different images in international relations. Taking the USA as an example, American federal governmental agencies such as the United States Agency for International Development and the State Department play an active role in providing material aid to many developing countries. Each of the three major images in international relations could provide a different perspective as to why sovereign states could be interested in international development endeavors. It is the purpose of this paper to observe foreign aid through the three major lenses of international relations in order to draw insight as to why countries might engage in international development. In this regard, the primary questions that need to be asked here
are: How do competing theories of international relations explain international development and the provision of foreign aid by some states to other states? Which image, if any, explains U.S. foreign aid policy best? And finally what are some of the effects of foreign aid for the recipients?

22. **Title:** Is Congress Still Regionally Divided?  
**Principal presenter:** Jacob Tomlinson  
**Major:** Political Science  
**Faculty mentor:** Dr. Vincent Auger  
**Abstract:** Peter Trubowitz created a spatial model in 1993 that analyzed Congresses key roll call votes. The votes that he analyzed specifically looked at foreign policy. The model that he created looked to see how members of Congress voted in regards to which state they represented. In this way, his model demonstrated that Congress was regionally divided on foreign policy issues. This study here replicates Trubowitz's model to see if Congress is still regionally divided over 20 years after Trubowitz published his work. Ultimately, it is found that Congress is no longer divided regionally on key foreign policy issues. I theorize here that this is the case today because the economic situation of the United States as a whole has changed rather dramatically.

23. **Title:** Natural Bat Biota from the West may Fight the Spread of White-Nose Syndrome  
**Principal presenter:** Paris Hamm  
**Major:** Biology  
**Other presenters or co-authors:** Nichole A. Caimi, Biological Sciences at the University of New Mexico; Diana E. Northup, Biological Sciences at the University of New Mexico; Ernest W. Valdez, United States Geological Survey  
**Faculty mentor:** Dr. Andrea Porras-Alfaro  
**Abstract:** White-nose syndrome (WNS), a bat fungal disease caused by the psychrophilic (cold-loving) fungus, Pseudogymnoascus destructans, has been estimated to cause the death of more than six million bats in the eastern U.S. and Canada. Fungal and bacterial surveys have been conducted to explore bats? natural microbial communities as a possible first line of defense against pathogens. In this study we evaluate the biocontrol potential of naturally occurring Actinobacteria isolated from WNS-free bats from New Mexico and Arizona. Bacteria colonizing bat fur and membranes were isolated from 12 species of healthy bats from New Mexico and Arizona, providing approximately 1000 isolates. We have screened 632 bacterial isolates using a bi-layer method, of which 35 isolates show antifungal activity against P. destructans. Of the 35 positive Actinobacteria, 31 (88.57%) were from the genus Streptomyces while the others were from the genera Rhodococcus, Streptosporangium, Luteipulveratus, and Nocardiopsis. Six of the isolates with antifungal activity against P. destructans were identified as novel Streptomyces spp. after multi-gene analysis. The bat, Myotis velifer, believed to be one of the species most at risk for WNS was colonized by the greatest number of inhibitory bacteria of any bat species with 10 (28.57%) isolates. Our
results suggest that bats in western North America possess bacterial microbiota that inhibit \textit{P. destructans} in situ. Our cultured actinobacterial isolates could be explored as a prophylactic or treatment of WNS infected bats and may provide insights on susceptibility of western caves and bat species.

24. \textit{Title: New Analytical Approach to Forecasting Models and their Applications}
\textit{Principal presenter:} Gloria Nnabuike
\textit{Major:} Mathematics
\textit{Other presenters or co-authors:} Dr. Mokhtar Aouina
\textit{Faculty mentor:} Dr. Mokhtar Aouina

\textit{Abstract:} Time series analysis is a very powerful tool to make real world forecasts and it is essential in business intelligence. This is an important challenge many financial, business, and industrial companies and organizations face. Analysts search for useful and efficient statistical methods that produce good forecasts that help companies to make the right decisions to improve their competitiveness and effectiveness. This research work gives a full account of moving average and the exponential smoothing methods. It underlines their important properties; the connection and the contrast between these methods. We provide a new way to how we think about these methods. One of the by-products of our novel analytical approach highlights that there are two extreme models - the mean model and the random walk model - and there are a range of possibilities in-between which gives rise to the moving average method. Our approach leads naturally to improve and build more statistical methods and models. This appropriate analytical approach uses further development of empirical and mathematical formulations and information visualization in terms of time series graphs that permits for analyzing data patterns. It helps us to better understand these statistical methods at a more systematic and deeper way. Moreover in our work we showed that there are corresponding statistical models to every exponential smoothing method, and how to use these statistical models to derive formulas for prediction intervals. We tested different models on sales problems, compared their performances based on error measures, and finally make point forecasts and (e.g. 95\%) prediction interval forecasts for \textit{h} periods in the future.

25. \textit{Title: Perceived use Compared to Actual Use of Alcohol and Marijuana on College Campuses and Associated Mental Health and Academic Difficulties}
\textit{Principal presenter:} Madison Cirks
\textit{Major:} Psychology
\textit{Other presenters or co-authors:} Natasha Kazakova, Ryan Van Fossen
\textit{Faculty mentor:} Dr. Johnathan J. Hammersley

\textit{Abstract:} The aim of this project is to examine perceived use compared to the actual use of alcohol and other drugs amongst college-aged students and the association with mental health and academic difficulties. The vast perceived vs. actual drug use differences found in this study indicate that many college students are perceiving their same age peers (typical
college students) as consuming more than actually occurs for both alcohol as well as for illicit drugs such as marijuana. A random sample of 3,527 undergraduate and graduate students from 158 colleges across the United States was used in this study. The sample was taken from the American College Health Association - National College Health Assessment (ACHA-NCHA) dataset. The data were collected from Fall 2008 to Spring 2009 with a diverse range of participating schools and participating students. Frequencies of multiple one item responses were summed and used to measure substance use and mental health. Regression analysis was used to measure mental health and academic performance based on differences between perceived and actual substance use. Target questions taken from this larger samples were used for the analysis such as actual substance use, perceived substance use and questions regarding mental health status and academic achievement. The results of the analysis demonstrate the discrepancy between actual use and perceived use and its relation to mental health difficulties and lower academic performance. A plethora of research has been done analyzing the power of social norms regarding alcohol and other drug use among college students and how these seemingly unbreakable social norms drive behavior. Alcohol consumption has traditionally been a part of the college experience; as students move away from home, a vast world of new experiences awaits. Many universities provide an environment of tolerance for a variety of lifestyles, experiences, and interests, allowing the student to potentially experiment with alcohol and drug use for the first time (Perkins et al., 2010). As evident in our research, alcohol and other drug use can relate to negative mental health status and lower academic performance, due in part to the misperceptions of consumption. Possible related negative factors include increases in reported symptoms of anxiety and depression and decreasing grades as the difference between actual and perceived use increases. The differences between perceived and actual use in this study indicate clearly demonstrate the power of social norms and the college campus culture. Implications of this research have already begun to be studied and implemented. An emphasis on social norms in alcohol and other drug education have become part of many campuses alcohol education program. However, preliminary research has indicated that incorporating social norm education into alcohol and other drug use education has not lead to vast decreases in alcohol or other drug consumption (Wechsler et al., 2003). The significance of this research will provide clarity to the understanding of alcohol and other drug use among college-aged students and will hopefully guide further research or intervention to curb the potentially negative consequences of consumption of these substances among college-aged students.

26. Title: Realism and Constructivism in the Middle East
Principal presenter: Brian Johnson
Major: Political Science
Faculty mentor: Dr. Jon Day
Abstract: Traditionally, scholars have held that realism best explains events in the Middle East, but constructivist authors have recently put forth several notable works challenging
the realist interpretations. This paper will weigh in on the debate between the two camps by analyzing the arguments that are put forth by each school of thought in order to determine which offers the most explanatory power. Utilizing a case study approach, the paper examines three events in Middle East history: the signing of the Baghdad Pact, the creation of the United Arab Republic and the Arab Union, and the North Yemen Civil War. These events were chosen because of their historical significance, and because they factor heavily into the debate between the two schools of thought. The paper will show that in each of the cases the realist school of thought offers the most explanatory power. The realist emphasis on security concerns, material factors, the balance of threat, and the balance of power will be shown to be present and important in each of the cases, while constructivist arguments about the importance of identity, norms, and ideational factors in these cases will be shown to be overemphasized.

27. **Title:** Redefining Sports Stereotypes: The Black Athlete  
**Principal presenters:** Alexander Deeb and Ryan Demming  
**Major:** Sports Management  
**Other presenters or co-authors:** Alexander Deeb  
**Faculty mentor:** Dr. Algerian Hart  
**Abstract:** Athletes far too often must face certain stereotypes in their sport, whether it is gender, race, ethnicity, or sexual orientation. Historically, however, it seems as though Black athletes are confined into a space that fuels stereotyping in a variety of sports. Some athletes are expected to represent an entire race they may not wholly identify with, such as Tiger Woods (Cashmore, 2008) as the face of Golf for the entire African American community. Others may be expected to behave a certain way, but are criticized for not being "black enough." Two athletes that have recently been subject to this criticism are Washington Redskins quarterback Robert Griffin III and Seattle Seahawks quarterback Russell Wilson, who is of a multiracial background. Rob Parker, a former employee of ESPN, has previously called Griffin a "corn ball brotha," and Wilson was reportedly considered by his teammates and broader media outlets as not being black enough. In addition to, and somewhat in accord with not being black enough, Wilson has been compared to his teammate, Pro Bowl running back Marshawn Lynch. While Lynch personifies the stereotype of a rebellious, nonchalant/nondocile, disruptive Black athlete, Wilson is the antithesis, often identified as a well-spoken, open, marketable commodity and role model for today's youth. In this comparison it would seem as though Lynch's persona is that of a stereotypical Black athlete and Wilson's identity is more closely related to that of a White athlete. Wilson's multiracial background poses a paradox as there are factions across the media and broader American sport culture that split between his racial identities. Some view Mr. Wilson as a NFL quarterback who exemplifies White qualities such as smart, leader, poised, pocket presence, and disciplined. In contrast, others view Mr. Wilson as a stereotypical Black NFL Quarterback who is athletic, undisciplined, low football IQ, and run first mentality. This paper will explore the current discussion regarding the propagation
of American sport society and how it influences stereotypical identities of the modern Black Athlete. The objective of this research is to identify systems to build pathways of tolerance and inclusion that can assist in supporting diverse spaces in various sport bodies.

28. **Title:** Seasonal variation of Dark Septate Fungi in an Arid Grassland and their Potential Role on Plant Growth  
**Principal presenter:** Cedric NDINGA MUNIANIA  
**Major:** Biology  
**Other presenters or co-authors:** Katrina Sandona, Jayne Belnap, US Geological Survey, Cheryl R. Kuske, Los Alamos National Laboratory, Andrea Porras-Alfaro  
**Faculty mentor:** Dr. Andrea Porras-Alfaro  
**Abstract:** The high temperatures and long extended drought periods in arid ecosystem promote the colonization of diverse microenvironments by dominant communities of dark septate fungi (DSF). Due to their abundance, DSF are likely to contribute to soil nutrient enrichment and stabilization, and plant survival in these stressful conditions, but their role and diversity are still not well known. We collected soil and isolated fungi from different microenvironments in an arid grassland near Moab, UT. The biocrust (BSC) fungi were isolated from lichen, moss and cyanobacteria, and rhizosphere soils were collected from two plants, Bromus tectorum and Hilaria jamesii. Fungi were isolated using a serial dilution technique and identified using ITS rRNA sequencing. Seasonal variation of DSF was evaluated using culture-based approaches and compare with fungal community profiles from Illumina sequencing. Our imaging pigment analysis reveals that DSF are more abundant in BSC compared to rhizosphere showing differences in colonization rates based on season with an increase of the fungi during the summer months. Trends on culture data were confirmed with the analysis of Illumina data, which showed an increase in abundance of dark septate fungi (Alternaria and Phoma) in rhizosphere and below biocrust during the summer months. From the 906 fungi isolated, Pleosporales was the dominant order in both BSC and rhizosphere. The most dominant DSF genera included Alternaria, Coniochaeta, Preussia, Cladosporium, and Phoma. Seed germination experiments using dominant taxa were conducted in corn and soybean to determine their potential roles on plant growth. Cladosporium and Alternaria in particular, showed growth promoting ability stimulating root production and stem elongation. This variation in abundance and colonization of DSF could be correlated to both environmental conditions and plant demand during the season. Thus, in addition to their adaptation to arid ecosystems, DSF growth promoting ability could be an important factor to help plants to cope with heat and drought conditions.

29. **Title:** Sensitivity Analysis of the Tetrapolar Electrical Impedance Measurement Systems Using COMSOL Multiphysics for the Non-uniform and In-homogeneous Medium  
**Principal presenter:** Onic Islam Shuvo  
**Major:** Physics
Other presenters or co-authors: Dr. Md Naimul Islam, University of Dhaka Dhaka, Bangladesh.
Faculty mentor: Dr. Kishor T. Kapale
Abstract: One of the major problems with Electrical Impedance Tomography (EIT) is the lack of spatial sensitivity within the measured volume. In this paper, sensitivity distribution of the tetrapolar impedance measurement system was visualized considering a cylindrical phantom consisting of homogeneous and inhomogeneous medium. Previously, sensitivity distribution was analysed analytically only for the homogeneous medium considering simple geometries and the distribution was found to be complex. However, for the inhomogeneous volume conductors sensitivity analysis needs to be done using finite element method (FEM). In this paper, the results of sensitivity analysis based on finite element method using COMSOL Multiphysics simulation software are presented. A cylindrical non-uniform, inhomogeneous phantom, which mimics the human upper arm, was chosen to do the experiments by varying different parameters of interest. A successful method for controlling the region of interest was found where the sensitivity was maximum. Refining the finite element mesh size and introducing multifrequency input current (up to 1 MHz) this simulation method can be further improved.

30. Title: Substance Use and Mental Health Symptoms Associated with ADHD Treatment in College Students
Principal presenter: Ryan Van Fossen
Major: Psychology
Other presenters or co-authors: Natasha Kazakova
Faculty mentor: Dr. Jonathan J. Hammersley
Abstract: Background: Previous research (Lambert, 2005) suggests lower rates of substance use among adolescents with attention deficit hyperactivity disorder (ADHD) treated with stimulant medication versus untreated adolescents or those utilizing other treatments, though results are inconsistent across studies. ADHD individuals not treated with stimulant medication may use nicotine and other drugs to manage symptoms. Greater drug use among ADHD individuals not reporting medication treatment may also relate to increased severity of ADHD symptoms (Wilens, et al., 2003). Method: The present sample consisted of 107,241 undergraduate students from the American College Health Association - National College Health Assessment (ACHA-NCHA) dataset. Data were collected from 158 colleges across the United States from Fall 2008 to Spring 2009. Of the total sample, 3,892 participants reported an ADHD diagnosis, and 2,997 reported receiving treatment for this condition. Participants identified whether they received psychotherapy, medication, psychotherapy/medication, no treatment, or other treatment in the past twelve months to treat ADHD. Results: Analysis of variance (ANOVA) was used to determine overall drug use, mental health, and academic outcomes among treated, untreated and non-ADHD individuals. Results indicate a significant effect of ADHD diagnosis and treatment on drug use. In posthoc Bonferroni tests, medicated ADHD participants reported significantly lower
overall substance use than those treated with psychotherapy alone (p = .004), but there were no significant differences reported in drug use between medicated and untreated ADHD groups. Also, individuals treated with medication alone report significantly more drug use than those with no ADHD diagnosis (p < .001). There was also a significant effect of ADHD diagnosis/treatment on overall reported mental health outcomes. Follow-up tests indicate that medicated ADHD individuals report significantly fewer overall mental health concerns (e.g., feeling hopeless, anxious, overwhelmed, sad, lonely, depressed; p < .001) than those treated with psychotherapy or combined psychotherapy/medication, though more mental health concerns than individuals not diagnosed with ADHD (p = .001). Discussion: Individuals treated with medication for ADHD report significantly better outcomes in areas of reported drug use and mental health compared to those who received other treatments such as psychotherapy. Possible reasons for this may include inaccurate diagnoses of ADHD of college students seeking stimulant medications, or symptom severity discrepancies across different treatment types. Further conclusions and implications for these findings will be discussed.

31. Title: Telemetry to Determine whether Weather Variables Can Predict Bald Eagle (Haliaeetus Leucocephalus) Movement onto and Use of the Upland Landscape
Principal presenter: Sara Schmuecker
Major: Biology
Faculty mentor: Dr. Susan Romano
Abstract: Over the next 35 years, wind energy production in the United States is expected to increase from 4.5 to 35 percent. Iowa and Illinois are likely to be significant contributors to this increase due to the presence of optimal conditions for producing wind energy. Significant raptor mortality, including bald eagles, has been observed at wind energy facilities, transmission lines, and other energy infrastructure throughout the United States. However, because bald eagles were thought to be strongly associated with water bodies, research to-date in the Midwest has primarily been limited to riparian corridors. Consequently, upland agricultural landscapes, where wind energy development is occurring, were thought to be benign environments in term of risk to eagles from wind energy. Nonetheless, bald eagle nests and individuals have since been documented in all 99 counties of Iowa and are not necessarily confined to riparian areas. High eagle mortality and increasing eagle use of upland areas have resulted in the need for more information regarding bald eagle biology and movements throughout the Midwestern landscape. In order to guide management and reduce eagle interactions with potentially hazardous anthropogenic structures, we captured and telemetered (GPS-GSM units) nine adult and sub-adult eagles in Iowa and Illinois during the winters of 2013-2014 and 2014-2015. The telemetry units collect data at 30s to 15min intervals. The local winter movements of the birds were recorded from time of capture/return to the wintering grounds until the onset of spring migration. Winter movements of eagles occurred in portions of Minnesota, Wisconsin, Iowa, Illinois, and Missouri and ranged from from 14 to 105 (±10.6 SE) days...
per bird for a total of 237,520 locations. To understand the conditions when eagles were present in upland landscapes, we subsetted our GPS data to one point every hour (n=3,707 points), used binomial linear mixed effects models, and Akaike's Information Criteria (AIC) for model selection. We evaluated five models that were comprised of variables replicating extreme cold, storm system, and spring migration conditions, in addition to universal and null models. The extreme cold model (AIC=4,626.3) had the most support in the data. Of the variables analyzed, waterbody ice cover (p-value<0.005), daily change in atmospheric pressure (p-value=<0.005, 4.0?0.1 atm), and days prior to migration (p-value<0.005, 33.8?0.4 days) appear to have the greatest influence for bald eagles moving onto the upland landscape, where they are most at risk of encountering potentially hazardous anthropogenic structures. Our results provide important information about bald eagle movements into upland landscapes that can be used to guide management decisions, including placement of energy facilities, required shut down of wind turbines when eagles are more likely to utilize the upland landscape as a result of ice cover restricting riparian foraging, or to consume energy-rich red meat in response to rising temperatures and preparation for spring migration. Additionally, pre-construction surveys may be designed and implemented to reduce take, thereby aiding in the conservation of this iconic species.

32. **Title:** The Effect of CdSe Nanoparticles on Sm3+ Optical Absorption and Fluorescence in Lead Borate Glasses  
**Principal presenter:** Krishna D Joshi  
**Major:** Physics  
**Other presenters or co-authors:** Dr P. K. Babu, Dr Saisudha Mallur  
**Faculty mentor:** Drs. P. K. Babu and Saisudha Mallur  
**Abstract:** Glasses are very common and useful materials which find a variety of applications from large scale equipment to nanotechnology. The optical absorption and fluorescence of glasses show interesting features when they are doped with rare earth ions. These doped glasses can be used in LASER technology and optical amplifiers. Presence of semiconducting nanoparticles are expected to significantly affect the optical properties of these glasses. We prepared 36.5PbO-60B2O3-0.5Sm2O3-3.0CdSe and 56.5PbO-40B2O3-0.5Sm2O3-3.0CdSe glass samples and analyzed the optical absorption and fluorescence of Sm3+ ions to investigate the effect of CdSe nanoparticles on the optical properties. Glass samples were prepared by the usual melt-quench technique. An ACCULAB digital balance was used to weigh the chemicals and a CARBOLITE CWF 1300 laboratory chamber furnace was used to melt the starting materials. The melt was poured onto brass rings placed on a heated brass plate to obtain circular shaped glass samples having nearly uniform thickness. These glass samples were then annealed using a CARBOLITE CWF 1300 Wire Wound Single Zone Tube Furnace at a temperature near 400ºC from 3 to 26 hours. This annealing removes the thermal strains on these glasses and helps to grow CdSe nanoparticles. Longer annealing times create CdSe nanoparticles with larger average sizes. The optical absorption and fluorescence spectra of all samples were collected after they
were flattened and polished with an Inland SwapTop™ 8” Flat Lap Machine. The recorded data have been analyzed by a Gaussian fitting using Origin Lab from which the oscillator strengths have been calculated. Variation of the oscillator strength, intensity parameters and radiative transition probability as a function of the annealing time shows the effect of CdSe nanoparticles on the optical properties of Sm ions in lead borate glasses.

33. **Title:** The Effects of Farming Practices on Fungal Communities Associated with Glycine Max (Soybeans)  
**Principal presenter:** Terri Tobias  
**Major:** Environmental Studies  
**Other presenters or co-authors:** Sara Dean², Winthrop Phippen³, Joel Gruver³, Andrea Porras-Alfaro¹ ¹ Western Illinois University, Biological Sciences. ² University of New Mexico, Biological Sciences, Albuquerque, NM. ³ Western Illinois University  
**Faculty mentor:** Dr. Andrea Porras-Alfaro  
**Abstract:** Both Glycine max (soybean) and Thlaspi arvense (pennycress) are important oilseed crops. These species are valuable agricultural plants and potential resources for renewable biofuels and industrial products. Pennycress is a member of the Brassicaceae plant family and can be grown over the winter months in corn stubble fields as a potential cover crop helping prevent erosion. In addition, pennycress does not compete with food production making it a viable option for biofuels. The objectives of this study were to compare the fungal communities associated with soybean roots grown under organic and conventional farming practices and to determine the potential impact of pennycress on microbial communities when used as a cover crop prior to soybean planting. Roots were collected in the summer of 2013 and 2014 from three treatment plots (conventional soybeans, organic soybeans, and soybeans following pennycress) at the Western Illinois University experimental farms. Roots were sequenced with fungal primers using 454 pyrosequencing and a total of 560,948 sequences were compared resulting in 720 species. The most dominant fungal phylum in all plot treatments was Ascomycota. Results suggest that host (8% of variation), practice (8%) and year (21%) all had highly significant impacts on fungal community composition. In addition, there were also significant host x year and practice x year interactions. Soybean roots in all treatments were dominated by the order Hypocreales with the most abundant species being Fusarium. Pennycress roots were dominated by the fungal order Eurotiales with the most abundant species being Penicillium citreonigrum. Microbial diversity is a key component of soil health and soil microorganisms provide a wide variety of services to plant communities. Understanding these interactions and the potential effects on agricultural practices could provide important insights on plant health and management.
34. **Title:** The Evolution of Halloween: From Pagan Ritual to American Tradition?a Virtual Exhibit  
**Principal presenter:** Jillien A. Zudell  
**Major:** History  
**Faculty mentor:** Dr. Jennifer McNabb  
**Abstract:** The adaptability of Halloween over two millennia causes one to consider who or what influences these changes. The changes in the celebration of Halloween were brought about by many factors. The impact of the church in the middle ages, the Reformation during the Tudor/Stuart age in Britain, famine and migration of the Irish and Scottish in the 1800s, and finally acceptance into mainstream American culture at the turn of the twentieth century all helped to shape the modern celebration of Halloween, creating an uniquely American tradition. Written in the form of a public history virtual exhibit with the purpose of both educating and entertaining the audience, this project explores the development of modern American Halloween traditions. It highlights the evolution of Halloween from its pagan Celtic roots as the festival of Samhain through the early modern period; it then follows the traditions of Halloween into the nineteenth and twentieth centuries when it became a standard in American culture. The exhibit serves two purposes. First, most of the American public have a basic understanding of what the festival means in the present, but often the longstanding traditions and their origins are not widely or correctly known. Not only do viewers gain a better understanding of Halloween within a historical context, but this topic could spark deeper interest in the past in general because of its familiarity?Halloween has mass appeal. Second and more importantly, through the lens of Halloween, this exhibit will explore the idea of popular culture within a historical context. It illuminates a specific aspect about early modern life of the masses and the ritual festivals in which those people participated. In doing so, the public gain a better understanding of how people of the past interacted with their neighbors, how their beliefs affected everyday life, and what factors worked to influence those interactions and beliefs. This project will be presented in the form of a museum exhibit tour. I will guide the conference audience through the subject matter of the exhibit and conclude with a brief discussion about the construction and purpose of the project.

35. **Title:** The Future Generation: A Look at College Students' Political Activity.  
**Principal presenter:** Kyle E. Davis  
**Major:** Political Science  
**Faculty mentor:** Dr. Jonathan P. Day  
**Abstract:** With political participation on the decline, this research analyzes student behavior through polling results to understand how college students are politically mobilized. This study found that what matters to student political participation and knowledge is the amount of time they have been in college, a belief that their input matters, their membership in a Greek organization, and whether they watch national news or read the newspaper. This research provides an update to our understanding of what most influences a college
students' political participation and level of political knowledge.

36. **Title:** The New Hierarchy of Relationships  
**Principal presenter:** Marcus Hendrickson  
**Major:** Psychology  
**Faculty mentor:** Dr. Kristine Kelly  

**Abstract:** Purpose: The purpose of this study was to introduce a hierarchical model of relationship types. According to Belongingness Theory (Baumeister & Leary, 1995), relationships formed as a means of survival; therefore relationships that promote the highest chance of genetic lineage should have an importance premium. For example, one's relationship with a child should be more important than any other relationship because offspring guarantee one's genetic survival. Furthermore, one's romantic partner should be more important than friends and acquaintances because the mate is increasing one's likelihood of creating a genetic lineage. Therefore, the purpose of this study was to examine the proposed relational hierarchy in terms of importance of various relationship levels.  

**Procedure:** Participants consisted of college students and non-student adults who, as part of a larger study, volunteered to complete an online survey. The questionnaire asked them to rank order a list of eight different relationship types in terms of their importance. Results: A Friedman test was used to analyze the rank ordering of relationships. The ranking from most important to least important, which can be seen in Figure 1, was as follows: Children, Significant Other, Family, Best Friend, Colleagues, Close Friends, Specific Role Neighbors, and Acquaintances. There was a statistically significant difference in reported general importance ranking, \( x^2(7) = 136.93, p < 0.001 \). To analyze each difference between relationship types, a Wilcoxon Signed-ranks test was used with a Bonferroni-adjusted significance level of \( p = .006 \). A significant difference was found between Children and Significant Other \( (Z = -3.98, p < 0.001) \), between Family and Best Friend \( (Z = -4.17, p < 0.001) \), between Best Friend and Close Friends \( (Z = -4.09, p < 0.001) \), and between Close Friends and Specific Role Neighbors \( (Z = -3.80, p < 0.001) \).  

**Conclusions:** The results of this study strongly support the proposed relational hierarchy model, whereby people consistently place more importance on certain types of relationships than others. Specifically, as expected, children were ranked as most important, followed by mates and family members, and lastly acquaintances. These results are consistent with Selective Investment Theory (Brown & Brown, 2006), which suggests that cost/benefit of altruistic behaviors will be higher in closer relationships. These findings also support the updated hierarchy of needs (Kenrick et al., 2010), which replaces self-actualization at the top of the pyramid with child-rearing followed by mating relationships. The results of this study will also be discussed in terms of relationship substitutability and investment.
Title: True Metabolizable Energy of Submersed Aquatic Vegetation for Dabbling Ducks
Principal presenter: Sarah E. Vanderhorst
Major: Biology
Other presenters or co-authors: Dr. Heath M. Hagy, Dr. Chris N. Jacques, John W. Simpson
Faculty mentor: Dr. Chris N. Jacques
Abstract: Aquatic systems in the Midwest have been highly modified since the beginning of the 20th century, including channelization, damming, and dredging of most large rivers (e.g., Illinois, Mississippi, Ohio, Missouri) and disconnection from their natural floodplains with networks of levees. While the loss of submersed aquatic vegetation from hydrologically-connected wetlands and backwater lakes along the Illinois and Mississippi rivers is well-documented, information is unavailable to determine the implications of these losses on energetic carrying capacity for waterfowl, especially dabbling ducks. The objective of this study is to estimate true metabolizable energy of species of submersed aquatic vegetation common to the Upper Midwest for dabbling ducks. We conducted feeding trials using wild-strain mallards (Anas platyrhynchos) during autumn 2015. Feeding trials consist of a 48-hour fasting period followed by precision feeding of one of six species of submersed aquatic vegetation (e.g., Stuckenia pectinata, Ceratophyllum demersum) and a 48-hour period in a metabolic chamber where excreta is collected. We will estimate gross energy of test foods and excreta using a Parr adiabatic oxygen bomb calorimeter and adjust estimates for digestion efficiency to ascertain true metabolizable energy. We expect the true metabolizable energy of submersed aquatic vegetation to be less than that of seeds, tubers, and other hard mast. Our data may aide conservation planners in estimating energetic carrying capacity of semi-permanently-flooded marsh habitats and projecting impacts of wetland management alternatives such as semi-permanently-flooded marsh verses moist-soil management. It will also be useful for assessing the tradeoffs in habitat quality for dabbling ducks considering hydrologic connectivity with rivers and lakes, and as input parameters in models predicting habitat change over time or in response to stressors (e.g., climate change).

Title: Vocabulary Instruction: The Effectiveness of the Frayer Model for Level 2 and 3 ELLs in First Through Third Grade
Principal presenter: Jessica Marty
Major: Educational Interdisciplinary Studies
Faculty mentor: Dr. Carla Paciotto
Abstract: The immigrant population of our nation has been steadily increasing over the past 4 decades, in Illinois alone, there are 207,417 ELL students (Chico, 2013, p.5). Nationally, only 2.5% of teachers who instruct ELLs are certified (U.S. Department of Education, 2012). As there are so few teachers certified to teach ELLs, it is of no surprise that 15% of ELLs receive no special instruction in their content areas or in learning English (Hopstock & Stephenson, 2003). One of the academic areas that keeps ELLs from achieving as highly
as native English speakers is the amount of vocabulary that native speakers come to school already knowing. ELLs entering school at Level 1 will have an extremely limited vocabulary. For comparison, linguistically "poor" native English-speaking first graders will have, on average, a 5,000 word vocabulary, and linguistically "rich" first graders a vocabulary of 20,000 words (Moats, 2001). In order to begin reading instruction, ELLs need to develop a high-frequency word vocabulary of about 3,000 words (Radwan & Rikala-Boyer, 2011). There have been many studies that look at effective vocabulary instruction techniques for ELLs when those ELLs are working with a pull out teacher or in a self-contained ELL classroom (August et al., 2005; Cox et al., 2011; DeLuca, 2010; Lehr, Osborn, & Hiebert, 2004; Radwan & Rikala-Boyer, 2011; Sibold, 2011) as well as studies that examine vocabulary strategies that are effective for native speakers (Dunston & Tyminski, 2013; Marzano et al., 2001). There is a gap in the research however when it comes to ELLs who spend the entire day in the general education classroom. The purpose of this research study was to find if a method of vocabulary instruction, the Frayer Model, is a valuable intervention for Level 2 and 3 ELLs in the general education classroom. This study was comprised of ten individuals ranging from first through third grade. The students were broken into a control and a treatment group. Both the control and treatment group received vocabulary instruction in their regular classroom during the intervention period. The treatment group also worked with the researcher 10 minutes per day completing a Frayer Model of one vocabulary word. All of the students were tested on their vocabulary knowledge at the beginning and end of the intervention period. A Wilcoxon Signed-Rank test indicated that both the control and the treatment group made statistically significant improvements from their pre- to their post-test (W = -15, Z = -2.02, p = 0.03; W = -21, Z = -2.04, p = 0.04). A Mann-Whitney U Test indicated that the achievement was greater for the treatment group than for the control group (p = 0.01). Teacher interviews also indicated that participation in the treatment resulted in increased confidence of students within the classroom. These results point to the Frayer Model being an effective intervention for Level 2 and 3 ELLs in first through third grade.

39. **Title:** White Identity Development Differences in White Privilege Attitudes Following Dissonance Intervention  
**Principal presenter:** Jonathan Counce  
**Major:** Psychology  
**Faculty mentor:** Dr. Kristy Keefe  
**Abstract:** Purpose Racial discrimination continues to be a major problem in society. One reason may be that many Whites are still unaware of or unwilling to admit their illegitimate social advantages (i.e., White privilege). According to Helms (1984), Whites develop a healthy racial identity through several statuses, higher statuses reflecting a better understanding of what it means to be White, as well as improved attitudes towards other races. One method of improving these attitudes is through cognitive dissonance tasks, like writing counter-attitudinal essays (Eisenstadt & Leippe, 2005). The purpose of this study
was to learn whether Whites' racial identity development status can influence their receptiveness to such an intervention. Procedure White undergraduates (n=97, 51 male) first completed the White Racial Consciousness Development Scale-Revised (WRCDS-R; Lee et al., 2007), which assesses four statuses of White racial identity development: Contact, Reintegration, Pseudo-Independence, and Autonomy (from lowest to highest status). Participants then took half of the White Privilege Attitudes Scale (WPAS; Pinterits, Poteat, & Spanierman, 2009), which measures White privilege (WP) attitudes via four subscales: Willingness to Confront WP, WP Awareness, Costs of Addressing WP, and WP Remorse. Next, participants wrote an essay in support of hiring additional equally qualified Black professors at universities where White applicants are given an unfair advantage. Finally, participants completed the equivalent second half of the WPAS. Results Based on WRCDS-R subscale scores, participants were split into eight racial identity development profiles. Paired t-tests revealed that participants in the Autonomy/Pseudo-Independence profile (i.e., greater understanding of White identity) significantly improved their total WPAS scores from pre-essay (M=50.71, SD=10.56) to post-essay (M=55.86, SD=6.18), t(6)=−2.52, p=.045, while participants in the Reintegration profile (i.e., high resentment towards Blacks) worsened their Willingness to Confront White Privilege scores from pre-essay (M=18.11, SD=5.04) to post-essay (M=15.22, SD=5.43), t(8)=5.64, p<.001. Conclusion Results imply that Whites' racial identity development status can affect how well they respond to racism-reduction interventions. Whites in higher statuses may improve their racial attitudes overall, while those in lower statuses (specifically Reintegration) may respond defensively and actually deepen their prejudices in certain areas. These individual differences are important for counselors and educators to consider when tailoring their efforts to reduce prejudice in clients or students. This study also adds support to literature suggesting that counter-attitudinal essays can be effective at improving racial attitudes, specifically pertaining to White privilege.