WIU Graduate Research Conference

Friday February 28, 2020.

Poster Presentations

1. *Title:* **A Survey and Implementation of Image Processing Techniques in Chest Radiographs for Tuberculosis Diagnosis**
   Principal presenter: Brittany Erickson
   Major: Applied Statistics and Decision Analytics
   Faculty mentor: Dr. Anna Valeva
   Abstract: Chest radiograph images are a practical tool for medical practitioners to use for diagnostic purposes when another medical technology is either unavailable or impractical. A system that can automatically perform quality assurance and detect abnormalities in radiographic images, can help speed up diagnostics for patients in critical need and identify complicated medical cases. An automated system would also reduce costs for those living in under-developed regions. The objective of this research is to improve upon the most cutting-edge technology and make the technology more accurate for a more significant portion of the general population. The first step in developing a diagnostic system is to extract information-rich, disease-specific features which can be input into machine learning algorithms. Chest x-rays suffer from somewhat unique problems compared to other types of imaging technologies. Thus, processing these images is complicated. We perform a survey of current image segmentation methods and implement a graph-cut algorithm. The segmentation algorithm first calculates intensity projection histograms of an image in the horizontal and vertical directions. Next, it calculates the similarity between the image and a set of model images. The algorithm then uses the five most similar models to calculate an average lung model. An objective function uses properties from the average lung model to assign background/foreground labels to neighboring pixels, which are to be consistent with the data. The research employs Dice's coefficient to gauge the overlap between the segmentation mask and manually drawn ground truth mask. Alone, the confidence interval for the Dice coefficient of the graph-cut segmentation algorithm is 0.91 ± 0.037, with 98.7% cases above 80%. When adding a registration method that can accommodate for

patient variability, the confidence interval for the Dice score increases to 0.96 ± 0.018, with about 93.5% images are above 90%. We demonstrate the mechanism of the segmentation process through visualization of the underlying mathematical techniques.

2. *Title:* **Spectral Line Survey of Ionized Jet Candidates from Broadband VLA Observations**
   Principal presenter: Emmanuel Sanchez-Tovar
   Major: Applied Statistics and Decision Analytics
   Other presenters or co-authors: Esteban D. Araya, Viviana Rosero (NRAO), Peter Hofner (NRAO and New Mexico Tech)
   Faculty mentor: Dr. Esteban D. Araya
   Abstract: Continuum mode observations with the Very Large Array (VLA) are essentially spectral line scans with broad channel widths. We focus on searching for spectral lines toward the sample of high-mass star-forming regions observed by Rosero et al. (2016). We developed an algorithm to search and stack spectral windows (SPWs) at radio recombination line (RRL) frequencies and to search for excited NH3 transitions. We report the detection of twenty-six high excitation ammonia lines toward four sources, in a range of transitions from (J, K) = (4,1) to (9,7), which corresponds to energy levels between 279 K and 1021 K. In the case of RRLs, the script was designed to stack multiple transitions to reduce the noise in the spectrum. At 6 cm, we stacked an average of five hydrogen RRL transitions per source, resulting in 120 μJy/b RMS (133 km/s channel width). While at 1.3 cm, an average of three hydrogen RRLs were stacked resulting in a 60 μJy/b RMS (38 km/s channel width). To achieve the best possible statistical detection limit of RRLs in the sample, we stacked all spectral windows at RRL frequencies from all sources, resulting in 7.0 μJy/b RMS (6 cm: 133 km/s channel width) and 17 μJy/b RMS (1.3 cm: 38 km/s channel width). We found that the RMS in the stacked data follows the radiometer equation, which highlights the potential of statistical studies of weak spectral lines from stacking broadband spectral windows from VLA continuum-mode observations. This work is partially supported by NSF grants AST-1814063 and AST-1814011, and computational resources donated by WIU Distinguished Alumnus Frank Rodeffer.

3. *Title:* **Gear Evaluation and Aquatic Macroinvertebrate composition in the Upper Mississippi River**
   Principal presenter: Cassidy Miles
   Major: Biology
   Other presenters or co-authors: Madeline Tomczak, Tyler Thomsen
   Faculty mentor: Dr. James Lamer
   Abstract: Aquatic macroinvertebrates are not only important indicators of water quality and habitat health, but they are a key component to the food web in large river systems. The macroinvertebrate community composition in the Upper Mississippi River (UMR) is diverse, but poorly understudied. Our main objective is to 1.) evaluate macroinvertebrate

community differences sampled using three different sampling methods stratified through the water column and 2.) provide a comprehensive assessment of aquatic macroinvertebrate community composition and structure in Pools 17-19 of the UMR. Backwater areas were targeted for aquatic macroinvertebrate sampling due to low velocity and high levels of habitat availability. Macroinvertebrates were collected by an ichthyoplankton push net, benthic sled, and light traps to cover a variety of habitat types. Sites were randomly stratified and macroinvertebrates were collected using an ichthyoplankton push net, benthic sled, and light traps across a variety of habitat types. Samples were sorted and macroinvertebrates were identified to family.

4. *Title:* **Population Demographics of Silver Carp, Bighead Carp, and four native species in Pools 16 through 19 of the Mississippi River**
   Principal presenter: Zachary Witzel
   Major: Biology
   Faculty mentor: Dr. James T Lamer
   Abstract: Silver carp and bighead carp (bigheaded carp) have spread throughout the Mississippi River basin since their introduction in the 1970's. Highly adaptable life history traits have contributed to their invasiveness and their ability to negatively affect native fish populations and ecosystems. Bigheaded carp can drive density dependent reductions in their body condition and that of other native species. Detection of a deviation from body condition baselines in bigheaded carp and native species over time can be used as a surrogate to evaluate tools used to reduce bigheaded carp populations. Therefore, the objectives of our study are to track body condition of bigheaded carp and multiple commercial bycatch species over time in pools 16-19 in the Upper Mississippi River. Gill nets were deployed to capture silver carp, bighead carp, and associated bycatch during the 2015- 2019 field seasons. Length and weight were recorded from all fishes and relative weight determined using standard weight equations for each species. Bigheaded carp body condition has remained steady indicating densities are remaining low. Trends in body condition and population demographic data can be used to evaluate the effectiveness of harvest, help managers populate spatially explicit models and prompt increased strategic removal efforts.

5. *Title:* **Binding of Peptides MCA1 and MCA2 to Panc 10.05, CFPAC-1, and HPAF-II Pancreatic Cancer Cell Lines**
   Principal presenter: Adaugo Anyanwu
   Major: Biology
   Other presenters or co-authors: Mette Soendergaard
   Faculty mentor: Dr. Mette Soendergaard
   Abstract: Pancreatic cancer patients have a 5-year survival rate of 3%. The dire prognosis is due to a lack of detection methods of the disease at early stages. However, molecular targeting using peptides may be used to detect pancreatic cancer biomarkers for use in

diagnosis. Bacteriophage (phage) display technology was previously used to select two pancreatic cancer targeting 15-mer peptides (MCA1 and MCA2) from a fUSE5 library. These peptides were shown to bind to pancreatic carcinoma Mia-Paca-2 cells with half maximal effective concentration (EC50) values of 16.12 ± 8.91 μM and 97.01 ± 4.88 μM (mean ± SEM), respectively. However, it is unknown if MCA1 and MCA2 bind to other pancreatic cancer cell lines. Thus, the objective of this study is to determine the EC50 values for MCA1 and MCA2 against pancreatic adenocarcinoma from a primary tumor (Panc 10.05), pancreatic ductal adenocarcinoma liver metastasis (CFPAC-1), and pancreatic adenocarcinoma from peritoneal ascitic fluid (HPAF-II). Peptides (MCA1 and MCA2) will be synthesized with an N-terminal GSG spacer and a biotin group to permit probing by streptavidin. A modified enzyme-linked immunosorbent assay (ELISA) will be performed using various concentrations (0.1, 0.3, 1, 3, 10, 30, 100, 300 μM) of peptides. Specifically, peptides, or dimethyl sulfoxide (DMSO; vehicle) will be incubated with Panc 10.05, CFPAC-1, and HPAF-II cells for 1 h at 37°C, 5% CO2. The cells will then be washed with 1% bovine serum albumin (BSA) in phosphate buffered saline (PBS), fixed using 10% formalin, and blocked by 10% FBS, 0.3 M glycine, and 0.05% Tween-20 in PBS. Peptide binding will then be probed by horseradish peroxidase (HRP)-conjugated streptavidin for 1 h, followed by addition of HRP substrate 2,2'-azino-bis(3-ethylbenzothiazoline-6-sulfonic acid (ABTS), and spectrophotometric measurement of the absorbance at 405 nm. The data will be analyzed by GraphPad Prism (vs. 8.0) using non-linear regression to fit a sigmoidal dose-response curve. The EC50 values will be calculated from the dose-response curve. In conclusion, this project will determine the EC50 values of MCA1 and MCA2 to Panc 10.05, CFPAC-1, and HPAF-II cells to compare the binding of these peptides to Mia-Paca-2 cells.

6. *Title:* **Phage quantitative polymerase chain reaction (pqPCR) for detection of pancreatic cancer cells**
   Principal presenter: Olakunbi Folake Olawuni
   Major: Biology
   Other presenters or co-authors: Mette Soendergard
   Faculty mentor: Dr. Mette Soendergard
   Abstract: Pancreatic cancer is a deadly disease that has one of the highest cancer mortalities with a 9.3% survival rate over 5 years. The disease is one of the leading causes of global cancer deaths in industrialized countries and is ranked as the 4th cause of cancer in the United States. The poor prognosis is linked to the unavailability of sufficiently sensitive techniques for diagnosis at the early stage of the disease. Circulating tumor cells (CTC) are detached cells from the primary tumor and are found in the blood circulation, even at early stages, making them ideal for minimally invasive detection. However, the current detection techniques that measure protein biomarkers are not sufficiently sensitive to detect the small number of CTCs in patients with early-stage pancreatic cancer. Often, as little as one CTC may be present in a blood sample. Hence, more sensitive technologies that detect pancreatic

CTSs are needed. Our previous studies have identified two peptide-displaying phage, pMCA1 and pMCA2, which specifically bind pancreatic cancer cells. These phage carry genetic material (DNA) that may be amplified and quantified by phage quantitative polymerase chain reaction (pqPCR). pqPCR may have the ability to detect as little as one phage particle, by amplifying the DNA up to 109 times. This may lower the detection limit of the cancer cells, compared to current methods, by increasing the sensitivity of the technique. To employ pqPCR to detect pancreatic CTCs, the detection limit must first be determined. For this, human pancreatic cancer (Mia Paca 2) cells will be gown in Dulbecco's Modified Eagle's Medium (DMEM) with 5% horse serum and 10% FBS at 37°C and 5% CO2. The cells will then be plated to 1-1000 cells per well and incubated with 108 V/mL pMCA1 or pMCA2 phage. Next, the cells will be extensively washed using 0.05% tween-20 in Tris-buffered saline to remove unbound phage. The phage will then be collected by cetyl trimethyl ammonium bromide elution and analyzed by qPCR. Briefly, eluted phage virions (5 µL) will be quantified by qPCR using Fast SYBR Green Master Mix on an Applied Biosystems StepOnePlus Real-Time qPCR System (Applied Biosystems, CA). Utilization of pMCA1 and pMCA2 for pqPCR detection of pancreatic cancer cells may lead to a more sensitive method of diagnosis. Thus, this technique could be a potential method for early diagnosis of pancreatic cancer and hence increase the survival rate of pancreatic cancer patients.

7. *Title:* **HPLC Analysis of Flavonoids from Grafted Heirloom Tomatoes in Hydroponic Culture**
   Principal presenter: Tyler A. Parr
   Major: Chemistry
   Other presenters or co-authors: Dr. Shelby Henning, Dr. Mette Soendergaard
   Faculty mentor: Dr. Mette Soendergaard
   Abstract: Recently there has been an increased interest in year-round, locally sourced produce, especially in varieties which offer supposed health benefits. [1,2] One of the most popular choices is the heirloom tomato, owing to their reportedly high antioxidant content. Control of disease-causing pathogens, extension of the growing season, and increased productivity may be realized through grafting of heirloom tomato plants onto productive rootstalks. There is potential for the grafting process along with hydroponic growth to alter the biochemistry of the tomatoes, potentially increasing their natural antioxidant content. [3] Antioxidants are compounds that literally inhibit oxidation, thereby balancing the oxidation state in plants and animals. Oxidation is damaging to cells, and antioxidants are thus associated with health benefits. Flavonoids, polyphenols, lycopene, anthocyanins, and hydroxycinnamic acids are some of the most common antioxidants which have been reported in tomatoes. [3] To study the effects of grafting and hydroponic culture on heirloom tomatoes, multiple varieties of fruit and rootstalk were used. Heirloom varieties selected for analysis included Black Krim, Cherokee Purple, and Green Zebra, as well as commercial varieties that included Trust, Big Dena, Big Beef, and Tasti-lee. The tomatoes

were grown in the WIU School of Agriculture greenhouse, and grafted on to generative rootstalks (Estamino, Supernatural, Submarine, DRO, Arnold, and Maxifort) to increase the yield. Following harvest, the tomatoes were sliced, lyophilized, ground into a fine powder, and stored at -20. For detection of flavonoids, extracts will be prepared by mixing tomato powder with 60% aq. MeOH containing 6 ppm of an internal standard as well as 20 mM sodium diethyldithiocarbamate as an antioxidant standard. The mixture will be hydrolyzed under acidic conditions with HCl under reflux at 90 for 2 hours. The samples will then be mixed with trifluoroacetic acid (TFA), filtered, and the antioxidant content analyzed via Reverse phase-high pressure liquid chromatography (RP-HPLC). In conclusion, the use of hydroponic growth methods combined with grafting onto generative rootstalks may be a viable way to produce tomatoes with high antioxidant content year-round. By employing RP-HPLC to analyze the antioxidant content, we will be able to determine if these production methods are a viable way to positively affect the potential health benefits of these fruits.

References [1]. (USDA), U.S.D.o.A. 2016 2016 [cited 2018 4/17/2018]; Available from: https://www.ers.usda.gov/topics/crops/vegetables-pulses/tomatoes.aspx. [2]. USDA. Local Food Marketing Practices Survey. 2015; Available from: https://www.agcensus.usda.gov/Publications/2012/Online_Resources/Local_Food/. [3]. Barrett, C.E., et al., Fruit Composition and Sensory Attributes of Organic Heirloom Tomatoes as Affected by Grafting. Horttechnology, 2012. 22(6): p. 804-809.

8. *Title:* **Anti-Proliferative Effects of Chinese Balsam (Impatiens chinensis)**
Principal presenter: Damilola Lawore
Major: Chemistry
Other presenters or co-authors: Shelby Henning, Mette Soendergaard
Faculty mentor: Dr. Mette Soendergaard
Abstract: Chinese Balsam (Impatiens chinensis) is grown in North-East India and used medicinally for pain relief, promoting blood circulation, and urinary tract infections. Despite the common use of the plant as a medicinal herb, only minimal research has been conducted to elucidate its bioactivity. The objective of this study is to investigate the anti-proliferative effect of Chinese Balsam on a panel of human cell lines. For analysis of the anti-proliferative effect (reduction of cell viability), Chinese Balsam will be harvested (WIU School of Agriculture greenhouse), separated into roots, stems, leaves, flowers, and seeds, freeze dried, and then ground into a powder. Plant materials will be extracted thrice using ethanol, methanol, water, and hexane for 24 h. Extracts will then be evaporated overnight at 50°C, and then resuspended in dimethyl sulfoxide (DMSO) to a final concentration of 20 mg/mL. A panel of human cell lines, including ovarian adenocarcinoma (SKOV-3), pancreatic carcinoma (Mia-Paca-2), pancreatic (hTert-HPNE), and kidney (HEK-293), will be treated with 0.2 mg/mL of each extract, 100 μM paclitaxel (chemotherapeutic drug; control), or DMSO (vehicle) for 48 h at 37°C, 5% CO2. Cell viability will then be determined using a tetrazolium reduction assay. For this, 0.45 mg/mL

3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide (MTT) will be added to the cells for 4 h. Formed formazan crystals will then be dissolved using DMSO, and the absorbance at 570 nm will be measured spectrophotometrically. The results from each extract will be analyzed using GraphPad prism software and compared to paclitaxel to decide if any of the plant materials exhibit anti-proliferative effects.

9. *Title:* **Total Antioxidant Capacity of Tea (FRAP Method)**
   Principal presenter: Allison Anderson
   Major: Chemistry
   Faculty mentor: Dr Brian Bellott
   Abstract: Free radicals (or single reactive unpaired electrons) are the cause of many harmful diseases. Some examples of such include Parkinson's disease, Alzheimer's disease, cancer, and many more degenerative diseases. To combat these free radicals in our bodies antioxidants are needed. They react with the free radicals in order to prevent oxidative stress. Because of this there is a need to study the amount of antioxidants present in our diets. There have been many procedures developed that may be utilized to find the total antioxidant capacity in a solution. The total antioxidant capacity tells us the amount of antioxidants that will react within the sample. One such procedure is the Ferric Reducing Ability of Plasma (FRAP) method. This method tests how much of the Iron in the solution can be reduced by the antioxidants. The resulting product is a dark purple color which can then be analyzing using UV-Vis Spectroscopy to compare the color to the standard of known concentration. Green and black tea will be analyzed at with both hot and cold brewing methods.

10. *Title:* **Comparison of Organic Carbon Contents of Conventionally, Vertical and No-till Soybean Fields Illinois**
    Principal presenter: Elijah Openiyi
    Major: Chemistry
    Other presenters or co-authors: Dr. Scott McConnell
    Faculty mentor: Dr. Scott McConnell
    Abstract: The Natural Resource Conservation Service (NRCS) defines soil as: "a natural body comprised of solids (minerals and organic matter), liquid, and gases that occurs on the land surface, occupies space, and is characterized by one or both of the following: horizons, that are distinguishable from the initial material as a result of additions, losses, transfers, and transformations of energy and matter or the ability to support rooted plants in a natural environment" (NRCS, 2010). Soil organic matter is the fraction of the solid component of the soil composed of plant or animal remains that are in various stages of decomposition. A majority of the soils used for agricultural purposes are composed of about 3% to 6% of organic matter (Schoonover and Crim 2015, Pettit 2008). Soils may act as vital carbon sink in the ecosystem thereby helping to mitigate climate change. Tillage is the mechanical turnover of soils that affect properties of soils such as soil water conservation, soil organic

matter content, soil temperature and soil evapotranspiration processes. Tillage is done for the sole purpose of crop production; however, it affects the environment (Busari et al., 2015). The introduction of modern and intensive agriculture has brought about a significant and steady loss of a portion of the soil organic carbon stock from agricultural soils (Lal et al., 2015). Statistics show that soils in the United States may have lost between 30 to 50% of the total soil organic carbon contained prior to the era of intensive agriculture (Ghimire et al., 2017, Busari et al., 2015). Changes in the amount of carbon present in soils can affect the concentration of carbon dioxide, a greenhouse gas in the atmosphere Soil samples were collected from three soybean (Glycine max L.) agricultural fields in Illinois, each field represented a different type of tillage practice. Four randomly selected site were sampled within each field. Each site was sampled to a depth of 30 cm in 15 cm segments. A total of twenty-four soil sample were collected from the four fields. The samples were air dried and grounded with a ceramic mortar and pestle. The large particles were separated with a 0.5mm sieve. Each sample was stored in air tight containers until used for analysis of soil carbon. The Walkley-Black wet chemistry method was used to find the organic carbon content of the soils (Nelson, 1996). The Statistical Analysis System (SAS) will be used for the analysis of the data collected and calculated (SAS Institute Inc., 2003). The SAS will be used to compare soil carbon fractions between the different tilled soils and no tilled soils. F-tests will be conducted as the test of significance at the α=0.05 level. Least significant differences (LSD) will be calculated at the α=0.05 level for significant effects. The overall hypothesis of this research is to learn how different tillage practices affect the soil organic carbon. It is intended to determine the amount of SOC in each soil and to relate much may they have been lost to the atmosphere.

11. *Title:* **Solid State Synthesis of Cobalt-Antimony-Q Crystals**
Principal presenter: Matthew Klyman
Major: Chemistry
Faculty mentor: Dr. Brian Bellott
Abstract: The synthesis of novel compounds has tremendous potential value in the modern era as society relies more and more on technological advances. There are various synthetic techniques within the field of solid-state chemistry. High-temperature solid state synthesis is one such method, which in this study is employed to synthesize cobalt-antimony compounds with various chalcogenides incorporated into their structures. The chalcogenides of interest were sulfur, selenium, and tellurium. This technique exposed the sealed samples to high temperatures over a significant period, followed by cooling. A traditional light-based microscope was used to examine the products formed. Clusters expected to be crystals were imaged and selected for further examination. Crystal candidates were placed within a scanning electron microscope (SEM), imaged, and subjected to energy dispersive X-ray spectroscopy (EDS) in order to determine the composition of the sample. Single crystal growth was observed for the primary CoSbQ compounds at the intended ratios, confirmed by the EDS analysis.

12. *Title:* **Quantitative Analysis of Limonene Content in Citrus Oil by Gas Chromatography Using Chlorobenzene as the Internal Standard**
Principal presenter: Alexandra Brisbin
Major: Chemistry
Other presenters or co-authors: Gabrielle Valenzuela, Dr. Liguo Song
Faculty mentor: Dr. Liguo Song, Dr. Shaozhong Zhang
Abstract: An experiment to integrate three significant topics in analytical chemistry and related disciplines, i.e. gas chromatography (GC), external calibrations, and internal calibrations, has been successfully developed in the quantitative analysis of limonene content in citrus oil using chlorobenzene as the internal standard. Through this experiment, students are exposed to GC instrumentation, the optimization of GC separation, the advantages and disadvantages of external versus internal calibration, and the selection criteria of an internal calibration standard. The technique and chemicals used in this experiment are simple, safe and easy. The experimental results show that this experiment is an ideal laboratory assignment for students at the undergraduate level.

13. *Title:* **Quantification of flunixin in equine plasma by ultra-high performance liquid chromatography electrospray ionization tandem mass spectrometry (UHPLC-ESI/MS/MS)**
Principal presenter: Madison Chao
Major: Chemistry
Other presenters or co-authors: Liguo Song, Nicole Hamilton-Cross
Faculty mentor: Dr. Liguo Song
Abstract: An UHPLC-ESI/MS/MS method was developed for simultaneous quantification and confirmation of flunixin in equine plasma. Flunixin was recovered from equine plasma by strong anion exchange solid phase extraction (SAX-SPE). The concentration of flunixin was determined between 0.04 and 2 ïg/mL by internal standard calibration using flunixin-d3 as the internal standard. The limits of detection (LOD) and quantification (LOQ) were 0.001 and 0.004 ïg/mL, respectively. The measurement precision and accuracy were 2.9% and 96%, respectively. The method is not interfered by any other NSAIDs that are regulated by the United State Equestrian Federation (USEF). The method can assist USEF to control doping in horse racing.

14. *Title:* **Quantitative Analysis of Limonene Content in Citrus Oil by Gas Chromatography using o-Xylene as the Internal Standard**
Principal presenter: Abdullah Rubayyi
Major: Chemistry
Other presenters or co-authors: Liguo Song, Shaozong Zhang
Faculty mentor: Dr. Liguo Song
Abstract: An experiment to integrate three significant topics in analytical chemistry and

related disciplines, i.e. gas chromatography (GC), external calibrations, and internal calibrations, has been successfully developed in the quantitative analysis of limonene content in citrus oil using o-xylene as the internal standard. Through this experiment, students are exposed to GC instrumentation, the optimization of GC separation, the advantages and disadvantages of external versus internal calibration, and the selection criteria of an internal calibration standard. The technique and chemicals used in this experiment are simple, safe and easy. The experimental results show that this experiment is an ideal laboratory assignment for students at the undergraduate level.

15. *Title:* **Quantitative analysis of the organic explosive tetryl in water by high performance liquid chromatography with ultraviolet detection**
Principal presenter: Ifeanyi Francis Offor
Major: Chemistry
Other presenters or co-authors: Thomas Hardesty
Faculty mentor: Dr. Liguo Song
Abstract: In this study, a method using high performance liquid chromatography with ultraviolet detection (HPLC/UV) has been developed for the quantitative analysis of the organic explosive tetryl in water samples. In order to avoid interference by other organic explosives, baseline separation of tetryl from the other thirteen priority organic explosives defined by EPA were achieved using a C18 reversed phase column. Subsequent quantification were accomplished through external calibration. Briefly, a series of tetryl standard solutions prepared in HPLC mobile phase were analyzed by HPLC/UV and a tetryl peak area versus concentration plot was fitted to a linear equation. After a tetryl contaminated water sample was analyzed by HPLC/UV under identical conditions, the tetryl concentration was calculated by using the linear equation and the tetryl peak area.

16. *Title:* **Carboxylic acids protected as 1,1-diphenylmethyl esters for the development of a practical and oxidative deprotection sequence**
Principal presenter: Adeola Adesoro
Major: Chemistry
Faculty mentor: Dr. T.K. Vinod
Abstract: A previous report from our laboratory identified selective oxidation of benzylic C-H bonds to the corresponding carbonyl functionalities using catalytic amounts of 2-iodobenzoic acid (2IBAcid) and Oxone. The mechanism of the reported reaction involves in-situ generation of 2-iodoxybenzoic acid (IBX) followed by an abstraction of the benzylic hydrogen atom and a subsequent single electron transfer step leading to a benzylic carbocation intermediate which in the aqueous reaction medium introduces the ultimate oxygen functionality. In this preliminary study we hypothesized that synthesis of 1,1-diphenylmethyl esters from acid chlorides and 1,1-diphenylmethanol can be treated as protected carboxylic acid derivatives that can be deprotected through selective oxidation of the doubly benzylic carbon atom of the 1,1-diphenylmethyl moiety using a combination of

a water-soluble o-iodoxybenzoic acid derivative and Oxone. Synthesis of several 1,1-diphenylmethyl esters and our initial oxidative cleavage of a representative example of the ester series will be discussed.

17. *Title:* **Studies towards developing a practical and an oxidatively cleavable protecting group for alcohols with concomitant oxidation of the alcohol in the deprotection step**
Principal presenter: Bishnu Prasad Neupane
Major: Chemistry
Faculty mentor: Dr. Thottumkara Vinod
Abstract: A previous report from our laboratory identified selective oxidation of benzylic C-H bonds to the corresponding carbonyl functionalities using catalytic amounts of 2-iodobenzoic acid (2IBAcid) and Oxone. The mechanism of the reported reaction involves in-situ generation of 2-iodoxybenzoic acid (IBX) followed by an abstraction of the benzylic hydrogen atom and a subsequent single electron transfer step leading to a benzylic carbocation intermediate which in the aqueous reaction medium introduces the ultimate oxygen functionality. In this preliminary study we hypothesized that synthesis of 1,1-diphenylmethyl alkyl ethers from benzhydryl bromide and the alcohol to be protected can be treated as the protected alcohol and subjected to selective oxidation of the doubly benzylic carbon atom using a combination of a water-soluble o-iodoxybenzoic acid derivative and Oxone. Synthesis of several 1,1-diphenylmethyl alkyl ethers and our initial oxidative cleavage of a representative example of the ether series will be discussed.

18. *Title:* **Synthesis of Organoselenenyl Azide by Click Chemistry**
Principal presenter: Jayasree Keerthi
Major: Chemistry
Faculty mentor: Dr. Jin Jin
Abstract: As the title itself suggests "click" here obtains the substances rapidly and accurately by combining small compounds together. In 1998 the word click chemistry was put forth by K. Barry Sharpless. Subsequently in 2001, The Scripps Research Institute published a click chemistry article with the help of Sharpless and Hartmuth Kolb. Click chemistry is mainly used in biomimetic applications such as Japanese Bullet Train mimic of Kingfisher bird beak, also involves in the process of bioconjugation one such example is the Staudinger ligation reaction. Click Chemistry aids to learn about Triazoles which are heterocyclic compounds. Triazole contains one five-membered ring, three nitrogen atoms and two carbon atoms on the ring they are mainly used with antibiotics to treat bacterial infections. There are different classes of triazoles most are biological active form which is 1,2,3 triazoles. The research is to obtain a different synthesis of 1,4-disubstituted 1,2,3-triazoles. Few products were obtained successfully by using benzyl bromide and diphenyl diselenide was used as a starting material. In our research, we are interested in introducing selenium to the triazole ring because selenium takes very important roles in the biological world. All animals and some plants need trace amounts of selenium and humans to

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 can also protect against heavy metal poisoning. Form the reaction performed the new compound obtained is Oranoselenenyl azide which is more stable compared to other Se-N containing compounds, many literatures performed experiments that showed the activity of selenenyl compounds based on this data I extended the research by using new solvents/catalyst and phenylacetylene to obtain Organoselenyl-azide compounds. The main advantage of Organoselenenyl compounds is having a high capability of stabilization. Research successfully obtained different new compounds which provide pharmacological action because of 1,2,3 triazoles and supports different industrial purposes. These results demonstrate that the compounds are used in many applications and these products were confirmed by using common NMR and chromatographic techniques.

19. *Title:* **Non-Communicable Diseases and HIV: A Look into the Health of Villagers of Kishapu District**
Principal presenter: Alyssa Detrick
Major: Health Sciences
Faculty mentor: Dr. Maureen Bezold
Abstract: The purpose of this research is to understand how non-communicable diseases and HIV affect the villagers in the Kishapu District of Shinyanga, Tanzania. Funding for this research was provided by PEPFAR, the President's Emergency Plan For AIDS Relief. The goal was to determine, by age group and gender, who is most affected by anemia, diabetes, hypertension, and HIV. This was accomplished through testing campaigns at a private clinic, government clinic, and outreach services within Ukenyenge Ward that serves a significant portion of Kishapu District. Anyone over the age of 18 was eligible to participate in the research. Upon examination of the data it became evident that women are more likely than men to test their health. Further, from the data collected, it is shown that women tend to have lower hemoglobin levels and higher blood sugar than men. Hypertension was more prevalent in both males and females over 50 years of age. The HIV prevalence was higher among older adults including males age 25-49 and females over 50. This research provides insight into how medical officials and community health workers can work to better educate the people in the Kishapu district about non-communicable diseases and HIV.

20. *Title:* **Trend Analysis of Drug-overdose-related Deaths in Illinois from 2013 to 2018**
Principal presenter: Queen Esekhalu, Ejura Salihu
Major: Health Sciences
Other presenters or co-authors: Mei Wen
Faculty mentor: Dr. Mei Wen
Abstract: Drug abuse is a rising public health concern in the United States. Illinois is among the top three states with the highest rate of drug overdose-related deaths in the nation.

According to CDC, drug-overdose-related deaths increased by over 50% in Illinois from 2013 to 2017, with Opioid and heroine as the most abused drugs leading to death. The study aims to explore the association between drug-overdose-related deaths and gender, ethnicity, age and geographical location in Illinois. The data were retrieved from State of Illinois Data Portal (https://data.illinois.gov/), data related to the study covers from 2013 to 2018. It was retrieved and entered into Excel spreadsheet and analysed and visualized to illustrate the trend and association. The results of the study showed that counties in the urban area (Cook and Chicago) had significantly higher drug overdose deaths than counties in the rural area (McDonough and Peoria). Majority of drug overdose victims in the data were of white ethnicity. The data also showed that more males died each year as a result of drug overdose than females. The peak death from drug overdose was those aged 25-44 years old. The lowest were those under 18 and 65 and above. This study translates the raw data into visualized and easy-to-understand trend and graphs to help people get a deeper understanding of the population at risk, thus calls for more attention from the policy-makers and community to take action to prevent the spread of the epidemic and reduce the harm.

21. *Title:* **Adherence, self-motivation, and exercise enjoyment in novice exercisers after four weeks of exercise protocol**
Principal presenter: Darice Brooks
Major: Kinesiology
Faculty mentor: Dr. Timothy Piper
Abstract: The purpose of this study is to examine the effects of a certified personal trainer workout versus social media influencer workout on adherence, self-motivation, and exercise enjoyment in college students who are considered novice exercisers. SIGNIFICANCE: The prevalence of weight gain and how to control weight gain in a college setting has garnered significant attention. This research study hopes to find a solution to help identify quality health and fitness resources for college students as well as creating awareness on ways to stay accountable and motivated through self-monitoring. RESEARCH HYPOTHESES: The hypotheses are; based upon qualifications, the college students will complete more of the social media influencer workout protocol versus the certified personal trainer workout protocol, self-motivation will increase after the four weeks of protocol, and novice exercisers will find enjoyment in these workout protocols. REVIEW OF LITERATURE: Individuals should participate in five or more days of moderate physical activity or three or more days of vigorous physical activity. Moderate and vigorous physical activity should be purposeful and done for 30-60 minutes or 20 minutes per session, respectively. Of the fall 2018 college students, about 54% performed 30 minutes of moderate aerobic exercise, 1-4 days a week. The reasons for the low participation rate could be due to a lack of adherence, motivation, and enjoyment to exercise. An additional factor to lack of adherence, motivation, and enjoyment to regular exercise routines is the source of information the routines come from. There are two common methods for learning about exercise that may affect how much individuals enjoy exercise. These two sources are social media influencers

and certified personal trainers. THEORETICAL/METHODOLOGICAL CONSIDERATIONS: There will be three different groups; one group performing the CPT protocol, one group performing the SMI protocol, and the final group will be a control group. To investigate adherence, self-motivation, and exercise enjoyment between these two protocols participants will complete three surveys. PROCEDURE: Demographic information and three surveys will be distributed and completed by the participants before and after completion of the protocol. This surveyed college students who did not work out for three days a week for six months consistently. There will be three groups total; CPT, SMI, and control. Participants will be asked to complete 28-days of the assigned protocol. Each participant will complete the Self-Motivation Inventory and the Physical Activity of Enjoyment Scale before the protocol and after completion of the protocol. An Adherence Questionnaire will also be given after the protocol has been completed. After completion of these surveys, a 3x3 mixed ANOVA design will be conducted.

22. *Title:* **Comparing the Effects of a Hip Strengthening Program and a Lateral Plyometric Program on Lateral Change of Direction Performance**
Principal presenter: Jason Taylor
Major: Kinesiology
Faculty mentor: Dr. Tim Piper
Abstract: Purpose: The purpose of this study is to compare the impact of a lateral plyometric training program and a hip abductor strengthening program on lateral change of direction performance. Significance: This topic was investigated due to the importance of change of direction in athletics. Ultimately, what this study attempts to answer is if change of direction is best improved via strength training of muscles responsible for changing plane of motion or training neuromuscular patterns similar to the change of direction task. Literature support: Strength training has gained popularity at every level of athletics, but there is no consensus into the best training method for change of direction improvements. In the limited research available, it is believed that lateral jumps are a better stimulus than vertical jumps due to the specificity of lateral movements. However, the difference between lateral jumps and hip strengthening has not been heavily researched. There are also several factors that determine change of direction potential including leg strength, leg power, and linear speed. One reason why lateral jumps are a good predictor of change of direction performance is the similarity of the motion, especially in regards to the stretch-shortening cycle. However, hip strengthening may be a better predictor due to the need for a minimum strength needed to have a consistent approach when making the change in direction. Methodology: Participants were recruited through various kinesiology courses at the local college. Participants were split into three groups: the control group, the strengthening program, or the plyometric program. Participants completed a pre-test for each of the two change of direction tests. After completing six weeks of their respective training program they again completed post-tests for each of the change of direction tests. Due to scheduling conflicts some participants were aware that there were different groups but were ultimately

unaware of the investigator's hypotheses. Procedures: Prior to all sessions, participants completed a dynamic warm up aimed to increase blood flow and increase extensibility of the working muscles. The first test that was chosen was the modified T-test. The only difference with the modified test is all distances are cut in half to reduce the influence of linear speed. This test has been shown to be highly reliability. The other test is the zigzag run test, which involves the participant running in a figure-8 pattern. Participants were given three minutes between each change of direction test trials to ensure that fatigue was not becoming a factor. Each of the strength training and lateral plyometric groups completed three sets of 10 repetitions for two different exercises. The strength training group completed lateral band walks and side planks with top leg abduction. The plyometric group completed lateral skaters and the hop-scotch ladder drill.

23. *Title:* **NCAA Division III athletes' use of mental skills and strategies to cope with mental barriers during the injury and rehabilitation process**
Principal presenter: Kylie Gerhardt
Major: Kinesiology
Faculty mentor: Dr. Renee Polubinsky
Abstract: OBJECTIVE: The purpose of this study is to examine NCAA Division III Athletes' use of mental skills and strategies to cope with mental barriers during their injury and rehabilitation process. SIGNIFICANCE: The study is providing an understanding as to how and why mental skills and strategies help athletes cope with the mental barriers they experience during their injury process. Since the study focuses specifically on Division III athletes, it will provide an understanding on the access the athletes have to mental training resources to help them cope with mental barriers related to injury. RESEARCH HYPOTHESIS: Since this is a qualitative study, there are two research questions being examined. The first question is how do mental skills and strategies help Division III athletes cope with their mental barriers during their injury process. The final question is what types of mental skills and strategies help Division III athletes cope with their mental barriers during their injury process. REVIEW OF LITERATURE: According to the NCAA and NATA, in 2004 there were about 200,000 injuries where athletes missed a day or more of practice or competition. Depending on the severity of the injury, some athletes need to seek medical attention and miss participating in the remainder of their season. During this time, athletes may experience mental barriers, which the use of mental skills and strategies can be used in order for the athletes to cope at their practices, training sessions, and competition. If athletes cannot cope with these mental barriers, sometimes it leads to the athletes quitting their sport. Therefore, it is important to understand athletes' injury process to determine if the use of mental skills and strategies were used in order to help cope with the mental barriers, but also see how these mental skills and strategies need to be incorporated into their injury process. THEORETICAL/METHODOLOGICAL CONSIDERATIONS: The interview questions on based on the Sport-Clinical Intake Protocol (SCIP; Taylor & Schneider, 1992). The interview is set up to find an understanding of Division III athletes'

injury and rehabilitation process and whether the use of mental skills and strategies helped them cope with mental barriers they experienced when they were previously injured at the collegiate level. PROCEDURE: Participants will be interviewed for 30-60 minutes about their injury and rehabilitation process at the Division III level. The participants will first be asked demographic items, then it will move into the main interview questions, which are spilt into three sections. The first section is on Injury Occurrence, which is followed by the second section, Reaction to Injury and Rehabilitation, and then the final section, Return to Sport. Once the interviews have been conducted, they will be transcribed verbatim in order to complete the data analysis, which is a thematic analysis. The two tools that will be used on descriptive coding and vivo coding.

24. *Title:* **Examining sprint speed changes over the course of an ultra-endurance event, The Ultimate Suck**
Principal presenter: Mason Reed
Major: Kinesiology
Other presenters or co-authors: Tim Piper
Faculty mentor: Dr. Tim Piper
Abstract: The purpose of this study is to examine the changes in sprint speed over the course of an ultra-endurance event named The Ultimate Suck. The Ultimate Suck is a grueling event that is 36 hours long where participant's mental and physical abilities are pushed to the maximum. To my knowledge no studies have examined sprint speed changes over the course of a 36-hour ultra-endurance event. Out of the 18 participants that volunteered for this study, 9 males and 5 females completed the full 36-hours. Four participants dropped out due to volitional fatigue. Descriptive data was collected on every participant before the start of the event. The average age of males was 35.2 years old (±4.37) and the female's average age was 34.5 years old (±9.06). The average height and weight for males was 182 cm (±5.86) and 95.84kg (± 11.96), and the average height and weight for females was 168.06 cm (±8.56) and 64.04 kg (±13.71). The aggregate average age was 34.87 years old (±6.62) and the aggregate average height was 175.61 cm (±10.03). The aggregate average weight was 81.16 kg (±20.54). Sprint data was collected on every participant before the start of the event and every 12 hours after until hour 24 (pre-test, 12th, and 24th hour). Sprint trials began after objectives were completed in The Ultimate Suck; each participant was timed on a 20-meter sprint in seconds. A One-way analysis of variance (ANOVA) test was conducted to determine significant differences in sprint times over the duration of the event. The sprint data for both genders was consolidated for analysis. Mauchly's Test of Sphericity indicated that the assumption of sphericity had been violated, $\chi 2$ (2) = 6.129, p =.047 and therefore, a Greenhouse-Geisser (1959) correction was applied. Epsilon (ε) was .714 as calculated according to Greenhouse-Geisser (1959) and was used to correct the one-way repeated measures ANOVA. Sprint times were found to be statistically significant across the test trials, F(1.429, 18.572) = 7.597, P =.007, partial $\eta 2$ =0.369, indicating large effect size. Post hoc analysis with a Bonferroni adjustment

revealed that when comparing sprint time, it was statistically significant from pre-intervention to hour 12 of the event (-0.471 (95% CI, -.758 to -.185) sec, p=.002), and from pre-intervention to hour 24 of the event (-0.641 (95% CI, -1.160 to -.123) sec, p=.014) and there were no differences between hour 12 and hour 24. Post hoc assessments revealed that when comparing the pre-test trial to other trials, significant differences were observed from pre-test 4.29 (± 0.57) to the 12th hour 4.76 (± 0.57), and from pre-test 4.29 (±0.57) to the 24th hour 4.93 (± 0.68). There was a statistically significant difference between the means at the different time points ($p < .05$). Therefore, we can reject the null hypothesis and can accept the alternative hypothesis, indicating that there is a significant effect on sprint times during long duration fatiguing events.

25. *Title:* **Geometrical Ray Tracing in Uniaxial Crystals Using Electromagnetic Method**
Principal presenter: Pramanand Joshi
Major: Physics
Faculty mentor: Dr. Pengqian Wang
Abstract: Uniaxial crystals being extremely useful in fabricating optical elements that find important applications in optical instruments, the research in this field has been a long lasting process since the Danish scientist Rasmus Bartholin in 1669. Here we have made an attempt to derive direct formulas to find the refractive index, ray index and the angle of refraction of the extra-ordinary wave (e-wave) using electromagnetic method. We start from the equation of index ellipsoid, which is the form with which e-waves propagate in uniaxial crystals. To find the refractive index of the generic e-wave, we choose a given wave propagation direction and we pass a plane that is perpendicular to this direction and passes through the center of the ellipsoid. Then the major and minor axes of the intersection ellipsoid gives the principal refractive indices along given wave propagation direction. The intersection of the intersection-ellipse and the incident parameter is at two points, one point corresponds to refraction and lies in the crystal II where the light is refracting; whereas the other point is in the first medium from where light incident at the interface and represents the point through which the e-ray reflects back. The angle that the line joining the point of intersection of incident parameter and the intersection-ellipse gives the angle of refraction. The formulas that we obtain contain only the incident parameters, i.e. no intermediate quantities. So, once we know these quantities and use in our formulas, we can find the target quantities.

26. *Title:* **Optical band gap of bismuth vanadium borate glasses**
Principal presenter: Mazharul Islam Mondal
Major: Physics
Other presenters or co-authors: P.K. Babu, Saisudha B Mallur
Faculty mentor: Dr. Saisudha B. Mallur
Abstract: Heavy metal oxide glasses containing V_2O_5 have potential applications in optoelectronic devices and electrochromic display devices. We prepared bismuth vanadium

borate glasses with the composition 30Bi2O3-(70-x) B2O3-x V2O5 (x= 0.1, 1, 2, 3, 4 mol%) and studied the optical absorption spectra of this ternary system as a function of vanadium composition. The optical band gap (Eopt) is an important parameter that depends on the electronic band structure of a glass and therefore, can serve as a basis to investigate the variation in the band structure. We carried out a detailed analysis of the optical absorption edge using the Mott-Davis model and determined Eop for all these glasses. We used a differential method based on Mott-Davis model to obtain the type of the electronic transition and the optical band gap which in turn was then compared with the value of Eopt determined using the extinction coefficient. We found that, with increasing V2O5 content, the absorption edge shifts towards longer wavelengths and the optical band gap decreases.

27. *Title:* **Optical Properties of Samarium(Sm)- doped Bismuth Telluro-borate glasses**
Principal presenter: Samson A. Akinpade
Major: Physics
Other presenters or co-authors: Dr P.K. Babu, Dr Saisudha B. Mallur
Faculty mentor: Dr. Saisudha B. Mallur
Abstract: Bismuth borate glasses doped with samarium ions are important materials for optical devices like lasers. We prepared bismuth borate glasses with the composition of 30-BiO3, (60-x)-B2O3, 10-T2O3 and xSm2O3 (x = 0.5, 1.0, 1.5, 2.0 mol%) by melt-quenching process and characterized through the measurement of refractive index and optical absorption. In the first part of this work, we measured the refractive index of the glass using Brewster's angle method. In the second part, the low energy region of the Sm3+ absorption spectrum is analyzed and the oscillator strength, which is the area under an absorption band, is calculated for further analysis. Variation of oscillator strength with Sm3+ concentration is studied and it shows a strong dependence on the Sm3+ content. The oscillator strength shows large values for 1 mol% of Sm3+ indicating that we can tailor our glasses by varying the samarium content to be a suitable candidate for solid state laser materials.

28. *Title:* **Study of Fluorescence Properties of Praseodymium (Pr3+) ions Doped Lead Boro-Germanate Glasses**
Principal presenter: Suman Gautam
Major: Physics
Other presenters or co-authors: P.K. Babu, Saisudha B Mallur
Faculty mentor: Dr. Saisudha B Mallur
Abstract: Rare Earth (RE) ions doped in germanate glasses are of great interest for their uses in various optical and optoelectronic devices. Fluorescence properties of PbO-GeO2-B2O3-Pr2O3 glasses doped with 20,30,40,50,60 mol% of PbO are studied. The glass samples were prepared using melt quenching method. This presentation discusses about the Pr3+ fluorescence spectrum obtained by exciting the glass sample at 445 nm excitation wavelength and viewing the light emitted by the excited atoms with the LEOI-101 Modular

Multifunctional Grating Spectrometer. It is observed that the positions of the peak wavelength of the intense fluorescence band of Pr3+ shift towards longer wavelengths indicating that the degree of covalency of RE-O bond increases with PbO content. The full width half maxima (FWHM) also increases from 20 mol % to 60 mol% of PbO with a slope change around 40 mol%. The intensity of the intense band reaches a maximum around 40 mol% of PbO indicating a major structural change happening in the glass for that composition and it affects the fluorescence of Pr3+ ions favourably at this composition.

29. *Title:* **Narrative Analysis of the Leisure Behavior of Black Individuals and Families in Rural Illinois**
Principal presenter: Taylor Brooks
Major: Recreation, Park & Tourism Administration
Faculty mentor: Dr. Jeremy Robinett
Abstract: It was not until the early 1960's that researchers began exploring the leisure behavior of racial minority groups. Researchers have since established that the leisure patterns of minoritized groups differ from those of their White counterparts. The literature has suggested three primary hypotheses for these differences: (1) subcultural, (2) marginality, and (3) discrimination. Each hypothesis suggests different explanations for why racial groups recreate the way they do, but there are still significant gaps in understanding the meanings and processes minoritized individuals and families negotiate while making choices about leisure. The purpose of this study is to add to this literature by exploring and providing richer understandings of the ways, if any, race intersects the leisure meanings and behaviors of Black individuals and their families in rural Illinois. Using conversational semi-structured interviews and Grounded theory coding strategies, this inductive qualitative inquiry will allow us to better understand how race intersects with leisure patterns for Black individuals and their families, and to offer programs to meet their leisure needs and wants.

30. *Title:* **Air Pollution and Racial Health Disparities**
Principal presenter: Chima Anyanwu
Major: Sociology
Faculty mentor: Dr. Lora Ebert Wallace
Abstract: This study is subsumed under an ongoing thesis on disease outcome associated with poor air quality in the context of different racial categories. Air pollution has been identified to induce several illnesses including cardiovascular and respiratory diseases. The objective of this study is to assess community exposure to air pollution and disease incidence according to community racial make-up. To understand the dangers of hazards, environmental toxics and how it is distributed among communities and racial groups, literatures and reports that delves into health disparities and environmental justice have been reviewed. This literature reveals a high-level pollution exposure among segregated black communities and other areas where non-white population reside. Based on literature

reviews and using critical race theory as a sociological lens, preliminary findings reveal race as the highest predictor of pollution exposure. Data for this research will be obtained from the U.S Census American Community Survey, Environmental Protection Agency, and Illinois Department of Public Health community map. They will all be matched together for analysis using SPSSS (Statistical Package for the Social Sciences) and will provide the necessary information needed to draw complete conclusion. There could be recommendations based on analysis, and study results can be a useful tool for population health studies, social advocacy, socio-economic and health policies.

Podium Presentations

1. *Title:* **A Systems Level Analysis of Hippocampal Involvement in Second-Order Fear Conditioning**
   Principal presenter: Matthew R Alwood
   Major: General Experimental Psychology
   Other presenters or co-authors: Kyle R Reterstoff
   Faculty mentor: Dr. Matthew R. Blankenship
   Abstract: Post-Traumatic Stress Disorder (PTSD) is characterized by intrusive memories of a previously experienced trauma. The onset of these memories is commonly caused by a trigger, which is a previously neutral sensory stimulus that has become associated with the traumatic stimulus. Curiously, triggers do not always relate directly to the trauma. Often triggers will be a neutral stimulus that has become associated with another more direct cue that was present during the initial trauma. In this case, a second-order association has been formed. In classical conditioning, first-order conditioning (FOC) occurs when a neutral stimulus (CS1) takes on the value of another positive (rewarding) or negative (frightening) stimulus (US). Pavlovian second-order conditioning (SOC) expands on FOC by adding an additional neutral conditioned stimulus (CS2) which acquires value through association with the CS1 without ever having been paired with the original US. Cued FOC has been previously demonstrated to require neurons in the amygdala, but not the hippocampus (Phillips & LeDoux, 1992). Recently, however, Gilboa et al. (2014) demonstrated that lesions of the hippocampus impair performance in appetitive SOC tasks. Given this finding, we hypothesized that the neural mechanism underlying SOC involves the recruitment of neurons in the hippocampus. If true, hippocampal lesions should reduce freezing behavior in an aversive SOC paradigm. To test this, we electrolytically lesioned the dorsal and ventral hippocampus of 11 Long-Evans rats via stereotaxic surgery. 16 rats underwent a sham surgery in which all factors were held constant with the exception that no current was run through the electrode. After a 10-12 day recovery period, all animals received 7 days of training. Days 1-3 and 6 were FOC days consisting of 20 trials in which a tone (CS1, 70dB SPL; 1kHz) was presented 6.7 sec followed by a foot shock (US) of (1mAmp, 500 msec) administered at variable intervals following CS1 (.2, 2.2, 4.2 or 6.2 sec). Days 4, 5, and 7 were SOC days in which the CS2, a brief 8-W light flash, was presented alongside the tone. On day 8, testing day, freezing time was measured as the length of time until movement (excluding breathing) following presentation of the CS2-alone on three trials. Maximum freezing time was recorded as 60sec. A 2 × 3 mixed ANOVA was performed using group (lesion vs. sham) as a between-subjects factor and trial number as a within-subjects factor. Preliminary data indicates, on all three trials, that lesioned rats consistently showed shorter freezing times compared to shams (mean differences for the 3 trials were 14.9 sec, 11.0 sec and 10.0 sec, respectively). Despite the predicted trend, no significant effects emerged for group ($F = 2.39$, $p = .135$, $\eta 2 = .087$) or trial number ($F = 1.114$, $p = .336$, $\eta 2 = .042$). The most obvious interpretation of these results is that the hippocampus is not critically

involved in the acquisition of SOC. However, the moderate effect size for the group comparison suggests that our sample may not have been large enough to reach significance. Ongoing work should address this

2. *Title:* **Alternative Approaches for Ending the Opioid Epidemic in the United States**
   Principal presenter: Courtney Dalton
   Major: Political Science
   Faculty mentor: Dr. Keith Boeckelman
   Abstract: This paper explores three alternative approaches to solving the opioid epidemic in the United States. Through historical analysis, data collection involving local, national, and international data, alternatives are suggested based on actions already taken by other areas and proposed recommendations by various researchers. This paper uses cost-benefit analyses and an outcomes matrix to determine the cost effectiveness, political feasibility, and implementation ease of these alternatives. The three alternatives are: decriminalizing opioid use, using cannabidiol oil to manage opioid addiction and its symptoms of withdrawal, and implementing safe injection centers into particularly inflicted areas.

3. *Title:* **Antioxidant Activity and Antiproliferative Effects of Acmella alba, Acmella oleracea, and Acmella calirrhiza**
   Principal presenter: Lindsey Weintraub
   Major: Biology
   Faculty mentor: Dr. Mette Soendergaard
   Abstract: Plants of the genus Acmella are found in subtropical parts of the southern hemisphere. A few species are utilized as medicinal herbs to treat various illnesses such as stomatitis, snake bites, and tuberculosis. However, there is little research documenting antiproliferative and antioxidant properties of the plants. In order to investigate the antiproliferative and antioxidant activities of plants of the Acmella genus, Acmella alba, Acmella oleracea, and Acmella calirrhiza were separated into leaves, roots, stems, and flowers, freeze-dried, and ground into a fine powder. For antioxidant activity assays and determination of phenolic content, plant powders were extracted using 1% HCl in 90% aqueous methanol for 2 h. The antioxidant capacity of extracts was then analyzed using 2,2-diphenyl-1-picrylhydrazyl (DPPH), and 2,2'-azino-bis (3-ethylbenzothiazoline-6-sulfonic acid) (ABTS) assays. The radical scavenging of each extract was compared to a 6-hydroxy-2,5,7,8-tetramethylchroman-2-carboxylic acid (trolox) standard and was calculated as trolox equivalents (TE; Î¼mol/g dry weight). Both assays revealed that the roots of all three plants contained the lowest antioxidant capacity compared to the leaves, stems, and flowers. The phenolic content was determined using the Folin-Ciocalteu assay. In correlation with the DPPH and ABTS assays, the roots showed the lowest phenolic content for all three plants. For Acmella alba, and Acmella oleracea, the leaves exhibited the highest phenolic content. Acmella calirrhiza demonstrated the highest phenolic content in the flowers. For analysis of cell viability, plant materials were extracted thrice using ethanol for 24 h.

Extracts were then evaporated overnight at 50°C, and then resuspended in DMSO to a final concentration of 20 mg/mL. Human ovarian adenocarcinoma (SKOV-3) cells were treated with 0.2 mg/mL of each extract, 100 Î¼M paclitaxel, or dimethyl sulfoxide (DMSO; vehicle) for 48 h at 37°C, 5% CO2. Cell viability was then determined using a tetrazolium reduction assay. In brief, 0.45 mg/mL 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide (MTT) was incubated with the cells for 4 h, after which formed formazan crystals were dissolved using DMSO. The absorbance at 570 nm was then measured spectrophotometrically. As expected, paclitaxel showed a significant decrease in cell viability. Additionally, the leaves, roots, and stems of Acmella alba, the leaves, and roots of Acmella oleracea, and the leaves, stems, and flowers of Acmella calirrhiza resulted in a significant decrease in the cell viability of SKOV-3 cells compared to DMSO.

4. *Title:* **Antioxidant Activity and Phenolic Content of Chinese Balsam (Impatiens chinensis)**
   Principal presenter: Kimberly Oldenburg
   Major: Chemistry
   Other presenters or co-authors: Dr. Shelby Henning, Dr. Mette Soendergaard
   Faculty mentor: Dr. Mette Soendergaard
   Abstract: The Chinese Balsam (Impatiens chinensis) is a species of plant found in water abundant areas of NE India. It has been used medicinally for the treatment of pain, prevention of cancer, and promotion of blood circulation. The plant, however, has not been well studied, leaving its phytochemistry predominantly unknown. This work thus serves to be the initial report of antioxidant capacity and phenolic content for each component of I. chinensis; seeds, leaves, stems, roots, and flowers. I. chinensis plants were harvested and immediately segregated into seeds, flowers, stems, leaves, and roots, lyophilized overnight, and powdered via a pre-chilled pestle and mortar. Extractions were prepared using 100mg of each component solubilized in 1mL 90% aqueous methanol, 1% HCl and shaken for 2h at room temperature. Antioxidant capacity was measured with both the 2,2-diphenly-1picryl-hydrazyl-hydrate (DPPH) and ABTS assays. For DPPH, 10µL of extract was incubated with 195µL 0.01nM DPPH for 15m in the dark, then measured at 517nm on a microplate reader (Spectra Max 250). Separately, 10µL of extract was incubated with 95µL of the working 3.5mM ABTS solution for 30s, after which the absorbance was measured at 734nm. Extracts were then diluted 3, 10, 30, 100, 300, 1000, 3000, 10000, 30000x to generate a dose response curve, from which the IC50 value was determined. The calculated IC50 results from the DPPH assay were 0.06366, 0.01351, 0.03642, and 0.08772 Trolox equivalents, for the stem, flower, leaves, and root, respectively. Similar values were observed from the ABTS assay, where the calculated IC50 values were 0.04675, 0.01507, 0.04817, 0.08108, and 0.04675 for the stem, flower, leaves, root, and seeds, respectively. The phenolic composition was then determined using the Folin-Ciocalteu assay. Briefly, 20µL of each extract was combined with 10µL 2N FC reagent, ddH2O, and 12.5% sodium carbonate and incubated for 30m, after which the absorbance was measured at 750nm.

Results were calculated using a gallic acid standard curve and therefore are reported in gallic acid equivalents (GAE; μmol/g dry weight). Extracts were then diluted 3, 10, 30, 100, 300, 1000, 3000, 10000, 30000x to generate a dose response curve, from which the EC50 value was determined. The calculated EC50 values for the stem, flower, leaves, and root were are 0.1896, 0.09099, 0.1872, and 0.5761, respectively. Further investigation of this plant, including flavonoid content, is currently underway.

5. *Title:* **Behind the Iron Mask: Dmitri Shostakovich and The Gadfly**
   Principal presenter: Lauren Cisna
   Major: Musicology
   Faculty mentor: Dr. Anita Hardeman
   Abstract: Dmitri Shostakovich wrote music for thirty-four films during his composition career. While Shostakovich's symphonies, string quartets, and personal life have been scrutinized heavily, his film scores have been largely ignored. This is surprising, given the varied political and social statements some films elicited. All Soviet art was carefully monitored, but cinema was deemed especially influential by Lenin and Stalin. The purpose of this research is to analyze and present the 1955 film, The Gadfly, as a valuable synthesis of mid-century Russian politics, culture, and musical development. There is no doubt that Shostakovich's oeuvre was impacted by censorship. The Gadfly was composed two years after Stalin's death, which allowed Shostakovich freedom to take an outspoken, satirical approach to his compositions. However, Shostakovich's contributions to The Gadfly are marked by subtle ironies, juxtaposed with a few bold anti-religious implications. His musical commentary on state unity, religious ideals, and social class is veiled, yet undoubtedly had considerable influence on Russian cinema-goers. Unfortunately, the regard for Shostakovich's once-popular film music has mostly disappeared today. I argue that his film scores, specifically The Gadfly, should be studied from a broader cultural perspective.

6. *Title:* **Comparing Whites and Minorities on Defense of the Status Quo**
   Principal presenter: Brianna Richmond
   Major: Experimental Psychology
   Other presenters or co-authors: Lukas Sotola (Iowa State University)
   Faculty mentor: Dr. Kristine Kelly
   Abstract: Introduction According to System Justification Theory (Jost & Banaji, 1994), people are motivated to maintain the belief that existing social hierarchies are just, fair, and legitimate. Research has found that both people from advantaged backgrounds (e.g., White males) and people from disadvantaged backgrounds (e.g., Blacks, lesbians, etc.) tend to engage in system justification (Jost et al., 2003). However, past work suggests that while Whites (a high-status group) and Minorities (low-status groups) tend to show equal levels of system justification (e.g., Rankin et al., 2009), system justification tends to have different psychological consequences for both groups (Jost & Burgess, 2000). This further suggests that system justification may be predicted by different psychological variables in different

racial and ethnic groups. The current study was designed to assess one's belief in racial system justification as a function of the endorsement of various ideologies, including modern racism, right-wing authoritarianism, protestant work ethic, political conservatism, social dominance orientation, and religious fundamentalism to investigate this possibility. Methods Participants were 419 college students from a large Midwestern university (79% White and 68% female) with ages ranging from 18-38 (M=19). As part of a larger study, they completed an online questionnaires that assessed modern racism (McConahay, 1986), right-wing authoritarianism (Altemeyer, 1998), protestant work ethic (Mirels & Garrett, 1971), a single-item question on political liberalism/conservatism, social dominance orientation (Pratto et al., 2000), religious fundamentalism (Altemeyer & Hunsberger, 1992), and racial system justification (Sotola & Crede, 2019). Results Modern racism, right-wing authoritarianism, protestant work ethic, political ideology, social dominance orientation, and religious fundamentalism were used in a stepwise regression analysis to predict racial system justification (RSJ). Models were built separately for White participants and Minority participants. For White participants, the prediction model was significant, $F(3,293) = 96.325$, $p < .001$ and accounted for approximately 50% of the variance. RSJ was predicted by three of the six predictors: specifically, higher levels of modern racism and protestant work ethic as well as a conservative political orientation predicted greater RSJ. The prediction model for Minority participants was also significant, $F(3,56) = 19.380$, $p < .001$ and accounted for approximately 51% of the variance. The three significant predictors were social dominance orientation, modern racism, and conservative political orientation. Discussion The current study showed that different ideologies are associated with RSJ beliefs among White and Minority individuals. Though modern racism and political orientation were both predictors for racial system-justifying beliefs, they received different weights in the two models. Also, protestant work ethic and social dominance orientation were unique to each model. Overall, racial system justification is a tool for understanding how different people view the world and social systems. By examining the differences among ethnicities, we can better understand how individuals justify social systems and how it may help them make sense of the world.

7. *Title:* **Development of a Novel Calreticulin Plasmid Reporter for the Identification of Immunotherapeutic Drugs that Induce Immunogenic Cell Death**
   Principal presenter: Rebecca N Bocian
   Major: Bioloy
   Other presenters or co-authors: Dr. Mette Soendergaard, Dr. Eric Gurzell
   Faculty mentor: Dr. Mette Soendergaard
   Abstract: Immunogenic cell death (ICD) initiates a series of damage associated molecular patterns (DAMPs) that are able to activate an immune response. Of these, translocation of calreticulin (CRT) from the endoplasmic reticulum (ER) to the outer leaflet of the cell membrane is a hallmark event that leads to activation of antigen presenting cells (APC), thus priming an immune response. Induction of ICD in cancer cells may provide a manner

of activating an immunological anti-tumor response, which may be utilized in immunotherapy. Currently, a few chemotherapeutic drugs, such as doxorubicin, are known to induce ICD, and have been proposed to be repurposed for this use. Thus, it is likely that other known drugs may exhibit ICD induction and may be utilized in immunotherapy. However, to evaluate such drugs, there is a need to develop a high throughput method of detecting ICD. Here, a novel ICD reporter based on translocation of CRT and the HiBit-tag expression system is described. This system utilizes recombinant HiBit-tagged CRT that complexes with LgBit when translocated to the outer leaflet of the cell membrane, which may then be detected bioluminescently by addition of D-luciferin. Thus, the intensity of bioluminescence may be correlated to translocation of CRT, a hallmark of ICD. This allows for the evaluation of potential immunotherapeutics, which may improve cancer treatment outcomes. To create the novel ICD reporter, the human CRT gene was amplified using polymerase chain reaction (PCR) from plasmid HsCD00322958 (Harvard Medical School, MA), and inserted onto the 3' end of the HiBit tag (pBiT3.1-N, Promega, WI) using restriction enzyme digestion (PspXI and SbfI) followed by ligation. The recombinant HiBiT-CRT plasmid was transformed into competent DH5a E. coli cells using the heat-shock method. The HiBit-CRT cassette was validated by DNA Sanger sequencing (Genscript, Piscataway, NJ). In order to transfect human ovarian adenocarcinoma cells (SKOV-3) with the ICD reporter, the optimal concentration of geneticin was first determined by performing a kill curve. In brief, SKOV-3 cells were maintained in McCoy's 5A cell medium supplemented with 10 % fetal bovine serum (FBS) at 37°C and 5% CO2, and then treated with varying concentrations of geneticin (0.05 mg/mL, 0.1 mg/mL, 0.25 mg/mL, 0.5 mg/mL, 0.75 mg/mL, 1 mg/mL, 1.25 mg/mL, 1.5 mg/mL, 1.75 mg/mL, 2 mg/mL). The cell viability was evaluated daily for 7 days using bright field microscopy. The optimal concentration was determined to be 1.25 mg/mL. SKOV-3 cells will be transfected with the ICD reporter, and the ability of the reporter to detect/quantify ICD analyzed using propidium iodide, fluorescent microscopy, and ATP luciferase assays.

8. *Title:* **Devil-Bug's Dream: an American Nightmare**
   Principal presenter: Kendrick Keller
   Major: English
   Faculty mentor: Dr. Timothy Helwig
   Abstract: In the 18th century, the expansion of the newly freed America in the West was seen as an optimistic new world rid of the mistreatment of the poor and the iron fist of the monarchy that dominated the Thirteen Colonies prior to the American Revolution. This paper compares the promises of the American West put forth by French pro-American author J. Hector St. John de Crevecoeur, promises of upward mobility, inherent equality, and of moral strengthâ€” American Exceptionalism with the fantastical dark future of American Democracy and Capitalism present in George Lippard's chapter "A Devil Bug's Dream" out of his 1845 book "The Quaker City". "A Devil Bug's Dream" imagines a 1950's religious apocalypse brought upon a corrupt and nightmarish 20th century Philidelphia.

This essay will discuss the ways in which "Devil-Bug's Dream" uses its nightmarish setting as a commentary on the failures of American Exceptionalism.

9. *Title:* **Examining Perceptions of Campus Climate: Opportunities for Inclusive Environments**
   Principal presenter: Geoffrey Dejanvier
   Major: College Student Personnel
   Other presenters or co-authors: Lauren Hoover, Jenissa Nino, Breanna Williams
   Faculty mentor: Dr Laila McCloud
   Abstract: Transforming the campus culture is complex and multi-dimensional. As colleges and universities continue to diversify the students and communities they serve, there is a need to examine a) students' perceptions of the campus climate for personal and social responsibility and b) how campus communicate their campus racial climate. This presentation will discuss preliminary findings on two studies. The first study is a mixed-methods analysis of undergraduate students' perceptions of the campus climate for personal and social integrity. The analysis included 1,197 student responses from a single institution in the southeastern part of the U.S. Our analysis found that students frequently cited being involved in campus-based activities as supporting their personal and social integrity, The second study is a content analysis of how institutions communicate the campus racial climate via pre-orientation program websites at five institutions across the U.S. Our analysis found that gratitude, recognition, mentoring, and leadership were highlighted one the pre-orientation websites. Overall, our analysis collectively concluded that the various aspects of campus climate have a huge impact on how students experience their college careers.

10. *Title:* **Gender Differences in the Prediction of Gender System Justification**
    Principal presenter: Jordan Glad
    Major: General Experimental Psychology
    Other presenters or co-authors: Lukas Sotola (Iowa State)
    Faculty mentor: Dr. Kristine Kelly
    Abstract: Background System Justification Theory (Jost & Banaji, 1994) proposes that people are motivated to see the social systems under which they operate as fair, legitimate, and desirable. Gender system justification (GSJ) refers to individuals' support of stereotypical differences between men and women. Jost and Kay (2005) have shown that endorsement of traditional gender roles increases system justification and the perception that each gender is ideally suited for the social positions prescribed to them. Furthermore, gender system justification legitimizes the existing divisions of labor and encourages the view that they are just, natural, and inevitable (Jost & Hamilton, 2005; Miller & Borgida, 2016). Remarkably, system justification is embraced by low-status groups (e.g., women) to defend their relative disadvantage (Jost & Hunyady, 2002). In one of the few studies that examined gender differences in system justification, Kray et al. (2017) found that strength of gender identification was a stronger predictor of system justification for men than it was

for women, suggesting that men's defense of the status quo may be motivated by their membership in a high status group. Patriarchal social systems are accepted by both men and women (Glick & Fiske, 1996), including benevolent and hostile sexism that promotes and maintains gender inequality (Glick et al., 2000, 2004). The purpose of the present study was to examine the strength of the relationship between GSJ and sexism, separately for men and women. Procedure A total of 356 college students from a large Midwestern university took part in the study. Their average age was 19, and 70% were women. As part of a larger study, participants an online survey comprised of measures of gender system justification (Jostkay, 2005) in addition to hostile sexism and benevolent sexism (Glick & Fiske, 1996). Results Two Pearson correlation analyses were conducted to assess the relationships between hostile and benevolent sexism, on the one hand, and GSJ on the other for men and women separately. Results indicated that benevolent sexism was a significant predictor of GSJ in both men [r(97)=.30, p<.01] and women [r(259)=.39, p<.01]. Hostile sexism also significantly predicted GSJ in both men [r(97)=.44, p<.01] and women [r(259)=..58, p<.01] as well. A Fisherâ€™s r-to-z transformation was used to test the significance of the differences between the correlations for men and women. There was no significant difference in the correlations between benevolent sexism and GSJ for men and women. However, the correlations between hostile sexism and GSJ for men and women were significantly different (z=1.69, p<.05) whereby this relationship was stronger for women than for men. Discussion This study indicates that hostile sexism is a better predictor of women's compared to men's acceptance and defense of traditional gender roles as measured by GSJ. This finding is consistent with previous research showing that individuals that are harmed most by the systems in play tend to system justify the most despite the negative effect that it has on them.

11. *Title:* **How is cannibalism in Spodoptera frugiperda influenced by plant induced defenses**
Principal presenter: Rajeev Roy
Major: Biology
Faculty mentor: Dr. Richard O Musser
Abstract: Cannibalism is common among a large number of lepidopteran species. In my research, I tested the impact of two plant induced defense compounds on effect on the cannibalistic behavior of Spodoptera frugiperda and determine if there is any compensatory benefit that cannibalism might provide to avoid these defense substances. In my thesis, I used 6th instar S. frugiperda larvae divided into four treatment groups. The control treatment was a single caterpillar that fed on a cube of artificial diet, the nicotine treatment was a single caterpillar that fed on an artificial diet treated with 0.1 mL nicotine solution (10% v/v). To examine cannibalism, I included three similar-sized 6th instar caterpillars on the artificial diet without any nicotine and on the artificial diet with nicotine treatment. The arena used to observe feeding was standard Petri dishes and I observed the caterpillars for 48 hours to record feeding behaviors and cannibalistic behavior. The amount of diet

consumed, and caterpillar growth will be weighed before after the respective treatments. Immediately after the final weighing, the caterpillars will be flash-frozen in liquid nitrogen ultimately for RNA gene expression analysis for a variety of digestive and detoxification genes. Besides, I will repeat the above protocol for additional plant defenses such as trypsin inhibitor with the 72-hour observation period. I hypothesize that these common plant defenses will trigger cannibalism and that cannibalism in part will reduce the compensatory digestive gene expression for the surviving caterpillars. The presence of nicotine and trypsin inhibitor both increased rate of cannibalism in S.frugiperda and the gene expression studies by qPCR revealed compensatory benefits in the expression of protein-digesting enzymes (trypsin, chymotrypsin and cathepsin like L cysteine proteinase). We also noticed significant changes in gene expression of defense-related genes and detoxification genes.

12. *Title:* **Phage Display Selection, Identification, and Characterization of Novel Pancreatic Cancer Targeting Peptide Ligands**
Principal presenter: Mallika Asar
Major: Chemistry
Faculty mentor: Dr. Mette Soendergaard
Abstract: Pancreatic cancer is currently the fourth leading cause of cancer deaths in the United States, characterized by an extremely low average 5-year survival rate of 3%. The low survival rate is due to inadequate diagnostic methods, which results in late diagnosis and treatment. Phage display technology using a fUSE5 15-mer library was employed in an effort to discover peptides that bind with strong selectivity and specificity to pancreatic cancer cells. The first round of phage display selection was performed against normal pancreatic cells (hTERT-HPNE) in an attempt to clear the phage that bind to normal cells. Four rounds of positive selection were then performed against pancreatic cancer (Mia Paca-2) cells. Following the fourth round of positive selection, the phage DNA was extracted and amplified through polymerase chain reaction (PCR). The PCR amplicons were purified and submitted for next generation sequencing. The sequencing results identified two phage clones that were prevalent in the positive selection, MCA1 and MCA2. The phage-displayed peptides were synthesized separately from the phage clones and used in cell binding studies and epifluorescent microscopy to understand more about their binding properties. Results showed that both peptides MCA1 and MCA2 bound significantly higher ($p<0.01$) to pancreatic cancer cells, compared to control DMSO (vehicle). A further study demonstrated that peptides MCA1 and MCA2 showed no significant binding to normal pancreatic (hTERT-HPNE) or normal embryonic kidney (HEK293) cells. Furthermore, peptide binding to two other cancer cell lines, ovarian (SKOV-3) and prostate (LNCaP), was evaluated to determine if peptides MCA1 and MCA2 were specific to pancreatic cancer cells. The results showed no significant binding to SKOV-3 or LNCaP cells, indicating specific binding to pancreatic cancer cells. Finally, epifluorescent microscopy provided additional evidence that peptides MCA1 and MCA2 bind specifically to pancreatic cancer cells. The fluorescent intensity per cell was quantified, and the results confirmed that

peptides MCA1 and MCA2 bind significantly higher to Mia Paca-2 cells ($p<0.0001$), and not to hTERT-HPNE, HEK293, SKOV-3, or LNCaP cells. These results indicate that the peptides MCA1 and MCA2 bind specifically to pancreatic cancer cells. Taken together, the results from cell binding and fluorescent microscopy studies suggest that peptides MCA1 and MCA2 bind specifically to Mia Paca-2 pancreatic cancer cells. These peptides may lead to the development of novel diagnostic and imaging methods for the detection of pancreatic cancer.

13. *Title:* **Phrenological Framework and Physical Depiction: Disability and Depravity in Poe's "The Tell-Tale Heart"**
Principal presenter: Maureen Sullivan
Major: English
Faculty mentor: Dr. Timothy Helwig
Abstract: My paper takes a New Historical approach to one of Edgar Allan Poe's most famous short stories, "The Tell-Tale Heart." I explore how Poe harnesses the underlying sense of cultural unease surrounding disability and bodily differences, as evidenced by the tale's narrator who fixates on the old man's abnormal eye and cites it as the impetus for murderous rage. Combining historical context of phrenology and contemporary disability studies, I demonstrate how this tale builds on the societal conviction that physical appearance reflects moral character and invokes the common trope of the disfigured villain. First, I argue that the pseudoscience of phrenology, which held that the shape of the skull revealed a person's traits and mental capacities, laid the groundwork for judging personality and moral character through physical appearance. Many scholars have deconstructed how Poe used elements of phrenology to enhance the characterization of individuals in his stories. The foundation of my argument regarding the connection between internal characteristics and external appearance is built upon Brett Zimmerman's dissection of phrenological elements of "The Fall of the House of Usher" and Erik Grayson's analysis of Poe's frequent use of phrenological detail, as well as Bridget M. Marshall's discussion of phrenology and morality in Gothic villains. Second, I argue that the old man's eye, and the narrator's violent reaction, can be interpreted as an example of the disabled villain trope, often discussed in disabilities studies. Scholars such as Rosemarie Garland Thompson and Michael Bérubé have written extensively about the popular literary device for characterizing villains through the convention that a disfigured body represented a corrupted morality within. By combining the two lenses of phrenology and disability studies in my close reading of Poe's tale, I explain how the narrator's homicidal response to the old man's abnormal eye follows this same tradition in which disability is encoded as evil, and characters and readers alike are trained to respond accordingly with disgust, horror, and fear. As modern media continues to grapple with issues of representation, analyzing literature through a critical lens reveals valuable insight into the enduring power of stories to shape our world.

14. *Title:* **Predicting General and Specific Religious System Justification**
Principal presenter: Melissa Gaston
Major: Psychology
Other presenters or co-authors: Lukas
Faculty mentor: Dr. Kristine Kelly
Abstract: Background System Justification Theory (Jost & Banaji, 1994; Jost, Banaji & Nosek, 2004) focuses on the ways individuals defend existing social, political, and economic institutions, even when doing so comes at the expense of their own personal interests. People who engage in system justification (SJ) tend to endorse other ideologies that maintain the status quo, such as political conservatism (Jost, Nosek, & Gosling, 2008), religious fundamentalism (Rankin, Jost, & Waslak,2009), and traditional gender stereotypes (Jost & Kay, 2005). Additionally, Jost and Hunyady (2005) identified social dominance orientation, right-wing authoritarianism, and protestant work ethic as system justifying ideologies. Overall, system justification increases individuals' feelings of well-being (Harding & Sibley, 2013) and satisfaction with their economic situation (Jost et al., 2003). In one of the few studies that assessed the impact of SJ beliefs in the context of religion, Jost et al. (2014) found that Catholic and Protestant belief systems were associated with many SJ attitudes. Our goal in the present study was to examine both general religious SJ and specific religious SJ in an attempt to build a model of each that delineates the SJ beliefs uniquely associated with each. Procedure Participants were 337 college students (70% women, 78% Caucasian) who completed an online survey as part of a larger study. This survey was comprised of measures of general religious system justification (Sotola & Crede, 2019), specific religious system justification (Sotola & Crede, 2019), a single item about political conservatism, religious fundamentalism (Altemeyer & Hunsberger, 2004), gender-related system justification (Jostkay, 2005), social dominance orientation (Pratto et al., 2000), right-wing authoritarianism (Altermeyer, 1998), protestant work ethic (Mirels & Garrett, 1971), religious commitment (Worthington et al., 2003) and religiosity (Rohrbaugh & Jessor, 1975). Results Political conservatism, religious fundamentalism, gender-related system justification, social dominance orientation, right-wing authoritarianism, protestant work ethic, religious commitment, and religiosity were used in a stepwise multiple regression analysis to predict general religious system justification (GRSJ) and specific religious system justification (SRSJ) separately. The GRSJ prediction model contained three of the eight predictors, and the model was statistically significant, $F(3, 352) = 87.88$, $p < .001$. GRSJ was primarily predicted by religious commitment, gender system justification, and religious fundamentalism. This model accounted for 42% of the variance. The SRSJ prediction model contained three of the eight predictors, and the model was statistically significant, $F(3, 281) = 66.21$, $p < .001$. The best set of predictors of SRSJ were religiosity, gender system justification, and religious commitment. This model accounted for 41% of the variance. Discussion This study indicates that GRSJ, which refers to justification of religion in general, encompasses a different set of concepts than SRSJ, which involves justification of one's specific religious belief system. Although both are

predicted by defense of traditional gender roles and religious commitment, GRSJ was predicted by the belief in absolute authority of religious leaders or deity (i.e., religious fundamentalism), while religious dedication and activity (i.e., religious commitment) predicted SRSJ.

15. *Title:* **Proactive Guerrilla Archiving**
    Principal presenter: Katrina Vandeven
    Major: Political Science
    Faculty mentor: Dr. Julia Albarracin
    Abstract: This presentation will review the the presenter's theory of guerrilla archiving, and specifically proactive guerrilla archiving. This entails the documentation of political history as it is created at activist events. She will also discuss her of guerrilla archiving as counter-hegemonic praxis, which can be used to create a more democratic archival record: this includes decolonial, feminist, and critical race theories. She will also discuss her theory and method of guerrilla oral history.

16. *Title:* **School as a Form of Ideological State Apparatus (ISA) and Liberation: A case study of Paulo Freire's "The Banking Concept of Education" and Tara Westover's "Educated"**
    Principal presenter: Rachael Aderoju
    Major: English
    Faculty mentor: Dr. David Banash
    Abstract: Schools in the past centuries have developed in both size and number. However, the school has remained one of the most (if not the most) important systems that inculcates dominant ideology and sustains the reproduction of labor in society. The dominant ideology, which is the ideology of the bourgeoisie, is often associated with the interests of the capitalists, political elites, and corporate networks. This paper explores how dominant ideology works and how schools play a good role in enhancing the reproduction of this ideology. By invoking Louis Althusser's theory of Ideological State Apparatus (ISA), I argue that the school serves the interests of oppressors in society by transitioning students into obedient workforce for the labor market. ISA denotes institutions that are not directly under the state but reproduce ideas and thoughts that are state friendly. Some other institutions under the ISA are church, family, media, and trade unions. These institutions imbibe into their students, ideologies, and skills that make them fit into the capitalist job. For Althusser education and oppression are connected, since education can either function as a form of oppression or liberation. ISAs do not only act by ideology but also use suitable methods of punishment like expulsion to discipline those who defy their ideologies, thereby acting with violence and coercion. The problem with schooling as an Ideological State Apparatus is diverse, however, this paper examines three most obvious and significant aspects of students' lives: the absence of critical thinking and creativity, the use of a dominating pedagogy of teaching, and the deficient of meaningful learning. Althusser's

theory of school as an ISA was contrasted with Paulo Freire's theory of 'the banking system of education.' Freire argued that, although the school could function as an ISA, it can also function positively as a form of liberation from oppressors. Freire suggested a problem-posing pedagogy which is based on dialogue and communication. In a problem-posing pedagogy, students are taught in ways that make them familiar and conscious of the system that exploits them. It is, therefore, easier for students to liberate themselves from the conditions that tyrannize them. By using Tara Westover's memoir, "Educated," this paper examines how education gained from school can also be made to function as a form of liberation. "Educated" relates a tale of how Westover's education at Cambridge University served as liberation from her fundamentalist father, which supports the liberating function of school proposed by Freire. However, the results of this study reveal that school only functioned as a liberating tool for Westover because there was a stronger ideology in place, which was her fundamentalist father. This study, therefore, agrees with Althusser, that school is not a neutral system, and it at all times function as an ISA. The rare situations where it functions positively are when a stronger ideology is in place.

17. *Title:* **Size Selectivity of Gill Nets Used to Target Silver and Bighead Carp in the Upper Mississippi**
    Principal presenter: Zachary Witzel
    Major: Biology
    Faculty mentor: Dr. James T Lamer
    Abstract: Bigheaded carp (bighead carp and silver carp) are highly invasive fishes in the Mississippi River System and can be detrimental to native fishes and ecosystems. To limit their impact and further expansion, fishermen have been contracted through state and federal agencies to remove bigheaded carp using predominantly gill nets. Mesh size of entanglement gears determines the size structure of fishes able to be captured. To increase efficiency and effectiveness of bigheaded carp harvest and minimize the capture of bycatch, it is important to understand the relationship of gill net mesh size with the size structure of persistent populations. Therefore, the objective of our study is to determine the size of bigheaded carp and commonly encountered bycatch that are effectively caught in different sized gill nets based on their size. Gill nets were used in pools 16 through 20 on the Mississippi River to capture silver carp and bighead carp. For every 25.4 mm increase in gill net mesh, it was determined that there is a 200 mm increase in the highest retained bigheaded carp body size. With this information managers will be able to more efficiently target bigheaded carp if knowledge of population size structure is available.

18. *Title:* **Social Media, Hashtag Hijacking and Public Relations: The Case Study of #AskChevron**
    Principal presenter: Fang Zheng
    Major: communication
    Faculty mentor: Dr. Josh Averbeck

Abstract: Social media offers organizations access to a vast network of users who assist them in important market tasks which other traditional media cannot efficiently facilitate.The trend toward using social media as a public relations strategy has been embraced by brands looking to engage with a variety of stakeholders.When organizations use social media, such as hashtags for public relations, there is greater potential for losing control of messages as they engage in two-way communication with the public. Previous research has shown that ignoring or misinterpreting the attitudes of a follower network in social media can be damaging for organizations and may lead to destroy public relations. On one of popular social media platforms, Twitter, hashtags are used to label tweets as being related to a particular topic. Through them users join virtual debates in which they are used to talk about issues. This research explored how a social group used hijacked hashtags as a social media public relations campaign of #AskChevron in creating or fueling organizational crises. Based on previous research, we present the following research question of this study: RQ1: How do hijacked hashtags #AskChevron have an impact on Public relations? RQ2: What should we learn from #AskChevron on Crisis Communication? In this study, we collect the Twitter data generated by users. To eliminate spammers, only users that posted tweets with asking Chevron are included. A thematic analysis of Tweets revealed that the hashtag was hijacked through audience members criticizing and mocking Chevron. Employing thematic analysis, this study identified the frames of hashtags in the movement including five themes: (1)Criticizing; (2)Mocking; (3) General sarcasm;(4)Explain;(5)Suggestion. This study offers practical implications for public relations practitioners. First, organizations need to acknowledge great potential of the social media platforms that enable an issue or event to be spread without temporal or spatial restrictions in a short period. Second, as the study's thematic analyses demonstrated that publics contributed the discourse by covering a wide range of facets. Third, managing social media is complex and should be well planned. The practitioners should prepare, post, and promote a response within the hashtag when anything unfavorable happens to them. We conclude with implications for understanding the role of social media in shaping public relations. Nevertheless, this research was limited in that it only explored single case. Single case study analysis has been subject to a number of criticisms, the most common of which concern the inter-related issues of methodological rigor, researcher subjectivity, and external validity. A second issue, again also incorporating issues of construct validity, concerns that of the reliability and validity of various forms of single case study analysis. The third and arguably most prominent critique of single case study analysis is the issue of external validity or generalizability. Although we believe that the insights gained from this case are important, it would be beneficial to examine multiple cases. Future research should examine other cases in social media to find more on hijacked hashtags and public relations.

19. *Title:* **The Age, Growth and Emergence of Larval Fish in the Upper Mississippi River**
Principal presenter: Madeline Tomczak
Major: Biology
Other presenters or co-authors: Tyler Thomsen, Cassidy Miles, Kevin Irons (Illinois Department of Natural Resources), James Lamer
Faculty mentor: Dr. James Lamer
Abstract: The Upper Mississippi River (UMR) contains diverse habitat structure, providing important nursery habitat for larval fish in backwater areas. However, how larval fish use these habitats and the environmental cues that contribute to their abundance and emergence is not well understood. Therefore, we evaluated environmental variables that contribute to larval fish emergence and habitats that influence their abundance. We sampled for larval fish from May-September, 2018 in Pools 17-19 in low-velocity habitats at water temps greater than 17°C using larval light traps (8 per night, n= 280 traps total). Each larval fish was identified to family and further resolved to species using genetic barcoding. Age was determined from daily otolith increments and used to back-calculate hatch date. Date of species-level emergence and abundance were modeled in relation to habitat structure, water temperature, and discharge. The average age for all fish was fifteen days and the average length was 8 millimeters. Hatch dates of Clupeidae and Catostomidae occurred in April-May, while Cyprinidae and Centrarchidae had continuous hatch dates April-August. Temperature and family had a statistically significant impact on the growth rate of the fish (millimeters per day). Information gained will contribute to a better understanding of this vulnerable life stage in a large, dynamic river system.

20. *Title:* **The Characterization of Pancreatic Cancer Targeting Peptides MCA1 and MCA2**
Principal presenter: April Franco
Major: Biology
Faculty mentor: Dr. Mette Soendergaard
Abstract: Pancreatic cancer is usually a fatal type of cancer and is anticipated to be ranked as the second leading cause of cancer deaths in the United States in 2020. The prognosis for pancreatic cancer patients is poor, as there is a 91% probability of dying within 5 years following diagnosis. Thus, early detection methods of screening are crucial for the treatment of pancreatic cancer. Previously, two pancreatic cancer (Mia Paca-2) targeting peptides MCA1 and MCA2 were discovered via phage display technology. These peptides were found to bind specifically to pancreatic cancer cells. The objective of this study was to determine the binding affinity by measuring the half-maximal effective concentration (EC50) of MCA1 and MCA2 as well as to determine their effects on pancreatic cancer cell viability. A modified enzyme-linked immunosorbent assay (ELISA) was used to determine the EC50 of MCA1 and MCA2 against Mia Paca-2, ovarian cancer (SKOV-3), prostate adenocarcinoma (LNCaP), human embryonic kidney (HEK 293), and human normal pancreatic (hTERT-HPNE) cells. Various concentrations of the peptides (0.1, 0.3, 1, 3, 10,

30, 100, 300 μM) were incubated with the cells for 1 h at 37°C and 5% CO2. This was followed by the washing of unbound peptide with 1% bovine serum albumin (BSA), fixing of cells with 10% formalin, blocking using 10% FBS, 0.3 M glycine, and 0.05% Tween-20 in PBS, and incubation with horseradish peroxidase-conjugated streptavidin (HRP). The measurement of absorbances at 405 nm after addition of azino-bis 3-ethylbenzothiazoline-6-sulphonic acid (ABTS) substrate was obtained. The results showed that MCA1 and MCA2 binding followed a sigmoidal dose-response curve against Mia-Paca-2 cells, from which it was possible to determine the EC50 values, which were 16.12 ± 8.91 μM and 97.01 ± 4.88 μM (mean ± SEM), respectively. A comparison between the binding ratio of these peptides with Mia Paca-2 and LNCaP and HEK293 for MCA1 and HEK293 for MCA2 showed minimal binding. However, no binding was found for SKOV-3 and hTERT-HPNE for MCA1 or LNCaP, SKOV-3, and hTERT-HPNE for MCA2. Additionally, the dose-response curves were not well-fitted for SKOV-3, HEK293, LNCaP, and hTERT-HPNE cell lines. Lastly, the evaluation of the effect of these peptides on the cell viability of pancreatic cancer cells was done utilizing an MTT assay. The Mia Paca-2 cells were incubated with 10 μM peptides or DMSO, followed by the addition of 10μL of MTT reagent. After a 4 h incubation period, the absorbance values were measured spectrophotometrically at a wavelength of 570 nm. No observable decrease in cell viability was seen for the Mia Paca-2 cells treated with MCA1 or MCA2 when compared to the paclitaxel control. In conclusion, peptides MCA1 and MCA2 exhibit binding affinity and specificity to pancreatic cancer cells with EC50 values in the μmolar range, but do not have any effect on cell viability of Mia Paca-2 cells. Therefore, these peptides may be used for early detection of pancreatic cancer to improve overall outcome of the disease.

21. *Title:* **The Farthest Point Problem**
Principal presenter: Belal Al-Madani
Major: Mathematics
Other presenters or co-authors: Dr. Roshdi Khalil Dr. Abdelrahman Yousef
Faculty mentor: Dr. Dinesh Ekanayake
Abstract: Mathematicians study some very abstract ideas that no one else sees any point in pursuing. The farthest point problem, introduced in 1950s, is one such idea. The question is: if every point in a normed space admits a unique farthest point in a given bounded subset, then should that be a singleton? Although there is still no solution for the general case, it was solved for some special cases. Here I present an introduction to the problem and the solution in a specific sequence space.

22. *Title:* **The Morbid Muses of Antebellum America: Death, Gender, and Defiance in the Works of Edgar Allan Poe**
Principal presenter: Alex Weidenhamer
Major: English
Faculty mentor: Dr. Tim Helwig

Abstract: In Edgar Allan Poe's essay, "The Philosophy of Composition," he states, "When it most closely allies itself to Beauty: the death, then, of a beautiful woman is, unquestionably, the most poetical topic in the world"; however, what if the beautiful woman refuses to remain dead (680)? Poe's beliefs in "The Philosophy of Composition" bring attention to a much larger phenomenon occurring in popular publication during the American Renaissance. For many other male authors during this time, the death of a young beautiful woman became an object of fascination, and throughout the pages of Burton's Gentleman's Magazine, this obsession manifests itself through works such as Cornelius Webbe's, "The Old Love", and an unknown author's, "A Morning's Meditation in a Burial Place." In both of these works, the male authors ruminate about a young woman taken from them too soon, and due to this death, the writers solidify their patriarchal place, literally and symbolically, above these women. Poe's Roderick Usher, too, follows this literary tradition, since his "improvised dirges" echo the lamentations in Burton's Gentleman's Magazine (Poe 205). However, when looking at Poe's "The Fall of the House of Usher" in relation to this cultural phenomenon, Madeline Usher is a stark comparison to "the spotless, peerless, guiltless" Mary Blaine from "A Morning's Meditation in a Burial Place," or the unrequited love from "The Old Love" who is "beauty's prime" ("A Morning's Meditation in a Burial Place" 136; Webbe 5). In fact, Madeline is not an inanimate, objectified woman, but rather, she is a roaring, bloody tempest that brings about immense change in the lives of her masculine counterparts. When compared with other representations of femininity in antebellum American print culture, Madeline Usher, and Poe's "The Fall of the House of Usher" stand apart from the crowd by becoming a symbol of feminine defiance in a country infatuated with women's subservience and domestic propriety. Furthermore, my research explores how Madeline's presence in Burton's disturbs the common, cultural, narrative that occurs between the female subject and the male observer in nineteenth-century print culture.

23. *Title:* **The West as Text: Poe's The Journal of Julius Rodman as Textual Exploration of Antebellum Reprint Culture**
Principal presenter: A.J. Rocca
Major: English
Faculty mentor: Dr. Tim Helwig
Abstract: One of Edgar Allan Poe's more obscure hoaxes on his reading public was The Journal of Julius Rodman, an uncompleted novel published in Burton's Gentleman's Magazine in 1840. Rodman presents itself not as fiction, but as the authentic account of the first white man to cross the Rocky Mountains. The claim is particularly brazen in light of the fact that the novel is heavily plagiarized from the journals of Lewis and Clark, Washington Irving's Astoria, and other genuine accounts of western exploration circulating at the time. I argue in my paper that Rodman and its blatant plagiarism provides us a valuable lens to understand how antebellum reprinting practices worked to generate Americans' imaginative investment in the West. The crucial question Rodman and its liberal use of plagiarism forces us to ask is how it substantially differs from "legitimate" accounts

of western travel literature which were also plagiarized. In Astoria, for example, Irving found it necessary to borrow material from other western travel accounts in order to maintain narrative and ideological cohesion in his history. The reality of the American West often resisted the stories Irving was trying to tell with it, hence his need to resort to supplementary material in order to create the "heroic" tale of western expansion contemporary audiences craved. Poe simply takes the next logical step in the borrowing process and instead of merely supplementing a real account with existing material, he collages together an entirely new one from it. The most interesting way to read The Journal of Julius Rodman, I argue, is not as an exploration of real geography, but rather as a journey through the print practices of the popular western travel narratives. One of the recurring peculiarities running throughout Rodman is how Poe consistently uses his editorial voice to draw attention to his plagiarized sources. Speaking as "the editors" of Burton's, Poe used footnotes and editorial asides to create an entire meta history around Rodman, explaining how Burton's discovered Rodman's manuscript and how Rodman's journey relates to his contemporary explorers, i.e. Poe's sources. By doing this, Poe marks out a path through the quagmire of antebellum print culture to show how documentary material from the West was appropriated, cut together, and reprinted in order to satisfy the reading public's appetite for tales of western expansion. This use of the editorial voice to mark out his sources transforms The Journal of Julius Rodman into not just an exploration of the West, but the West as ideological text.

24. *Title:* **Use and Attitude Towards Complementary and Alternative Medicine Among University Students**
Principal presenter: Ejura Yetunde Salihu
Major: Sociology
Faculty mentor: Dr. Lora Ebert Wallace
Abstract: Complementary and Alternative Medicine (CAM) is a fast-rising industry in the United States. According to the National Center for Complementary and Integrative Health (NCCIH), about 50% of US adults use a form of complementary or alternative therapy over the course of their lifetime. It is important that the university community becomes aware of the general health practices of the students and their level of use of CAM in order to tailor her health services communication to meet current realities and achieve better health outcomes for its population. This study assessed the use of CAM, reasons for use of CAM, attitude towards CAM among university students and level of disclosure of use to healthcare providers. The association between a set of predisposing social factors such as gender and ethnicity and use of CAM were assessed as well. Fifty-six students participated in the study and analysis of the data was done using Chi Square and Mann Whitney Tests on SPSS 26. The results of the study showed that there are a number of students who use complementary and alternative medicine; there is positive attitude towards CAM and little disclosure of use of CAM to healthcare providers. Result also showed that most users of CAM use it for wellness purposes and the most commonly used CAM among students are:

music therapy, herbal medicine, vitamins and mineral supplements, massage therapy and meditation and yoga therapy. There was no significant association between gender and attitude towards CAM found in this study. There was no significant association between gender and use of CAM and no significant association was found between ethnicity and use of CAM. There is need to explore the reasons for non-disclosure of use of CAM among university students in future studies in order to bridge the communication gap between university students and their healthcare providers.

25. *Title:* **Video Game Ratings Study**
Principal presenter: Benjamin Kolaczkowski
Major: Clincal & Community Mental Health
Other presenters or co-authors: Michael Waters
Faculty mentor: Dr. Jonathan Hammersley
Abstract: Video gaming's growing popularity in recent years has led to a great potential for behavioral addiction. For example, Mathews, Morrell, and Molle (2018) found that over 23% of those who play video games become addicted. The purpose of the present study was to obtain ratings on approximately 120 video game related images in five different categories: valence, arousal, relevance, urge and interest. This image set was implemented in attempt to develop a standardized image set to assess video game addiction to be used in future research. The image set was developed simply to assess which images are the most salient to video gaming with regards to the five aforementioned categories of valence, arousal, relevance, urge and interest, and to examine psychological correlates of these factors. Valence, arousal, relevance were rated on a scale of 1-9; urge and interest were rated on a scale of 1-10. The end goal of the study is to establish a standardized image set from those implemented in the online survey based upon which images were rated highest among the five measured categories. Questions related to the Big-5 personality traits were also included in this study to examine how the ratings for images related to such traits as well as how the amount of hours spent gaming related to personality traits. Susceptibility to video gaming addiction was assessed with the Gaming Addiction Scale. The results demonstrated that the mean for the relevance scores was 5.37 with a standard deviation of 1.95. For the variable of urge the mean score was 3.80 with a standard deviation of 1.96. For the variable Interest, the mean score was 3.72 with a standard deviation of 1.952. Relevance scores were most strongly correlated with valence scores; Urge scores were most strongly correlated with arousal and interest scores. Total gaming score on the Gaming Addiction Scale was closely associated with urge and interest scores. There was also an negative correlation between total gaming score and the trait of Extraversion. We also found that ratings were higher for relevance when game content versus controller/system was included in the image.

26. *Title:* **Impact of obesity of academic performance of college students**
Principal presenter: Oluwasegun Austine Akinyemi
Major: Health Sciences
Faculty mentor: Dr. Lorette Oden
Abstract: Background: Obesity in the United States has reached an alarming proportion with about two-thirds of the American population either obese or overweight. About 40 million of the adult population is obese. The impact of obesity cuts across every strata of life in the United States. This is demonstrated in the rapidly rising healthcare cost of obesity in the United States. Aim: The study aims to determine the relationship between obesity and academic performances of college students at Western Illinois University, located in Macomb, Illinois. Method: This was a cross-sectional study with self-reported questionnaires sent to Western Illinois University (WIU) students who fulfilled the inclusion criteria. The study was conducted between August 15, 2019 and December 15, 2019. About 700 undergraduate college students participated in the study. Some of the data collected from the students included their height, weight, and a self reported current cumulative grade point average (CGPA). The Body mass index (BMI) was calculated from their reported height and weight and the relationship between the BMI and the CGPA was then determined using a multiple linear regression. Result: A total of 700 respondents participated in this online survey. 61% of respondents were females with the remaining 39% identifying as male. Out of all the respondents, 70% identified as white. Two-third of our respondents were overweight or obese. At the end of the study, we detected a negative, howbeit, insignificant association between obesity and the academic performances of college students at WIU. Conclusion: There is a need for further research to determine the relationship between obesity and academic performances of college students at WIU.

27. *Title:* **Improving pregnancy outcome with early screening of diabetes in pregnancy.**
Principal presenter: Oluwasegun Austine Akinyemi
Major: Health Sciences
Faculty mentor: Dr. Maureen Bezold
Abstract: Diabetes in pregnancy is associated with significant maternal and perinatal morbidity and mortality. Early Identification and treatment of Diabetes in pregnancy is the goal for improving maternal and fetal outcome. AIM: To determine the effectiveness of early screening for Diabetes in pregnancy using the oral glucose tolerance test. METHODS: This was a cross-sectional study carried out between 1st of December 2016 to 30th May 2017 at the Federal Teaching Hospital Ido-Ekiti and Ekiti State University Teaching Hospital Ado-Ekiti, Nigeria. Two hundred and eighty pregnant women who satisfied the study inclusion criteria were selected using convenience sampling method and were screened with the oral glucose tolerance test before the 24th weeks of pregnancy. The women who tested negative at this stage were screened again between 24-28th weeks of pregnancy. The diagnostic performance (effectiveness) of early screening for diabetes in pregnancy was determined by comparing it with the gold standard of screening in the third

trimester. RESULTS: A total of two hundred and eighty women were screened for Diabetes in pregnancy using the oral glucose tolerance test. This was done twice in pregnancy, in the second (before the 24th week and the third trimester, between 24-28th weeks). Ten participants were lost to follow up. Five of the sixteen cases of diabetes in pregnancy were diagnosed in the second trimester. Women who were negative in the second trimester were rescreened in the third trimester with twelve of them diagnosed with Diabetes. The prevalence of diabetes in pregnancy was 7.8%. The five women that were diagnosed in the second trimester of pregnancy represented women who would have missed the opportunity for early intervention if screening were restricted to the third trimester of pregnancy alone. CONCLUSION: Screening for diabetes in pregnancy should be done twice in pregnancy. Screening should be done using the fasting blood sugar in the second trimester and the oral glucose tolerance test in the third trimester.

Podium with Performance Presentations

1. *Title:* **A Journey Through the Scenic Design Process of "Stupid F#@king Bird"**
   Principal presenter: Kaitlin Findley
   Major: Theatre - Design
   Faculty mentor: Dr. Steven House
   Abstract: This creative presentation will explore how the scenic design for "Stupid F#@king Bird" came to fruition. The purpose of the scenic design for "Stupid F#@king Bird" was to put the audience into the world of the show; so it was obvious that they were a part of the action that was taking place. The significance of this design was that the audience entered the production from backstage. From there they were allowed to explore the scenery and really become a part of the setting before heading to their seats. This created a far different theatrical experience for the audience than any other production they have seen at WIU. There were a great number of steps taken in order to complete the scenic design for "Stupid F#@king Bird." The most important thing was to analyze the playscript and determine the reason(s) why we were choosing to produce this show. From there possible settings were explored. The setting needed to be something that mirrored the way that the characters' thought. Once the setting was decided on, research was important in order to help better develop the concept and design. Extensive talks were had between myself and the entire production team in order to make sure that everyone was on the same page with the design. A color model was made in order to show the production team what the final product would look like. This model was also presented to the actors in order to allow them to understand the setting of the production and what it meant to them. Due to the nature of the setting, it made sense for the actors to constantly stay onstage throughout the show. Since the actors were told this from day one of rehearsals they were able to fully explore the concept and how it affected their characters. The scenery was then built and painted in order to make the world fully realized. However, it was not until the audience came to see the production that the world felt like it had fully come to life. There are several major conclusions that have come from this creative process. The experience that the audience had was such a huge part of this production. For some the audience members it was either really fascinating entering the theater in a unique way, for some they are upset about the theatrical tradition that had been broken. Another conclusion is that it is not only important to think about the importance of a setting to the production but also to the audience. Sometimes the subtlety of design choices is important because it allows for the audience to come to their own understandings and realizations--it allows room for the audience to explore.

2. *Title:* **Costume Design For Richard II**
   Principal presenter: Rebecca Rankin
   Major: Costume Design
   Faculty mentor: Dr. Hadley Kamminga-Peck

Abstract: Costuming is a vital part of storytelling in theatre. It is a visual depiction of the inner psyche of a character. When I begin any production process, it is necessary to understand the period the piece is set in, as well as the individual character arc. Through the design process of Richard II by William Shakespeare, I was able to explore the psychological state of these historical characters and find parallels to the world of high fashion, while incorporating traditional iconography from the 14th century. By taking a cross-curricular approach to design, I can create a well-rounded and fully developed world. Shakespeare is a crucial part of the antiquity of theatre, allowing artists to explore the ideas and turmoil that plague our society regardless of the time the work is performed. There has never been a more critical time to perform works that challenge political structure, break traditional ideas of masculinity and femininity, and push the audience to think beyond the present. Richard II does this in so many ways. It is the story of a king who is challenged to see beyond himself, with commentary on self-corruption, and presentational manifestation of the inner self. My work as the costume designer for Richard II highlights these themes, as well as the play's connection to our community at WIU, Macomb, and the global reverberations of those themes. This presentation is the costume design process for the 2020 WIU Department of Theatre and Dance production of Richard II. It is a collection of the historical, garment, esoteric, and color research used to inspire the design. My preliminary design sketches, finalized design renderings, and the realized garments highlight the development during the collaborative, as well as demonstrating the value of historical research and analysis in the performative arts. A costume parade will demonstrate how the costumes tell the story of the production. The actors will demonstrate the use of costuming as a storytelling device by performing selected scenes.