Abshire, Nicholas; Sledge, Dalton; "Safety Investigation Of Driver Behavior At Work Zones In Kentucky: A Driving Simulator Study" (Kirolos Haleem)
Work zone safety is a significant aspect of construction projects; thus, keeping both workers and vehicle drivers safe is essential. Work zone areas are among the highest priority locations in Kentucky's Strategic Highway Safety Plan (SHSP). This study represents an ongoing project that uses a driving simulator to investigate driver behavior at various work zone scenarios. These include various roadway configurations (multilane and two-lane settings), area types (urban and rural), roadway sections (straight and curved), work zone types (lane closures and shoulder work), lighting conditions (nighttime and daytime), and texting options (texting and non-texting while driving). Noticeably, previous work zone simulator-related studies did not cover such comprehensive roadway testing scenarios. The study uses the RS-150 driving simulator located at the Transportation Safety & Crash Avoidance Research (TSCAR) Lab at WKU's School of Engineering and Applied Sciences. The study recently received the Institutional Review Board (IRB) approval, and fifty participants (including younger and middle/older age groups) will be driving the simulator for 10 minutes. Additionally, video recordings and behavior observations (e.g., recording single longest off-road eye glance while driving) will be collected. The data analysis will correlate the driver behavior with traffic measures, including speed standard deviation and variance, and lane keeping.

Adeyemi, Kayode; Banga, Simran; "Histone Acetyltransferase Activity of Legionella pneumophila LneB Protein in Treated Macrophage." (Simran Banga)
One crucial virulence factor of Legionella pneumophila is its stack of over 300 effector proteins, including the hypothetical LneB protein. Although the eukaryotic host cell elicits an arsenal of innate immune cells, including macrophages, against invading microbes, L. pneumophila comfortably resides within these cells by unclear mechanism. The specific host's cellular process affected by the LneB protein during infection is also unknown. Our bioinformatics predictive functional analysis of LneB suggested that the protein induces histone acetylation in the host. This analysis was supported by our previous work on the nuclear localization of LneB. Therefore, this study aims at contributing to the characterization of the protein by investigating its histone acetylation activity within the macrophage. For this, we will express the protein in Escherichia coli as a HIS-tagged LneB protein. Expressed LneB protein will be purified using single-step Nickel ion affinity chromatography and introduced invitro into an actively dividing macrophage cells. The cells will be collected at 0, 2, 4, 6, and 12 hours after LneB protein treatment for the preparation of nuclear extracts and HAT activity measurement . We expect to obtain an increased HAT activity from the nuclear extract of the treated macrophage when compared with the phosphate buffered saline treated negative control.

Al Mahruqi, Nasser "Islamic Art Into Modern Design" (Shahnaz Aly)
Islamic architecture is characterized by the diversity of geometric and decorative shapes, in addition to the accuracy in design and the selection of shapes and colors. With this in mind, I started my design for this Islamic Center which includes a Museum of Islamic Art and a basketball court, in addition to the main prayer building. I designed the main building on the shape of a pentagon, in relation to the five pillars of Islam, and five pentagon-shaped minarets. Each building has its own entrance, as well as an emergency exit from behind the main building

to be used when visitors and those in charge of the center need it. The building's exterior will be based on lead concrete and dark glass to give modern depth. As for sustainability, the minarets will have wind generators as and (IoT) system to facilitate the building's management process. The main objective of this center is to add a new urban imprint in the area in which the project is to be established, to find a place for worshipers, to design a multi-use basketball court, and to attract lovers of fine arts to learn about it through the museum.

Allen, Patton; Fields, Cameron; Stansell, Max; Skau, Madeline; Weaver, Hunter; Ashley, Noah; "Inflammatory Response to Sleep Fragmentation in Skeletal, Cardiac, and Smooth Muscle Tissues in Female Mice" (Noah Ashley)
Sleep is a critical process that the body undergoes. When sleep is interrupted, so that the individual is awakened for some period before going back into sleep, the sleep can be described as fragmented. Studies in the past have shown that sleep fragmentation (SF) promotes an inflammatory environment, especially in the brain and peripheral tissue. However, studies have not been conducted to observe inflammatory responses in muscle. To examine this, C57BL/6J female mice were subjected to either a control group (no SF) or an SF group which involved using an automated SF chamber to disrupt sleep every two minutes over a 24-hour period. Afterwards, mice were euthanized, and tissues were collected from different types of muscle (skeletal (pectoralis and gastrocnemius), smooth (uterus), and cardiac muscle). Total RNA was then extracted by a fibrous tissue extraction method using RNeasy kits. The total RNA was then reverse transcribed into cDNA. Pro-inflammatory cytokine gene expression (interleukin-1-beta and tumor necrosis factor-alpha) was measured using RTPCR. We predicted that an inflammatory response would occur in cardiac and skeletal muscle, but not smooth muscle. Results of this study will increase our understanding regarding how sleep loss can affect multiple tissues and organ systems.

Andrulonis, Emily "Applying the Circumplex Model to the Examination of Job Stress" (Katrina Burch)
This study will investigate job stress as a dynamic phenomenon and the possibility of job stress spin. The concept of spin is typically associated with affect and examined using the Circumplex Model of Affect. In an effort to better assess job stress, the circumplex model will be adapted to reflect the dynamic nature of job stress. Two preexisting data sets will be used for this study. In both samples, burnout was collected once using the Oldenberg 15-item Burnout Inventory; experiences of job stress were also collected once using the Stanton measure of work stress. Two items, pumped and excited, were added in the measure of work stress scale. The measure of work stress items was used to adapt the circumplex model to reflect job stress. Calculations for affect spin will be used to calculate job stress spin. A hierarchical regression will be run with traditionally calculated job stress and job stress spin serving as predictors. Burnout will serve as the outcome in both steps of the regress. It is hypothesized that job stress spin will demonstrate incremental validity in associated outcomes, such as burnout, over between-person assessment of job stress. Future research and practical implications will be discussed.

Apostolopoulos, A. S. "Consequences of Climate Change in North American Cave Fauna" (Keith Philips)

Rising temperatures and diminishing groundwater due to climate change are predicted to expose cave faunas in eastern North America to unprecedented environmental conditions that could prove detrimental to these ecosystems. Organisms that inhabit relatively stable environments, like caves, are known to develop narrow physiological tolerances. Caves are simple ecosystems whose homogeneity offers an ideal system for testing a highly specialized fauna's ability to tolerate abiotic changes. We tested the capability of a cave-specialized beetle in the eastern United States, Darlingtonea kentuckensis Valentine, to withstand climatic shifts in their environment. We exposed individuals to a range of humidities and temperatures for 10 days. The data strongly suggest a temperature threshold for the survival of D. kentuckensis, but it is a higher tolerance than would be expected. The wider-than-expected thermal tolerance breadth suggests remnant physiological characteristics of ancestral epigean carabids. Decreasing the relative humidity in the environment resulted in a much more dramatic decline in survival, suggesting highly evolved specialization for constantly high humidity environments. The narrow humidity threshold in which troglobionts can survive may be a much more apparent limiting factor in adapting to climatic shifts within a cave environment than temperature.

Archey, Casey "The Role of Emergency Management Disaster Science and its Application to the December 11, 2021, Bowling Green Tornadoes." (Josh Durkee)
The city Bowling Green and surrounding Warren County communities were affected by multiple tornadoes that caused 165 mph wind-induced destruction (EF-3) during the early morning hours of December 11, 2021. The purpose of this study is to discuss the role of emergency management in various multi-incidents that took place during that morning. Such events included tornadoes, fires, flooding, power failures, injuries, loss of life, and of course, the COVID-19 pandemic. Due to the collective nature of the incident, geographical area of damage, and number of patients, Warren County Emergency Management (EM) immediately activated the emergency operations center at a level-one activation. Additional EM efforts were facilitated by the Department of Health and Safety at WKU. After action reviews found that agencies struggled with communications between the emergency operations center and the numerous scenes. Another weakness was a widespread internet outage that caused issues with dispatch efforts and accountability. Mapping also became an issue as GIS personnel were not readily accessible. Preparedness as far as resources were not an issue, as mutual aid agreements, preplans, and mass casualty training had been created and practiced in previous full-scale exercises, and had those factors not be in practice, the response might have been much worse.

Ash, Peyton; Naas, Alexa; "Comparing Retrieval Strategies on Long-term Memory" (Jenni Redifer)
Retrieval practice is a well-established strategy for information retention. Though the participants in many of these studies were undergraduate psychology students, limited studies used materials relevant to psychology. For example, Agarwal et al. (2007) used passages on wolves, tornadoes, and fossils from a 7th grade-level physical science textbook, and Roediger and Karpicke (2006) used passages on sea otters and the sun. The nature of the content may impact how students approach studying. For example, students have reported different levels

of motivation to succeed in courses within their major versus outside their major. In the current study, participants' long-term retention of the material was compared to a control condition. Participants read an article for seven minutes, then were randomly assigned to either a free recall, quiz, test-question generation, or control (reread) condition. Participants returned seven days later to complete an assessment of retained information. A one-way ANOVA revealed there were no significant differences in long-term retention test scores when comparing the different conditions, contradicting previous research on the benefits of retrieval practice. The non-significant results may indicate that complex content can hinder the effectiveness of retrieval strategies. Sufficient comprehension may be necessary before retrieval strategies are helpful for information retention.

Aydin, Ahmet "The Uniform Observability of Filtered Approximations for Three-layer Beam" (Ahmet Ozkan Ozer)
The set of partial differential equations describing vibrations on a three-layer Mead-Marcus beam model, consisting of piezoelectric or elastic outer layers constraining a compliant viscoelastic layer, is considered. This model fully describes uniform transverse vibrations (bending) of the perfectly bonded beam as well as the shear due to the compliant layer. The eigenvalues, and in particular, the uniform gap among the eigenvalues of the model with hinged boundary conditions is proved to be written in terms of the ones of the single-layer Euler-Bernoulli beam model. Therefore, the three-layer beam model can be considered as a perturbation of the single-layer beam model. Ingham's inequality is utilized to show the uniform observability result of the model with a single boundary sensor. Space-discretized Finite-Difference approximations of the model do not retain the uniform observability due to high-frequency spurious eigenvalues generated by approximations. To obtain a uniform observability result, for the same sensor design, the spurious eigenvalues of the approximated model are filtered by the so-called Direct Fourier filtering method. After filtering, the approximated solution space uniformly converges to the whole infinite-dimensional solution space as the mesh parameter goes to zero. The preliminary results of the sandwich beam with arbitrary number of layers will also be discussed. This research is funded by KY NSF EPSCoR grant #3200002692-22-08.

Aydin, Ahmet "Avoiding Sensor Data Filtering by the Finite-difference Approximations of a Three-layer Beam" (Ahmet Ozkan Ozer)
A perfectly bonded clamped-free three-layer sandwich beam, consisting of piezoelectric or elastic outer layers constraining a compliant viscoelastic layer, is considered. This model fully describes uniform transverse vibrations (bending) as well as the shear due to the compliant layer. On the contrary to the PDE model with hinged boundary conditions in the other talk; the eigenvalue-based Fourier techniques are not appropriate to spectrally analyze the PDE model with clamped-free boundary conditions. Therefore, the technique so-called the “multipliers" is utilized to show the uniform observability (sensor design) of the PDE model with a single boundary sensor, which is, the sensor data allows to fully describe the motion on the beam. For the approximations of the PDE, different from the classical use of Finite-Differences, an equivalent first order formulation is considered. This leads to an order-reduced Finite Difference approximations by the implementation of average operators using auxiliary middle

nodes in the uniform meshing. By this novel approximation method, a new variation of the boundary equations is obtained. The energy of the approximated model is defined appropriately, and shown to be conservative mimicking the PDE model. Open problems will be discussed. This research is sponsored by KY NSF EPSCoR grant #3200002692-22-08.

Baig, Maheen; Eaton, Jerica; Gunter, McKenzie; Norman, J. Farley; "Aging And Tactile Speed Matching" (J. Farley Norman)
Eighteen younger and older adults (mean ages were 20.4 and 72.8 years, respectively) participated in a tactile speed matching task. On any given trial, the participants felt the surfaces of rotating standard and test wheels with their index fingertip and were required to adjust the test wheel until its speed appeared to match that of the standard wheel. Three different standard speeds were utilized (30, 50, & 70 cm/sec). The results indicated that while the accuracy of the participants' judgments was similar for younger and older adults, the precision (i.e., reliability across repeated trials) of the older participants' judgments deteriorated significantly relative to that exhibited by the younger adults. While adverse effects of age were obtained with regards to both the precision of tactile speed judgments and the participants' tactile acuity, there was nevertheless no significant correlation between the older adults' tactile acuities and the precision of their tactile speed judgments.

Bailey, Dalton "Do People Overestimate The Number Of People In Their Political Party That Support Their Policy Preferences?" (Aaron Wichman)
A robust finding in social psychology is that people often overestimate the extent to which other people share their own opinions and beliefs. This is known as the false consensus effect. This study was conducted to investigate whether differences in group identification might moderate false consensus about political beliefs. Participants initially rated their liking of 12 hypothetical political policies, then indicated their political ideology. Finally, they completed a short questionnaire measuring political identity fusion. One to two days later, participants completed a 14-item measure of social group identification and commitment. Next, they completed an 11-item quiz that measured general political sophistication (knowledge). Finally, participants were shown each policy a final time. For each policy, they were asked to indicate what percentage of people in their own party would support the policy. Data collection is still in progress. I expect people will tend to overestimate the amount of people that share their same opinion of the policy. I also hypothesize social group identification will moderate the effect observed (where those higher in identification will see greater effects), as this is a measure of how similar the individual believes other group members are.

Baldwin, Sylas "Queer Identity As Agency And Resistance" (Tim Frandy)
Studies of the Queer community have put too much focus on the ways in which Queer people hide their identities from others, which in many ways is for personal safety. However, many individuals purposefully use their group identity, or use the exposure of their identities, to critique others on their ideas, to challenge them, and to resist forms of discrimination. This paper describes how spite and anger are important emotional tools of defense and inspiration and how use of one’s own identity to claim space and challenge others is not limited to individuals or a specific time. It is also intended to build upon previous studies and theory, using

ethnographic fieldwork to magnify the oral histories of queer people, of resiliency, and the use of identity exposure as a form of purposeful resistance.

Beauchamp, Isaiah; Gibson, Steven; "New Analysis Of Cold Clouds In Perseus Spiral Arm" (Steven Gibson)
It is well known that stars form from the gravitational collapse of cold interstellar gas clouds within galaxies, but how such clouds themselves form remains up for debate. The origins and development of these clouds should therefore be investigated. Building on research by Sato (1990) and Hasegawa et al. (1983), we are investigating a section of the Perseus spiral arm. We have developed a new method of determining the abundance of cold hydrogen gas in this region, where passage through the arm may cause the clouds to evolve. Our approach compares cold atomic gas appearing as HI self-absorption (HISA), molecular gas traced by carbon monoxide (CO) emission, and thermal radiation from interstellar dust. We compare our results to Sato's and Hasegawa et al.'s in order to test and refine our analysis. Once our method is finalized, we will compare the gas properties (temperature, density, etc.) implied by different studies to assess how their analytic assumptions affect our knowledge of these clouds' evolutionary states and their prospects for future star formation. This work was generously supported by the WKU Department of Physics and Astronomy.

Beery, Elissa "Creating A Fun Explorative Place" (Aly Shahnaz)
Most resorts across America lack something -- an interactive experience with nature and the building itself. When staying at a hotel some people may stay solely to rest and nothing more but for those looking for a unique experience with lots of interaction then my building is for them. Creating an overall experience for those who decide to stay or visit my building is a main aspect of research. The purpose of my building is to show that buildings can be interactive with the use of structure. Incorporating activities for guests/ residents that are in the building plus the building structure itself is a major goal of this project. Researching building inspiration for this project brought about new ideas which I hoped to incorporate in my building. With research I found that the idea of incorporating nature into a building can be very different in regards to design, structure, and interactivity. With my building I hope to broaden the ideas of nature and interactions and how they combine to make a new, unique structure. Once people experience what my building and buildings like mine have to offer, I feel like more buildings will be created to interact with those staying in them.

Belcher, Jacob "Hawaiian Breeze" (Aly Shahnaz)
Hawaiian Breeze: an exclusive resort defining experience in the beautiful outdoors of Hawaii. The goal is to provide a relaxing and unique vacation stay to anyone around the world. The secluded area of this resort will provide the opportunity for a perfect get-a-away vacation experience. Researching other resorts in the area, I found great “hotel” designs. This goal was to change this cliché hotel atmosphere into a more specific cultural experience. I introduced aspects of typical resort amenities mixed with a Hawaiian touch. Providing the relaxation stay of a private location and spas and combining that with a Hawaiian outdoor performing stage and small villas in the woods give you this exact ambience. These specific inclusions give you the best of both worlds with the relaxing amenities of many resorts with the beautiful outdoors

of Hawaiian culture and experience. The architecture creates an eye opening experience to arrivals and ease of access to the entire resort.

Bennett, Cooper; Durkee, Josh; "White Squirrel Weather: Applied Learning Model Utilized During The December 11, 2021 Tornado Emergency And Operations At Wku" (Josh Durkee)
White Squirrel Weather is a weather monitoring and decision-support service for weather hazard emergency preparedness and awareness for WKU, industry partners, and events. This presentation focuses on White Squirrel Weather as an applied learning model, which has allowed students to put classroom concepts into practice. Serving under the leadership of WKU's University Meteorologist, Dr. Josh Durkee, students fill the roles of Lead Forecaster, Lead Emergency Manager Operator, and several General Forecasters. This gives students the opportunity to gain practical experience in leadership while developing forecasting skills. These students provide weather-decision support for campus officials and play a large role in the weather preparedness of WKU. Students participating in White Squirrel Weather are building knowledge bases via innovative learning experiences. White Squirrel Weather played a major role before, during, and after the tornadoes on Dec 11, 2021, in Bowling Green, KY. Students were given the opportunity to alert the public through social media and forecasts before and during the event. Afterward, students joined the National Weather Service to conduct forensic tornado assessments while working with experts to determine a tornado's strength. Students were also given a rare opportunity to not only learn from experts after the event but to see how their forecasts and post-storm assessments make a difference in their community.

Bergeron, Lily; McCollum, Diamonde; Moskal, Katie; McCollum, Diamonde; Moskal, Katie; Glass, Paige; Teeters, Jenni; "Investigating The Difference In Emotion Dysregulation In Alcohol, Cannabis, And Co-use With College Students" (Jenni Teeters)
Previous research has linked difficulty regulating emotions with alcohol and cannabis use. Rates of co-use of alcohol and cannabis have been rising in recent years and it has been speculated that co-users may have greater emotion dysregulation than those who use only alcohol or cannabis. The present study compared differences in emotion dysregulation among drinkers, cannabis-users, and co-users. Participants were 382 college students recruited from the Western Kentucky University Studyboard system. Participants completed validated measures of emotion dysregulation, alcohol use, and cannabis use. Participants who reported drinking alcohol but not using cannabis were classified as drinkers (n = 81), participants who reported cannabis use but not drinking were classified as cannabis users (n = 31), and participants who reported both cannabis-use and drinking were classified as co-users (n = 53). An ANOVA revealed significant differences in emotion dysregulation between drinkers, cannabis users, and co-users ($p = .02$). Post-hoc analyses showed that cannabis users scored significantly higher on emotion dysregulation than drinkers ($p = .02$). These findings indicate that cannabis users endorsed more emotion dysregulation than co-users and drinkers. Further research is needed to determine why cannabis use is associated with greater difficulties regulating emotions.

Boils, David; Emslie, Gordon; Hebenstiel, Lars; Novikov, Ivan; "Data Exploration and Feature Extraction from Existing AIA and GOES Data on Solar Flares" (Gordon Emslie)
Jake Boils, Dr. Gordon Emslie, Lars Hebenstiel, and Dr. Ivan Novikov Western Kentucky

University Department of Physics and Astronomy Solar flares are powerful releases of 1025 J of energy and some 10 billion tons of mass. Solar flares cause disruptions around the Sun, producing high-energy charged particles and high doses of extreme ultraviolet and X-ray radiation. Produced in the upper atmosphere, secondary particles can damage satellites, causing disruption to communications networks. In March 2024, two instruments, High resolution Coronal Imager (Hi-C) and Focusing Optics X-ray Solar Imager (FOXSI), will be launched to observe a solar flare. These instruments will focus on a specific region of the Sun that has a high probability of producing flaring activity during the ten-minute mission. The goal of our project is developing machine learning architecture to predict a flare occurrence on a ten-minute timescale. That prediction will decide on the time of the instrument launch. In this presentation we discuss available flare AIA and GOES data, data set statistical features and possible neural network architectures which could classify various types of flare or extract topological features from solar images. This study was funded by a grant from the KY EPSCoR NASA program, subaward #: 3200004436-22-125.

Boothe, Chezney "Molecular Evolution Of The Cancer-related Tyrosine Kinase ABL1 Gene (ABL1)" (Chandrakanth Emani)
This project examines the molecular biological evolution of the tyrosine kinase ABL1 protein, encoded in humans by the ABL1 gene. The primary biological functions of ABL1 include cell proliferation, apoptosis, differentiation, and movement. When overexpressed, it has been shown to be involved in the development of some solid cancers. ABL1 is most well known for its involvement in chronic myeloid leukemia (CML) and acute lymphoblastic leukemia (ALL) upon fusing with the breakpoint cluster region (BCR) gene on chromosome 22, a translocation resulting in an altered chromosome 22 known as Philadelphia chromosome. In this study, FASTA sequences of the ABL1 protein from a variety of organisms were analyzed using bioinformatics software from the databases NCBI and EXPASY, and conserved domains and evolutionary ancestors were identified using PSI-BLAST and the creation of phylogenetic trees via COBALT.

Bowen, John "Understanding The Meteorology Behind The December 11, 2021 Bowling Green, Ky Tornadoes" (Josh Durkee)
Severe weather is an occurrence that most people in Kentucky are familiar with. Even so, expectations of severe weather during winter seasons are low, let alone to the extent of widespread damages and loss of life. On the late evening of December 10 and early morning of December 11, 2021, a series of tornadic thunderstorms trekked across the middle Mississippi River Valley into western and central Kentucky. The city of Bowling Green suffered direct hits from two separate tornadoes with wind speeds estimated at 160 mph (EF-3), leaving behind close to a billion in estimated damages and 17 fatalities. The purpose of this study is to identify key meteorological variables that led to such anomalous, historic severe weather outcomes during the least-frequent measured severe-weather month, annually. Initial findings suggest an unseasonably warm humid air mass preconditioned the environment before a progressive jet stream advanced toward the region, providing a host of common severe weather ingredients that are more typical during late spring. A potent combination of atmospheric instability and strong wind shear set the stage for long-track tornadic storms that ultimately led to these

historic events.

Bradford, Lillian "Skating Rink Days: An Oral History Of A Traveling Roller Skating Rink" (Kate Hudepohl)
The Golden Age of roller skating extended from the late 30s to the late 50s in the United States. Previous research into this period of roller skating history has focused primarily on stationary rinks and the local cultures built around them while traveling rinks are rarely mentioned though they provided a living for operators and entertainment for many American families. In order to explore the history of these traveling rinks, I conducted ethnographic research into the portable rink owned by my grandmother and her family in the late 40s-early 50s. My methods included archival research, interviews with the family, and mapping exercises and allowed me to reconstruct a picture of the family's daily life and the culture of their rink. Several overall themes emerged, one being the sense of fun and adventure that this life created. Equally significant was the importance of family and the familial support system during this period of their lives. Finally, the stark contrast between modern living and the culture of the time period serves to highlight some of the most unique aspects of this lifestyle.

Brown, Gillian; King, Rodney; "The Isolation And Characterization Of Bacteriophage Hasitha" (Rodney King)
Microbacteriophage Hasitha is a virus that infects Microbacterium foliorum, a bacterium associated with grasses that was first discovered in Germany. Hasitha was isolated from an enriched compost sample and is of particular interest due to its unusual growth pattern: it appears to infect and kill stationary (non-replicating) bacterial cells. Most bacteriophages require actively growing host cells to produce new phage progeny. We discovered this unusual characteristic through a fortuitous observation of plates that were allowed to incubate in the lab workspace for approximately one month. During this time, a noticeable "halo" grew around the initial site of infection and consumed most of the lawn. Here we report the genomic sequence of Hasitha and its ultrastructural features. We also report the results of experiments to determine the mechanism for the expanding plaques. Our results suggest that phage particles diffuse outward from the initial site of infection and continue to infect and lyse surrounding stationary host cells, forming the characteristic halos. These results have ultimately contributed to expanding knowledge of bacteriophage genomics and host-microbe interactions.

Brunt, William "Photometric Distance To Rx For" (Ting-Hui Lee)
Measuring distances in space is important to many fields of astronomical studies. Parallax – the fundamental method of measuring distance – is most reliable but is limited to measuring the distances to nearby stars with ground-based telescopes. RR Lyrae variable stars are one kind of object that can be used to measure larger distances. This method measures the star's period (usually between a few hours to a day) from which its intrinsic brightness can be found. We compare this with apparent brightness to calculate the distance. This method was tested on the star RX Fornacis (RX For). Observations were made from the Las Cumbres Observatory every five hours for three weeks. Each observation obtained images in four color filters (B, V, ip, and zs). The light curve and period were found for each filter. The distance was calculated for the V, ip, and zs filters and compared to the parallax distance measured by the GAIA space telescope.

The calculated distances for the ip and zs filters both agree with GAIA's, while the V filter does not. This indicates that the theoretical relationship of intrinsic brightness and period in V is not as well understood as in other filters.

Bryant, Jonathan "White House Community Center Abstract" (Shahnaz Aly)
White House Community Center Abstract Community centers act as anchors to the community that they are located in. The building should accommodate everyone's needs while following the city's recommendations. It is important to create a building in the community that gives people a sense of purpose and allows them to stay active, while still interacting with their neighbors. The White House Community Center relies a lot on nearby buildings such as the White House Library for their ability to bring in even more demographics of the community. People will be able to travel to and from which every part of the community grounds they please with the connected pathways. The spaces are created in a way where it is easy to travel from one amenity to the next with little confusion. Curtain walls bring in the outside light and brighten up these spaces which helps boost people's energy. This state-of-the-art building has anything a person would need to stay active and entertained throughout the day. The exterior materials were chosen to flow with the already existing structures nearby. With this new addition, White House's community will finally have a central location to interact with one another in a purposeful way.

Bunnell, Madeline; Stinson, Bailey; Lenoir, Joel; "Determination Of Weld Sectional Properties: Classical Techniques Vs. Digital Cad Tools" (Joel Lenoir)
The design of welded joints for construction is covered by standardized structural welding codes, specifying the layout of the welds. However, non-structural analysis of welds, reference texts have tables covering a range of weld joint shapes such as U's, L's, circles, and rectangular outlines are common. Tables cannot cover the full range of weld profiles, so equations for the centroid, the weld throat area, the weld second moment of inertia (MOI), and the polar MOI are included in the reference texts. However, using these tables for any profiles other than superficial elementary examples is very difficult. Classical parallel axis transfer methods become cumbersome and error-prone quite quickly. In addition, calculating the distance from the weld group centroid to any point of interest can be a tricky geometric problem. The work presented here shows how modern digital 3D CAD tools such as SolidWORKS can calculate the weld group centroid and estimate the required MOI's easily with an acceptable level of accuracy, using the same types of assumptions as embedded in the table equations. Examples of analytical and table methods will be compared to and contrasted with the textbook methodology.

Buoncristiani, Nicholas; Malone, Grant; "The Validity Of Perceptual Recovery Status On Monitoring Recovery During A High-intensity Back Squat Session" (Dano Tolusso)
It is important that coaches monitor recovery between sets of exercise in order to assure desired adaptation. Traditional means to accomplish this are expensive and timely. If valid, the perceptual recovery status (PRS) scale may be used as an efficient recovery assessment tool to monitor individual recovery and modify rest periods. The aim of the current study was to assess the validity of PRS during a singular high-intensity back squat session. Seven healthy men volunteered for the study and came to the laboratory on two separate occasions. The first

session was anthropometrics, familiarization of PRS, and a one-repetition maximum (1RM) back squat. The second session was the high-intensity session and consisted of five sets of five repetitions performed at 85% of their 1RM. PRS was queried prior to the first set and during the last 30-seconds of each recovery period. A linear position transducer was attached to the barbell allowing for average power calculation. Repeated measures correlations were used to assess the intra-individual relationship between PRS and average power. A strong, positive correlation was found for PRS and average power (r=.81). Results indicate that PRS can be a non-invasive means to predict intra-set average power.

Burchett, Noah "Comparison of 3D Scanning Techniques and Photogrammetry Tools" (Joel Lenoir)
Digital reproduction of complex shapes such as fossils, skulls, sculptures, and other flowing geometries is very difficult, but optical methods such as 3D scanning and photogrammetry allow for geometry nearly impossible to reproduce. Once 3D models are available, rapid prototyping (3D printing) allows for reproducible models quite easily. Three methods of capturing geometry are evaluated in this study, two laser scanning systems and one photogrammetric software. The Revopoint 3D POP is a structured light scanner for PC's and mobile devices using feature detection as the scanner moves travels, capturing details at the cost of an unrefined mesh. The Matter and Form 3D Scanner uses a built-in turntable to scan subjects with a laser as they rotate, merge into a single model. PhotoModeler is the photogrammetry tool used to build a digital model from photos of objects evaluated. Digital photos from a Fujifilm XF10, taken from all sides of the object in a rising spiral fashion, were combined to create a 3D model in same file formatting. Test objects scanned includes human faces, felt objects, organic specimens, and concrete statue fragments were used to evaluate the techniques. Final results were 3D printed on the same machine for visual comparison. The goal is to increase the use of 3D scanning technology available to the university community.

Butterfield, Christian "Where Health Meets Hackers: Public Policy Recommendations On Medical Cybersecurity Infrastructure" (Timothy Rich)
The COVID-19 pandemic has accelerated the digitization of U.S. medical systems, mandating technological reliance regarding public-private and public-patient health relationships. Despite this, the efficacy of the public health sector is jeopardized by lagging internal cybersecurity infrastructure, limited private-sector piracy protections, and digital disinformation campaigns. Additionally, the globalized nature of medical diplomacy centers public health infrastructure as a target for foreign manipulation, placing U.S. international interests at risk. This public policy analysis seeks to propose a summative federal policy proposal designed to bolster medical cybersecurity. Through a literature review of existing cyber-protections, the analysis identifies three key vulnerabilities: hospital data/infrastructure security, digital disinformation campaigns, and medical intellectual property protections. In turn, the researched policy recommendations provide novel federal responses designed to strengthen public-private sector security engagement, protect patient health data, and promote U.S. national security interests.

Calhoon, Drake; King, Rodney; "Discovery and Analysis of Mycobacteriophage Viridity" (Rodney King)

Bacteriophages are viruses that infect bacterial cells and are the most abundant biological entities on earth. Programs, such as SEA-PHAGES, are working to learn more about their therapeutic potential through characterizing novel bacteriophages. The newly discovered phage, Viridity, infects the host Mycobacterium smegmatis, a common soil microbe. Viridity was isolated from a garden soil sample where Okra plants were being grown in Calloway County, Kentucky. Electron microscopy of the purified phage showed that it belongs to the Siphoviridae family. Viridity genomic DNA was isolated and analyzed by a restriction enzyme digest and gel electrophoresis. The results of these protocols demonstrate that Viridity is a unique novel bacteriophage. Future work will involve sequencing Viridity's genome with the goal of identifying phage gene products that may be used to control pathogenic strains of Mycobacteria.

Campbell, Cassandra "Severe Weather Analysis On The 2016 May 24th, Dodge City Kansas Tornado Outbreak With An Emphasis On Satellite And Radar Data" (Josh Durkee)
On May 24th, 2016, during the late afternoon into early evening hours, a series of supercell tornadoes hit western Kansas near Dodge City producing 13 tornadoes. The extreme instability and moisture provided perfect ingredients for supercells that day. A single supercell produced the 13 highly visible tornadoes. This evening in western Kansas there were five EF3 tornadoes confirmed and three EF2 tornadoes in the vicinity of Dodge City causing damage to trees, powerlines, vehicles, and a few homes. Scattered weak tornadoes were also confirmed across other parts of southwestern Kansas throughout the lifespan of this storm. Surface observations, satellite and radar imagery from sources including the National Weather Service, the National Oceanic and Atmospheric Administration, and the Storm Prediction Center are studied throughout the duration of this paper. The observed data will help evaluate the exact location, relative duration, and intensity of each tornado along the storm path. Examining characteristics of these tornadoes intensity, how they changed as the tornado formed, strengthened and then weakened. There will be a study of how the tornado debris affected the intensity and growth of this thunderstorm. Discussed in detail will be the sequence of events from this supercell.

Carpenter, Gunther; Wininger, Steven; Carter, Olivia; Rudolph, Emily; "Does Multi-Tasking Impact Anxiety, Cognitive Load, Enjoyment, and Heart Rate?" (Steven Wininger)
Problem Statement The main objective of this study was to examine the impact of multi-tasking on anxiety. Research questions: Q1: Does multi-tasking negatively impact anxiety, cognitive load, enjoyment, and heart rate? Q2: Will systematically engaging in solo and multi-tasking using the same tasks impact beliefs about multi-tasking? Subjects Thirty-one undergraduates completed the study. Procedure In session one demographic and individual differences measures were completed, heart rate was monitored, 4 five-minute tasks were completed, and questions about anxiety, cognitive load, and enjoyment were answered. In session two similar processes were followed with 4 different 5-minute tasks and a second assessment of individual difference measures. Results There were significant increases in anxiety from solo to multi-tasking trials. Increases for cognitive load from solo to multi-tasking were significant. Enjoyment significantly decreased from solo to multitasking. Heart rate increased from solo tasking to multi-tasking. There was a significant decrease in participant's beliefs in their ability to multi-task from pre to post experimental assessments. Conclusions It is important for the public to

understand the myriad of harmful effects of engaging in multi-tasking. There is a need to identify methods of increasing awareness and belief change. This study shows promise for accomplishing both.

Cecil, Matthew "Examining Hydrogeological Dynamics Of Baselevel And Reverse Flow Of The Green River And Major Springs Of Mammoth Cave, Kentucky" (Jason Polk)
Mammoth Cave is one of the most studied caves in the world but lacks hydrological data on the recharge/discharge dynamics of its primary spring outlets, Echo and Styx Springs, during varying moisture conditions and river reversal events. The Green River, which is the primary receiving stream for these springs, can backflood and reverse flow into the springs. Recharge dynamics of varying storm events and baseflow conditions are also not well understood between the two adjoining springshed basins for Styx and Echo. Data were collected starting in January, 2021 and include weekly water samples for isotope and geochemical analyses at 17 sites on the surface and in-cave, water levels at six sites (four surface, two in-cave), and discharge data for the two springs and Green River. The February, 2021 major flooding event was captured within this study. Recharge points in the cave have varying geochemical signatures and indicate the complex residence time dynamics that control the discharge in the springs during different seasons and antecedent moisture conditions. These results have implications for the management of the cave system and adjacent Green River with respect to a variety of hydrologic and biological parameters, including the potential future response under a changing climate.

Chambliss, Robert; Philips, Keith; "Molecular Phylogenetics And Biogeography Of North American Spider Beetles" (Keith Philips)
The Ptininae are a subfamily of small beetles commonly known as spider beetles. Spider beetles have a high degree of morphological adaptation in xeric climates, where they are most diverse. Several species of spider beetles of the genus Niptus inhabit a diverse array of arid and semi-arid habitats in the western United States and northern Mexico. Niptus spider beetles are most commonly associated with caves, rock shelters, and animal burrows and have been observed feeding on mammalian dung, indicating specialization as a detritovore. Molecular and morphological analyses of spider beetle specimens collected during the summer of 2021 reveal speciation patterns and elaborates upon the known range of western North American Niptus species as well as indicate the existence of multiple yet undescribed species.

Chavda, Chetas "Paid Parental Leave and its Effects on Employee Turnover and Wage Replacement Rate" (Lauren McClain)
In the US, paid leave policies have developed slowly compared to other UN member states and OECD countries. Other countries provide mandated paid parental leave, while the US only mandates 12 weeks of unpaid leave. There is extensive literature on the economic impacts of paid parental leave in other countries. However, the difference between paid leave policies in these countries with the US makes it difficult to extrapolate their findings to the US. The new Parental Leave Study is a quota sample of parents in the US who had a baby in the last 2 years (n = 2649). This study examines the relationship between access to and use of paid leave, type of leave taken, wage replacement rate, and the likelihood of returning to work for the same

employer to determine how leave options are associated with employee turnover.

Chelson, Christian; Stansell, Maxwell; Ashley, Noah; "Weight Gain Variance From Glucocorticoids And Sleep Fragmentation In Male Mice" (Noah Ashley)
Sleep loss and increased circulating glucocorticoids (GCs) have been shown to independently lead to weight gain. Sleep deprivation in men has been significantly associated with weight increase, while data in women show no correlation. In cases of excess GCs, i.e., Cushing's disease, weight gain is clearly observed in both sexes. This study examines the effect of GCs and sleep loss on weight gain in male C57BL/6J mice. Sleep fragmentation (SF) is a form of sleep loss that accompanies obstructive sleep apnea. In this study, mice were adrenalectomized (ADX) or given sham-ADX and provided with exogenous GCs in their drinking water (or vehicle). Half of these mice were exposed to chronic SF (8 weeks) or no SF (the other half). Here, we report on differences in weight gain among mice subjected to these GC and SF manipulations, with a future goal of assessing neuroinflammation. Results of this study will increase our understanding of how stress and sleep act together to influence weight gain.

Chetawatee, Apirada; Galloway, J. Michael; "Implementing Virtual Reality Into Footwear Design" (J. Michael Galloway)
Mass customization has gone from a privilege to an industry norm. Consumers are accustomed to getting what they want when they want it and as technology advances this becomes more easily accessible. Virtual reality can connect people in a virtual space from anywhere in the world. This technology has the ability to transport the user to a different world. The goal of this project is to create a virtual reality shoe customization program in Unity game engine viewable through a virtual reality headset. The program allows the user to change the color and materials of the shoe's silhouette and for collaboration in the virtual space. Future work includes expanding into virtual reality try-on.

Chhabra, Sahil; King, Rodney; "Genome Engineering Of Bacteriophage Moomoo" (Rodney King)
To successfully infect host cells, viruses must precisely control the expression of their genes. In temperate bacteriophage, the repressor plays a central role in determining whether the virus will grow lytically or integrate into the host genome and remain dormant. The goal of this research was to create a mutant phage that can only grow lytically. To accomplish this, we used the Bacteriophage Recombineering of Electroporated DNA (BRED) technique to delete the repressor gene in bacteriophage MooMoo. This technique requires electrocompetent Mycobacterium smegmatis cells that contain plasmid pJV53, which expresses proteins that promote recombination. MooMoo genomic DNA and a recombination substrate were simultaneously electroporated into the transformed bacterial strain to allow for recombination to occur. After incubation, plaques were picked and screened for the desired deletion. Plaques that tested positive for the deletion were purified. Surprisingly, MooMoo deletion mutants produced plaque phenotypes similar to wild-type phage. Because the integrase gene also regulates temperate phage life cycles, a deletion of both the repressor and integrase genes is currently being attempted. The BRED genome engineering technique can be applied to other temperate phages to produce therapeutic phages that can treat a wide range of bacterial diseases and target antibiotic-resistant microbes.

Claussen, Hannah "Will The Real News Reporters Please Stand Up?: A Study Of Bias In The Media" (Mac McKerral)
Will the real news reporters please stand up? A study of bias in the media By Hannah Claussen The goal of my project is to define what news media bias is and examine its history and the effects it currently has on our country and democracy. I will examine its electoral effects as well as how media bias has contributed to lower trust in the news media. My project will consist of a general readership news story on the subject of media bias, two news story sidebars that will hone in on unique components of the main story, an abbreviated research paper and a personal reflective essay. My project will feature research papers, surveys from sources such as the Pew Research Center and the Poynter Institute, interviews and other news sources. This project is significant because it can help equip people to better understand the news media and how it operates, how to recognize bias and how to distinguish biased and fake news from factual reporting, and to distinguish news from opinion.

Clayton, Nicholas; Herring, Will; Putman, Michael; Costello, Austin; "UAV Cave Mapping And VR Experience- Hardware" (Jeffrey Galloway)
The exploration and mapping of cave systems has historically been a dangerous activity due to unpredictable conditions. These conditions cause the data collection to be inaccurate and time-consuming. The goal of our UAV (unmanned aerial vehicle) drone is to eliminate the need for people to physically enter caves to map them. As well as obtaining more accurate data, this information will be collected faster in comparison to traditional cave mapping. For the hardware of our project, we are constructing a quadcopter built on the s500 drone frame platform. This medium-sized frame will be large enough to hold all the data collection equipment, yet small enough to easily navigate the cave. The drone will be fully autonomous which means it can fly itself inside the cave without any human input. To control the motors, stabilization, and flight path, a Pixhawk automated flight controller will be used. It will be programmed for unmanned flight using sonar and lidar to sense its location, and code will be written to tell the drone where to go next. The Lidar sensor will also accurately map the 3D environment by creating a point-cloud data stream of the cave's surfaces. The data collected will be stored locally on an SD card and removed from the drone after task completion.

Clouse, Matthew; Steward, Troy; Cirak, Mirza; Chidurala, Manohar; "Design And Development Of Pitot-static Tubes For External Flow Pressure Measurements During Wind Tunnel Testing" (Manohar Chidurala)
In wind tunnel testing of external flow, the ratio of the cross-sectional areas of the test sample to the test section has significant impact on the accuracy of the experimental results. Similitude is the objective method that optimizes this ratio and allows the scaled testing of aerodynamic behavior during prototyping. This project applies similitude to the test samples that were created by a previous group during their design and development of a force balance and pressure data acquisition system. Upon completion of their data acquisition system, significant boundary layer interference is present when experiments using these samples are conducted. A cylindrical test sample and a NACA 0012 airfoil are the test samples being used. The pressure measurements are collected using pitot-static tubes mounted normal to the surface of the test

sample. The current pitot-static tubes in use are too large for the size of test sample required to eliminate boundary layer interference. This requires the design and development of pitot-static tubes. For the static pressure at the end of the static tube to equal the dynamic pressure of the air flowing around the test sample, the air flowing into the static tube must reach static equilibrium through an isentropic process.

Colao, Alison; Buoncristiani, Nick; Baker, Kayla; Scali, Sarah; "Do Changes In Navy Fitness Testing Protocols Impact Service Member Performace?" (Rachel Tinius)
BACKGROUND: The fitness level of our service members is of the upmost importance due to the nature of their occupation. This study investigated whether changes to the Navy's Physical Readiness Test (PRT) impact performance on the fitness test. METHODS: 20 males between the ages of 18 and 29 participated (n=20; 21.05±2.01 years; 182.95± 24.44 lbs; 71.95±1.82 inches; BMI 24.85± 2.74). Participants performed both the New PRT and old PRT at two separate randomized visits. Protocols included push-ups, curl-ups (old version) or a forearm plank hold (new version), and 3) 1.5-mile run. At the end of each exercise the participants' heart rate and rating of perceived exertion (RPE) were recorded. RESULTS: There was a significant difference in points awarded for the plank protocol compared to curl-up protocol (p=0.002; 54.50± 12.02 vs. 32.75±31.30). Participants scored higher on the new PRT compared to the old PRT (p=0.019; old PRT: 113.75±49.23 vs. New PRT: 135.25±44.47). CONCULSIONS: The curl-up and forearm plank standards are not equivalent. The Navy should consider increasing the minimum standard for the forearm plank hold to maintain the same rigor as the old PRT.

Cole, Zoe; Rowland, Naomi; King, Rodney; "The Discovery and Sequencing of Bacteriophage" (Naomi Rowland)
In the biosphere, there are approximately 10^31 bacteriophage particles, but less than three thousand of them have been characterized genomically. Bacteriophages are viruses which are capable of infecting and killing bacteria without harming human cells, this makes them a potentially revolutionary replacement for antibiotics. This is beneficial because the rise of antibiotic resistant bacteria is slowly increasing. A water sample was collected from the Ohio River and enriched for mycobacteriophages by providing the bacterial host Mycobacterium smegmatis. Plaques were produced and a pure population was generated. The purified phage was named Vevay. Genomic DNA was isolated from Vevay phage particles, digested with restriction enzymes and analyzed by gel electrophoresis. After isolating Vevay's DNA, a series of restriction digestions were run and used for gel electrophoresis. The gels produced a genetic "fingerprint" for Vevay. After the lysate was collected, the morphology of the phage was determined by electron microscopy. The phage is 288.6 nanometers long with striations along the tail and a round capsid. This phage was previously undiscovered. The phage was registered into the national database and samples of Vevay were archived at WKU and the University of Pittsburgh for further investigation in the future.

Congleton, Keegan "United Nations Efforts to Understand and Protect the Most Precious Caves and Karst Resources of the Americas" (Christopher Groves)
Karst landscapes and aquifer systems occur in regions underlain by relatively soluble limestone bedrock, where features such as caves, sinkholes, underground rivers and large springs are

common. There are more than 150 United Nations Educational, Scientific and Cultural Organization (UNESCO) Biosphere Reserves (BRs) around the world that have caves and/or karst resources. This research has analyzed data for UNESCO's BR efforts in North and South America to support a global database of cave and karst resources in BRs to better understand cave and karst BRs, as well as recognize the extent of cave and karst within the UNESCO Man and the Biosphere Program. There is not a sole, complete, database for this data so a variety of disparate internet and literature sources were used and pieced together, including UNESCO, Google Maps, and government websites. These are now being compiled into a Geographic Information System (GIS) database. Of 169 cave and karst BRs identified in 67 countries, 31 are located in North America and 18 in South America, respectively. This will ultimately inform sustainable development planning and protection of sensitive biota and water resources in fragile cave and karst ecosystems found in the UNESCO World Network of Biosphere Reserves.

Cook, Kaitlyn "Bridewealth And Dowry In Northern India" (Kate Hudepohl)
My research delves into the practice of bridewealth and dowry specifically in the Punjab region of Northern India. This practice is one that is the exchange of money and occasionally goods in return for marriage. It's existed around the world but the majority of countries have outlawed both dowry and bridewealth as they often do not bode well for the women involved. In Northern India, it is still practiced quite often despite the fact that it has been outlawed by the government. Not everyone in the situations that involve bridewealth and dowry sees it as a negative thing. While the action itself may not be viewed as bad by all overall the effect on women is. Both bridewealth and dowry promote a sense that women are below men and therefore they are the ones that are 'bought' and 'sold'. My research goes into the ethics of these practices and examples in the modern age of what can result from an arrangement of marriage involving bridewealth or dowry.

Cooper, Chloe "Evaluating Flood Risk, Perception, And Equity In Urban Karst Communities Using An Integrated Gis Assessment Approach" (Jason Polk)
This proposed study aims to examine how the usage of an integrated GIS (Geographic Information Systems), flood vulnerability assessment, and management approach can aid in hazard response planning in karst groundwater systems, particularly in urban environments. This study will focus on lower-income or marginalized communities in order to better understand the impacts of flood events on socially vulnerable groups. Additionally, place-based vulnerabilities will primarily be assessed based upon three main factors in the vulnerability framework and how these components intersect: social, environmental conditions, and economic. By understanding which areas of the city are most vulnerable and the precise ways in which these areas are vulnerable, management can be focused to specifically target those areas and the susceptibilities present. It is expected that some areas of the CoBG will have experienced flood impacts more than others and that there will be some variability in how these different areas handle recovery, including potentially diminished abilities to recover based on environmental inequities. The ultimate goal of this project is to take the acquired knowledge of flood vulnerabilities in the CoBG and apply this to make suggestions or proposals on how flood mitigation and recovery may be improved through changes and updates on existing management strategies and comprehensive development planning.

Coyle, Josie; Brueggemann, Carolyn; Dawson, Miriam; Davis, Justine; Rich, Timothy; "US Public Supports Action on China's Human Rights Abuses: Survey and Publication" (Timothy Rich)
The U.S. government frequently criticizes China's government for human rights violations. This survey and article examine how the American public views human rights issues in China, specifically the Uyghurs. The contents of this survey is used to determine if the US public supports the government in placing regulations on China in retaliation to these abuses. We asked three questions which include the severity of China's human rights issues, the most pressing human rights issue, and if they would support economic sanctions on China depending on who the abuses were against and if it would damage our relationship with China. Our major findings were that the American public is aware of the Uyghurs and the human rights violations that they have endured. They also support placing economic sanctions onto China at high rates, even if it further hurts our relationship and concerns a different dominate religious group (muslims).

Curtis, Elizabeth; Dersham, Tristan; "People are more certain about policies attributed to their own political party." (Aaron Wichman)
Previous research shows that endorsement of policies by one's own political party increases liking for these policies. These attitudes can have broad effects on behavior. One important determinant of whether attitudes drive behavior, however, is the strength of the attitude. Attitude strength has multiple components, but certainty, or confidence, is an important quality associated with strong attitudes. The current research presented participants with different hypothetical political policies attributed to either the Democratic or Republican party. Participants were then asked about their certainty in their attitudes toward these policies. Expanding on previous research showing own-party endorsement causes more positive policy attitudes, the current research found that own-party endorsement caused increased certainty in policy attitudes. Together with previous research, it appears that party endorsement not only increases policy liking, but also certainty in that liking. Party endorsement therefore may have even stronger effects on behavior than previously realized.

Darbar, Dipak; "Tyrosine Kinase Receptors" (Dr. Emani Emani)
Epidermal growth factor receptor (EGFR) tyrosine kinase inhibitors gefitinib and erlotinib are effective therapies for non–small cell lung cancer patients whose tumors harbor somatic mutations in EGFR. All patients, however, ultimately develop resistance to these agents. Thus, there is a great need to understand how patients become resistant to develop effective therapies for these cancers. Studies over the last few years have identified two different EGFR tyrosine kinase inhibitor resistance mechanisms, a secondary mutation in EGFR, EGFR 790M, and amplification of the MET oncogene. These findings have led to clinical trials using newly designed targeted therapies that can overcome these resistance mechanisms and have shown promise in laboratory studies. Ongoing research efforts will likely continue to identify additional resistance mechanisms, and these findings will hopefully translate into effective therapies for non–small cell lung cancer patients.

Davis, Shelby; McDaniel, Adalin; Sorensen, Melissa; Kendrick, Mia; Hurt, Cora; Simmons, Molly;

"An Investigation Of Perceived Authenticity Of Diversity And Black Lives Matter Statements And Their Influence On Applicant Attractiveness" (Katrina Burch)
The social responsibility of organizations has been a widely explored concept. Corporate Social Responsibility (CSR) refers to when organizations are concerned with the social problems of the neighborhoods and communities they serve. Organization's CSR activities (e.g., diversity and social justice statements) can help to influence an organization's attractiveness which refers to the degree in which applicants perceive an organization as desirable. Over the past several years social injustices such as systemic racism, racial injustice and inequalities against minority people have plagued society. Since 2020, companies have been left to confront the social injustices against Black lives and their stances on diversity initiatives and Black Lives Matter (BLM) have been shown in their public diversity and/or Black Lives Matter statements. The aim of this study is to understand the perceived authenticity of those statements and their influence on applicant attractiveness. It is hypothesized that Fortune-500 diversity statements that specifically mention race/ systemic racism/ racial inequality and/or actions taken to promote diverse workplaces will be seen as authentic and those organizations will be the most attractive for people who reflect those values. This hypothesis will be tested by conducting a mixed-method study using text analysis, and correlation and regression analyses.

Dawson, Miriam "Chinese Use Of Shaming Language On The Topic Of Covid-19 In The Sino-American Relationship" (Ashley Stinnett)
This paper examines Chinese shaming discourse directed towards the United States specific to COVID-19 in order to explore tensions in the Sino-American diplomatic relationship. Shame is a fundamental concept within Chinese culture, as being susceptible to shame is a sign that one knows right and wrong. Chinese Ministry of Foreign Affairs Spokesmen in their regular press briefings throughout 2020 use tactics such as directly and indirectly insulting U.S. officials, for example asking rhetorical questions, emphasizing that 'the world is watching.' This discourse aims to invoke a sense of shame on the behalf of the U.S while re-framing U.S.–China relations to fit the image China wishes to project to the world. The strategic portrayal of both the U.S. and China create the contrast of China as a responsible country–capable of leading on the world stage– and the U.S. as immoral, self-serving, and unfit to be a world leader. This paper will discuss the impacts of this discourse and its implications for current and future relations.

Diaz Buezo, Andrea; Portmann, Abigail; Ashley, Noah; Portmann, Abigail; "Behavioral Phenotyping Of Sleep Patterns In Arctic-breeding Birds" (Noah Ashley)
Polar environments are characterized by prolonged periods of continuous light during the summer. As the light/dark cycle is the primary agent that synchronizes circadian rhythms, its absence during polar summers can pose challenges to organisms that inhabit those environments. Our lab has previously shown that Lapland longspurs (Calcarius lapponicus), arctic-breeding songbirds, still maintain a diel activity rhythm during the summer; birds are active around-the-clock, except for a brief 4-hr period of quiescence that begins around 12 am. This study used behavioral phenotyping of captive longspurs to assess when birds were sleeping during the polar day. A behavioral ethogram was developed to assess sleeping behavior, and birds were videotaped in outdoor aviaries in Alaska. Behaviors measured were % of time active, feeding, drinking, sleep, and number and length of sleep bouts. Results of this study will

elucidate when birds are actually sleeping during the arctic summer.

Disinger, Jacob "The Use Of Unmanned Aircraft Systems, Meteorological Forensics, And Engineering To Estimate December 11, 2021 Tornado Strength In Bowling Green, Ky." (Josh Durkee)
During the early morning hours of December 11, 2021, a pair of deadly tornadoes tore through the college community of Bowling Green, Kentucky. Given the extensive damages, along with the record number of injuries and fatalities due to tornado events for this area, the procedure to estimate tornado strength began immediately with the National Weather Service. Since tornadoes are rarely measured directly and/or accurately in real-time, a workflow is carried out to assess damages in an attempt to estimate wind speed ranges as the likely cause. In Bowling Green, a host of vegetated, urban, and suburban land use classes were completely destroyed. The purpose of this study is describe the combined methods utilizing unmanned aircraft systems, meteorological forensics, and engineering to estimate December 11, 2021 peak tornado strength of 165 mph (EF-3 scale) winds in Bowling Green, KY.

Driehaus, Alexandra "A Thorough Mathematical Investigation Of The Point-feedback Stabilization Of Piezoelectric Smart Beams" (Ahmet Ozkan Ozer)
Piezoelectric materials produce electrical energy when a mechanical force is applied, making them desirable for multiple purposes, including the use of quartz crystals in the production of some nano materials. The partial differential equations model governing the energy in an oscillating piezoelectric smart beam will be discussed, with an emphasis on closed-loop stabilization of the beam through the sensor placed at the tip of beam, reading out the tip velocity and the total current. This beam is clamped at one end, and is free at the other to oscillate longitudinally. The focus will be on longitudinal vibrations and the movement of charges within the beam itself. Readings of tip velocity and the total current after a proper exposure time are sufficient to reconstruct the behavior of the entire beam. So, a controller (an actuator) at the free end of the beam can be designed based on this principle. The process of determining the optimal feedback gains and damping rate will be discussed. The practices used to model this situation will then be utilized for a discretized partial differential equation model of a piezoelectric beam. Filtered Finite Difference Method is utilized for the discretization to generate desired stability behavior in the beam as a whole. This research is funded by KY NSF EPSCoR grant.

Driehaus, Alexandra; Dobrokhotov, Vladimir; Pimienta, Matthew; Novikov, Ivan; "Development of Automated Scent Classification using Gas Chromatography" (Ivan Novikov)
The goal of the project is to utilize machine learning to develop an algorithm that will generate a verbal description of scent from experimentally obtained gas column chromatograms. Scents are grouped together based on their verbal descriptions. These scent families include floral, citrus, leather, woody, aromatic, oriental, and green. Scents that would be considered green include cut grass and moss, while aromatic scents include menthol and mint. Scent families and descriptions are not universal, and differ by manufacturer and distributor. To better categorize scent, Andrew Dravnieks, in “The Atlas of odor character profiles” (1992), provided quantified descriptions of scent. 140 volunteers were asked to scale the applicability of 146 descriptors for

each of 160 chemicals. These descriptors included cadaverous, cinnamon, and peach. All verbal descriptors were given an applicability on a scale of 0 (not applicable) to 5 (highly applicable). We acquired three chemicals from each of three scent families, and experimentally collected gas column chromatograms for each. These chromatograms will be used as the bank for the machine learning algorithm. We will discuss the preliminary GC data, and the current state of development for the machine learning algorithm. This project was supported by a KY NSF EPSCoR grant, and currently is supported by WKU FUSE grant #20-FA251.

Eilers, Kylee "Rurality and its effects on prenatal care in southcentral Kentucky" (Neena Jones, PhD, MSN, RN)
Despite ongoing efforts to increase positive healthcare outcomes for prenatal care in rural Kentucky, there continues to be limited access to adequate and quality resources. Research questions for this research project explore the prenatal care resources for Allen, Barren, Butler, Edmonson, Hart, Logan, Metcalfe, Monroe, Simpson, and Warren counties, compare healthcare disparities that exist in those counties with other rural regions of Kentucky, and identify limitations of such prenatal care resources in successfully achieving positive care outcomes. In addition to evaluation of applicable online resources through organizations local to the region, some healthcare professional and representatives are interviewed to find out about available resources, and the amount of care received for prenatal recipients.

Elliott, Haley; Tariq, Aysha; McCall, Bella; Abbott, Braiden; Pardue, Chase; Adams, Elizabeth; Williams, Kierstin; "Coronavirus Anxiety Among University Students" (Lester Archer)
In 2020, coronavirus SARS-CoV-2, more commonly known as COVID-19, disrupted the lives of everyone, including university students. While most university students have high grit behaviors, the pandemic has added another challenge. University students are expected to persevere in spite of adversity. The purpose of the present study was to explore grit and COVID-19 anxiety among university students. The research team used an online questionnaire. The sample (N = 55) comprised mostly cisgender females (70.9%). Graduate students comprised 29.1%. The questionnaire included Grit-S, COVID-19 anxiety, and current anxiety scales. Many participants reported low levels of COVID-19 anxiety. Spearman’s rank order correlation found no significant correlation between grit and COVID-19 anxiety rs = -.046, n = 55, p = .368. While no significant difference in grit between undergraduate students and graduate students was found, grit was highest among undergraduates (61 - 90 credits; Mdn = 3.63). Despite the pandemic, students had similar or little differences in COVID-19 anxiety and had similar levels of grit across student levels. Findings suggest that over the course of the two years of COVID-19, students are becoming accustomed to the new normal. Implications for university administration include recognizing that students are persevering in spite of adversity.

Fannin, Lindsey; Srivastava, Ajay; "Genetic Analysis Of Cathepsin L In Drosophila Melanogaster Wing Development" (Ajay Srivastava)
There are eleven known human cysteine cathepsins. They perform a variety of roles in protein turnover and are omnipresent in human tissues. It is known that the dysregulation of these cysteine cathepsins is associated with human cancer progression. However, due to the large number of existing cathepsins in humans, it is difficult to study them. Drosophila melanogaster

is an efficient model organism to investigate the function of the cysteine cathepsins because they contain only one— Cathepsin L (CP1). CP1 is expressed in various regions of the wing, as determined by experiments using stained antibodies to visualize expression. Through use of the GAL4/UAS- system and RNA interference, the expression of CP1 can be controlled in various regions of Drosophila melanogaster. The focus of this project is to downregulate CP1 in various wing regions to generate various phenotypes. Characterization of these phenotypes will help us determine its role in wing development. First generation progenies were analyzed for phenotypes in order to demonstrate this role. Information on the function of CP1 in Drosophila melanogaster will provide us with more knowledge regarding the role of cysteine cathepsins in humans, especially when dysregulated.

Flanagan, Morgan "Encouraging Little People's Big Questions: An Elementary School Teacher's Guide To Philosophical Inquiry In Decision Making" (Audrey Anton)
Children serve as natural philosophers. Their innate sense of questioning, in a classroom setting, with the right instruction, can be beneficial to understanding many abstract concepts. This project is a user-friendly elementary school teachers' guide to encouraging philosophical questions and thoughts in young students. Teachers will be able to utilize the guide as a skeleton in forming their own lesson plans. The guide will not be a lesson plan in itself, rather an array of activities and literature that can be incorporated into pre-existing units, or be used as a tool in creating new ones. Outlines include literature synopsis, overall philosophical themes, teacher facilitated discussion questions, and optional assessment activities. Outlines are cognitively appropriate to the various grade levels, and incorporate Kentucky Common Core standards. The finished product of this capstone will be printed and given to teachers who helped work on the project. It will also be posted on public portals (such as Kentucky library websites) so that teachers who wish to use the guide may do so. This will encourage teachers to discuss abstract concepts in the classroom, and ultimately allow students to explore natural curiosity in a manner that is cohesive with education requirements.

Flowers, Alastair "Decomposition Rates Of Rye, Crimson Clover, And Mixed Rye-clover Cover Crops In A Kentucky Corn Field" (Becky Gilfillen)
With cover cropping growing in practice as a way to retain nutrients in soil, a question that has emerged is how exactly we can manage and aptly measure the amount of nutrients being cycled into the soil from cover crops. In particular, different cover crop species take up different amounts of nitrogen and release nitrogen at different rates, raising questions about which species can work best to provide nitrogen to the subsequent crop. In this study, we examined the decomposition and nitrogen release rates of two winter cover crop species – cereal rye and crimson clover – grown in monoculture and mixture. We hypothesized that cereal rye would decompose slowly due to its high C:N ratio, while crimson clover, a legume with low C:N ratio, would decompose quickly, and the mixture would decompose at an intermediate rate.

Ghrist, Coral "Molecular Evolution Of The Cancer-related AT-rich Interaction Domain 2 Gene (arid2)" (Chandrakanth Emani)
The present study deciphers the molecular biological evolution of the ARID2 protein. ARID2 was shown to correlate with cell cycle regulation of cyclinD1 and cyclinE1 to suppress tumor cell

growth. ARID2 plays a role in pathogenesis of hepatocellular carcinomas. The protein's primary function is to regulate normal cyclinD1 and cyclinD1 levels for cell division. In this study we analyze FASTA sequences of ARID2 from a diverse array of life forms using computational tools. Analysis was performed using bioinformatics software databases NCBI and EXPASY. Conserved domains and evolutionary ancestors were identified through PSI-BLAST and neighbor-joining phylogenetic trees. The initial BLAST analysis has identified a hypothetical evolutionary ancestor, the Sunda flying lemur.

Glass, Paige ""Comparison Is The Thief Of Joy"? The Effects Of Absolute Versus Relative Status On Mental Health Outcomes" (Qin Zhao)
In performance settings, absolute scores show stronger effects on satisfaction with performance and emotions than do relative rankings (Zhao, 2021). But the opposite pattern might occur in the financial area. Based on the relative deprivation theory (Smith et al, 2012), the hypothesis of the study was that relative (vs. absolute) financial status would be more impactful. In an experiment participants were randomly assigned to one of four status conditions in a 2 (absolute: high vs. low) x 2 (relative: high vs. low) design. Depending on their condition, participants received different messages (generated by computer software) about their absolute and relative financial status after completing questionnaires about family income, spending behaviors, etc..

Gregory, Caitlin "Differences in Parental & Peer Relationship Quality and Self-preservation for Those With and Without Self-harm History." (Amy Brausch)
The study assessed differences between those with and without self-harm history on relationships with parents and peers (communication, trust, and closeness), as well as self-compassion and loneliness. Data were collected on-line from 167 participants at a south-central university within the United States, with the majority identifying as white (78.2%) and female (78.2%). Most reported having a mother figure (98.2%) and father figure (88.8%) within their lifetime. The study used self-report measures, including the Inventory of Parental and Peer Attachment (IPPA), the Self-Compassion Scale (SCS-SF), the Social Desirability Scale (SDS-SF), the Loneliness Scale (LS), and the Self-Injurious Thoughts and Behaviors Interview (SITBI). Results showed that groups with self-harm history reported significantly lower trust and communication with their parents and peers, in addition to lowered self-compassion and greater loneliness, compared to those without self-harm history.

Hakimov, Somon; Kylychbekov, Salizhan; Belekov, Ermek; "Evaluation Of Antibacterial Activity Of Pulsed Laser Synthesized Silver Nanoparticles Combined With Methylene Blue For Photodynamic Therapy Application" (Ali Oguz Er)
Photosensitizing agents play an essential role in the deactivation process of multidrug resistant pathogens and tumor treatments. Methylene blue (MB) functionalized silver nanoparticles (Ag NPs) can potentially be used as an effective photodynamic therapy (PDT) agent for prosthetic joint infection (PJI). Ag NPs were synthesized by pulsed laser ablation technique in different aqueous solutions like polyvinylpyrrolidone (PVP), citrate and polyvinyl alcohol (PVA) at different wavelength and power. With 1064nm wavelength, Ag NPs average size distribution in citrate, PVP, and PVA were found to be 6nm, 10nm, and 12nm respectively. Further, with

532nm wavelength it was found to be 4nm, 7nm, and 10nm respectively. NPs were characterized in depth using a TEM, UV–vis, and photoluminescence spectra. These Ag NPs were combined with MB and used to deactivate the Gram-negative bacteria, Escherichia coli, and Gram-positive bacteria, Staphylococcus aureus. MB and Ag NPs combination was found to possess higher antimicrobial activity and thus were more effective in killing both bacteria in comparison to MB and Ag NPs alone. Within 6 min of irradiation time with 660 nm LED, the MB/Ag NPs deactivated entire ~108 CFU/mL concentrated S.aureus and E.coli. MB/Ag NPs used in PDT could be effective in killing bacterial pathogens in open wounds, prosthetic joint infections, in vivo cancer, and tumor treatments.

Hall, Megan; Miller, Allie; Olajuwon, Sidikat; Lewis, Abbey; "The Role Of Pt(en)cl2 In Altering Cellular Iron Transport" (Blairanne Williams)
Approximately 75% of all chemotherapy cancer patients receive a platinum chemotherapeutic during their treatment. Although these drugs are widely utilized, little is known about the cellular transport of platinum drugs. It is hypothesized that platinum utilizes transporters for other metals to enter the cell. Structural differences between compounds are predicted to affect the compounds' ability to manipulate different transporters. Also, different cell types express different transporters. Therefore, compound structure is expected to influence transport of platinum compounds differently in different cell types. This study investigated the role of the platinum compound Pt(en)Cl2 in altering iron transport in a melanoma cell line (SK-MEL-5). Atomic absorption spectroscopy was utilized to determine the total amount of platinum and iron that has accumulated in the SK-MEL-5 cells. With increase in platinum concentration exposure, the intracellular iron concentration showed no significant change. Thus, it is unlikely that Pt(en)Cl2 is entering SKMEL5 cells via an iron transporter. Further investigations will analyze the data from a non-cancerous skin cell line with similar pigmentation to the SK-MEL-5, to determine if cancerous cells express different transporters than the non-cancerous cells.

Hammonds, Kennedy; Burch, Katrina; "Attitudes Toward Diversity Initiatives" (Katrina Burch)
The purpose of the proposed study is to examine the relationship between attitudes toward Black, Indigenous, and People of Color (BIPOC), cynicism towards organizational change, diversity initiative fatigue, and unit diversity climate. It is hypothesized that negative attitudes toward BIPOC will be associated with cynicism toward organizational change and diversity initiative fatigue will mediate the relationship between attitudes toward BIPOC and cynicism toward organizational change. It is also hypothesized that unit diversity climate will moderate the relationship between negative attitudes toward BIPOC and diversity initiative fatigue and moderate the relationship between negative attitudes toward BIPOC and cynicism toward organizational change. To examine those relationships, a survey will be distributed to WKU faculty. SPSS Process Macros Model 8 will be used to perform the analyses moderated mediation. The results will clarify the effect of diversity climate on organizational cynicism derived from diversity initiative fatigue. Identifying people's cynicism towards organization change is important because employees' cynicism can create negative consequences for the organization. This study is significant because it addresses how the lack of inclusion can interfere with minority opportunities and well-being in organizations, as well as help

organizations become more aware of how policies and procedures can influence employees.

Hampton, Trevor "Housing For Western Kentucky University" (Shahnaz Aly)
A mixed-use apartment complex located off-campus, less than a mile away, would give students a greater selection of where they can live when ready to move out of the dormitories. Significant information to research would be how many students are looking for housing that is not on campus, as well as the population of the targeted age group that the apartments will be designed around. Collected data showed that 77% of Western Kentucky University's students are full time. This means that students who don't live within commuting distance to Bowling Green must find housing while classes are in session. With 46% of full-time students being in their teens and 50% of students being in their 20s, this is typically the age range that students are looking to move off campus and into their own private space. In conclusion, closely located off-campus housing will be beneficial to Western Kentucky University and its full-time student population.

Harne, Austin "Incorporating Period Architecture Into Contemporary Designs" (Shahnaz Aly)
Much like architecture, bourbon has a rich history. The history of bourbon is especially important in Kentucky, as it is the birthplace of bourbon. The goal of my research was to showcase the history of bourbon, while also incorporating contemporary design to point towards the future of the bourbon industry. My research involved looking at various time periods that marked important events in bourbon history, touring several distilleries, and studying similar museums across the globe. I utilized the barn style of the 19th century with several modern elements throughout the design. By incorporating both historical and contemporary design elements I was able to give the visitors a fully encompassing experience of the history of bourbon. This allows for visitors to experience the history of bourbon through the exhibits as well as the architecture, displaying the past, present, and future of bourbon and making for a sustainable and timeless design.

Harness, Briana; Hakimov, Somon; Neupane, Shreya; Er, Ali; Banga, Simran; "Antibacterial Effectiveness of Methylene Blue and Silver Nanoparticles on Prosthetic Joint Infections" (Banga Simran)
Reoccurring prosthetic joint infections (PJIs) are often caused by treatment-resistant bacteria. Photodynamic therapy (PDT) is a treatment method against drug resistant pathogens and the diseases they cause. Photosensitizers like methylene blue (MB) are compounds in PDT that react with light to produce antimicrobial species. It is hypothesized that methylene blue in combination with silver nanoparticles (Ag NPs) is more antimicrobial than methylene blue alone. In this study, Ag NPs synthesized by pulsed laser ablation technique in different aqueous solutions like polyvinylpyrrolidone (PVP), citrate, and polyvinyl alcohol (PVA) were combined with methylene blue to test their antimicrobial effectiveness on Gram-positive Staphylococcus aureus and Gram-negative Escherichia coli bacteria. Bacteria with an initial cell density of 108 ml-1 were treated with methylene blue combined with AgNPs, AgNPs, or methylene blue and irradiated with 10.0 mW LED light at 660nm at different time interval. The inactivation rate for MB-Ag NPs was determined by enumeration of Colony Forming Units (CFU) using serial dilution technique on Luria Broth (LB) agar plates and were compared with bacteria treated with

phosphate buffered saline (control). Results show that MB and Ag PVP NPs in combination had more profound antibacterial effect against S. aureus and E. coli.

Harris, Darwin "A Community Engaged Partnership for Watershed Health Protection and Stormwater Management" (Ritchie Taylor)
A community engaged partnership for watershed health protection has been created between Western Kentucky University and Greenbrier, TN. This is a collaborative stormwater management model for small municipalities that engages stormwater managers with faculty and students in watershed monitoring, assessment, and evaluation. The Tennessee National Pollutant Discharge Elimination System (NPDES) general permit for discharges from Small Municipal Separate Storm Sewer Systems (MS4) requires a Phase II monitoring program that consists of analytical and nonanalytical components. Monitoring is required as part of a process to identify pollutant sources, assess attainment of water quality criteria, and evaluate stormwater management effectiveness. Analytical monitoring of stream segments included semi-quantitative macroinvertebrate stream surveys and bacteriological sampling for E. coli. A final component of the stormwater monitoring program was non-analytical monitoring through visual stream and habitat surveys to assess sources of siltation, habitat alteration, and pathogens. Results of the monitoring showed there were sensitive biometrics to indicate habitat perturbations for macroinvertebrates. In comparison, E. coli levels for stream segments were found to exceed the recreational use water quality criterion, with exception to one stream segment. Results of nonanalytical monitoring will be compared to analytical monitoring metrics to prioritize stormwater management in the stream segments.

Harris, Faith "Antitype" (Trini Stickle)
Antitype is a collection of poetry that examines childhood and adolescence through a lens of place and loss, while exploring both poetry and creative processes. The work presented begins by contextualizing antitype within the history of poetry and assessing influences of specific poets and poetic movements on my own work. Next, I share excerpts from my poetry collection to illustrate connections from its five different sections, each investigating facets of this overarching theme: my childhood affected by loss and as it contributes to my development as a poet. Section one examines how my childhood was shaped by place and family heritage. Section two delves into the loss of my sister, while also addressing, more generally, death and our reactions to it. Section three looks at the influence of my sister's death on me as poet. Section four focuses on coming of age after loss, with poems that characterize my life during college. The final section examines romantic love, with poems that highlight the fears of loving and possibly losing someone when one's life has been shaped by such a loss. This highly autobiographical collection aims to showcase the shared effects of loss, particularly loss in childhood, that people experience.

Harris, John "The Louisville Art Complex" (Shahnaz Aly)
This project was created to provide a space for local and traveling artists as well as the local community to come together to view and create art. Visitors have the option to make the facility a temporary home by renting out studio apartments that include their very own private design studio. Local visitors can shop at the marketplace located on the northeast side of the

structure. As well as having access to a second-floor cafe, and two separate art galleries. My overall main goal with creating this structure is to have emphasis on green spaces. I've included several green rooftop decks, along with a public green rooftop space for visitors to enjoy. The project also utilizes solar energy by including many solar panels and using natural lighting to eliminate the excessive use of artificial lighting. The landscaping also includes large open green spaces that can be used for summer events, or for community gatherings.

Harry, Trevor; Cooper, Chloe; Lawler, Trayson; Hourigan, Amy; Wisenden, Matthew; Strenecky, Bernie; "Rotary and Rivers: Saving Our Rivers Through Service Learning in Riverside Communities via Riverboat-Based Education and Outreach" (Jason Polk)
Water quality and accessibility are universal problems for humans and this is true now more than ever. The Ohio and Mississippi Rivers are particularly good examples of rivers with water quality issues because of the size of the watersheds and density of urbanization and agricultural activities. The Save Our Rivers project was pioneered by Rotary International to address water quality through service learning. Over 100 participants took a steamboat from Louisville, KY to Alton, IL, stopping in ports along the rivers to participate in water quality related activities designed and led by students and Rotary leaders in partnership with Kentucky Waterways Alliance. Surveys with quantitative questions were given to the participants before and after each event to gauge the effectiveness of each activity. Questions asked included confidence in topics relating to water quality pre- and post-activity and ways to make the activities more enjoyable. Participants learned a lot from the activities and requested for more time at each stop. Finally, students presented at the final port and gave student input in a roundtable discussion, which included stakeholders and community leaders to formalize a plan for continuing the Save Our Rivers project. This project has large implications for the future of using service learning to teach science, with Rotary International showing an interest in continuing this project globally.

Heard, Whitney; King, Rodney; "Identification of Toxic Genes from Mycobacteriophage MooMoo" (Rodney King)
MooMoo is a temperate mycobacteriophage isolated from a water sample. Based on published evidence that phages encode proteins that are toxic when overproduced, we hypothesized that MooMoo may encode genes that are toxic to Mycobacterium smegmatis. Five genes (gp87, g88, gp89, gp90, and gp91) were chosen for analysis because they have no known function. Each gene was amplified by polymerase chain reaction (PCR) and cloned into an Escherichia coli/M. smegmatis shuttle/expression vector. The recombinant plasmids were propagated in E. coli, verified by PCR, then moved into M. smegmatis cells. The cloned genes were induced, and cell growth was monitored. The toxicity of each gene was scored on a Toxicity Index (TI) from 0–5, with 0 corresponding to no toxicity (abundant growth) and 5 representing the strongest toxicity (no growth). Gp87 displayed the strongest toxicity and was chosen for further analysis. The next step is to determine how gp87 interferes with M. smegmatis growth by performing a protein-protein interaction assay using a bacterial two hybrid screen. This analysis may identify possible interactions with the host metabolic machinery or other critical cellular processes. This also represents a general approach for elucidating gene function and may identify potential new targets for therapeutics.

Hebenstiel, Lars; Er, Ali; Novikov, Ivan; "Measurement Improvement in an Optical Interferometer using Stochastic Resonance" (Ivan Novikov)
Stochastic resonance (SR) is a phenomenon by which the signal to noise ratio (SNR) of a weak forcing function acting on a bistable system is enhanced by the addition of noise to the forcing function. First introduced to explain Earth's periodic ice ages, SR has since been measured in a variety of mechanical, electrical, chemical, and even sociological models. The simple theoretical model of SR is based on a two-state system in which the average transition time due to noise can be matched to the period of the weak forcing function. One of the theorized applications of SR in an optical system is to improve the SNR of the LIGO interferometer by adding a nonlinear cavity to the output beam path of the experiment. We are developing numerical simulations for a small-scale interferometer measurement of SR using a nonlinear crystal. In this presentation we will briefly describe the theoretical model of SR, present experimentally observed SR in a magneto-mechanical oscillator, and discuss finite difference time domain (FDTD) numerical simulation of signals in an optical interferometer.

Heckerman, Gabriel "The Protective Role Of Melanin In Peocilia Latipinna Inner Ear" (Michael Smith)
It has been observed that a lack of melanin pigment is associated with mammalian deafness. Previous work in the Smith lab showed that black fish color morphs had reduced noise-induced hearing loss compared to white color morphs. I hypothesized that this oto-protective effect was due to melanin in the inner ear of these fishes. To test this, I quantified the melanin concentration of the inner ears of white and black Poecilia latipinna (common molly) color morphs. I measured the mass of each fish, dissected the inner ears out, and measured the melanin levels via spectrophotometry, based on an adapted version of previously published protocols. Preliminary data shows that the inner ear of black mollies contain approximately 2.5 times the melanin of white mollies, suggesting that melanin may play a protective role in preventing noise-induced hearing loss. Future research is needed to understand the cellular mechanisms in which melanin may provide this sort of auditory protection and may pave the way for new drug testing opportunities in the search for hearing loss prevention or cure in humans.

Heidbreder, Zachary "New Albany Community Center" (Shahnaz Aly)
A community center requires research determining the type of structure to build whether its modern, historical, or any other types of structures. The community center for New Albany is a contemporary structure incorporating elements from the Victorian nature of Downtown New Albany. When researching historical structures in New Albany the Culbertson Mansion was one building that inspired a lot of the design elements in the Community Center. The way I developed my forms and floor plans was due to research of other community centers across the country and incorporate real spaces. Researching fun and creative floor plans was helpful when it came to developing the floor plans because it gave me the design pathway. The community center uses IBC standards and research went into determined this structure is an Assembly group A-3 building due to the community center having a community hall, gymnasium (without spectator seating), and an indoor swimming pool (without spectator

seating). The results of the research and effort is the New Albany Community Center.

Helmers, Henry "An Empirical Study on Feature Selection for Prediction of Online Shopping Purchases." (Huanjing Wang)
With the popularization of digital marketing and services such as Amazon, online shopping has become an almost daily occurrence for many. In our research, we are exploring data collected during customers' online-shopping sessions to better predict customers' purchases and understand the data produced during online shopping. The dataset contains 18 different features that describe a customer's actions. These features were collected during real customers' purchases creating redundant information which could have an adverse effect on our prediction. Thus, feature selection can be used to make an intelligent selection of only the most influential features to be used when building classification models. The Waikato Environment for Knowledge Analysis (WEKA) data mining tool was used for both the feature selection and classifier algorithms. The feature selection methods we tested include Information Gain, Pearson's Correlation, Gain Ratio, ReliefF, and OneR Evaluations. Additionally, three classifiers (Multilayer Perceptron, K-Nearest Neighbor, and Decision Tree) were used to build our prediction models. Results demonstrate that the Information Gain feature selection algorithm and the Multiplayer Perceptron classifier performed the best. This leads us to recommend the use of these two algorithms to select the feature subsets and build prediction models due to their time efficiency and predictive accuracy.

Hendrick, Colton "Strategic Design For National Park Facilities" (Shahnaz Aly)
National Parks are considered by many to be one of America's most valuable assets. America's National Parks provide a place to escape from the increasingly complex and industrialized world. When designing facilities for a National Park, not only is it important to design a structure that adequately serves the needs of park visitors, but it is also crucial to ensure that the natural beauty of these special places is not compromised. When designing a proposed lodge and cottage area for Mammoth Cave National Park, my intent was to design a facility that provides the modern conveniences that guests desire while maintaining a minimal visual and environmental impact on the surrounding park. This was achieved through a comprehensive design that embraces the parks natural features, offers transitional indoor and outdoor spaces, and employs a variety of energy-efficient features. As opposed to the dated existing facility, the new strategic design is much more suitable for the park visitors and environment at Mammoth Cave National Park.

Herald, Benjamin; Tobbe, Johnathan; Sharp, Ashton; Spargo, Will; Seymour, Liam; "Vibration Mitigation in Top-Loading Washing Machines" (Morteza Nurcheshmeh)
The goal of this project is to prepare, implement, and test several designs that reduce the noise and vibration produced by a top-loading commercial washing machine with an unbalanced load. These designs will be low-cost to prevent drastically increasing the cost to produce the unit and consist of simple additions to the original design so as to not increase the difficulty of manufacturing. A team of mechanical engineering senior students spent several months preparing the machine for testing and brainstorming solutions that met the given criteria. The design of the drive system needed to be changed to accommodate a new electric motor, as well

as to prevent further malfunction and damage to the washing machine and permit future modifications. For the spring 2022 semester, the team plans to implement several design solutions including springs, rubber straps, and foam blocks to reduce the noise and vibrations produced by the washing machine.

Herrmann, Hannah "Kentuckians' Perception of the Environment and Use of Public Outdoor Space" (Leslie North)
Understanding the emotions relating to the environment, both the natural and built public environments, is instrumental in guiding future planning. This project aimed to understand Kentuckians' perception of the environment and their use of public outdoor spaces such as parks, farmer markets, bike lanes, and walking paths through the use of a digital survey. Understanding how people perceive the environment and built public outdoor spaces is valuable in determining the direction of future development in the state. Respondents to this survey are Kentuckians over the age of 18. The digital survey was split into four sections. The first section focused on gaining basic demographics of respondents. The second section focused on respondents' perception of the environment. The third section looked at respondents' perception of public spaces, and the final section looked at respondents' use of the public spaces. These responses were analyzed to determine how Kentuckians' perceive the environment around them, the public spaces built for them, and their access to and use of public spaces. This information can be used in future urban and rural planning across Kentucky.

Higgs, Eugene "The Junkanoo Museum" (Shahnaz Aly)
For my project I will be designing a Museum and Theater. This project will be Junkanoo inspired. Junkanoo is a Bahamian parade that is held every year. Everything Junkanoo related will be displayed in the Museum showing the different Junkanoo groups and costumes and in the theater Junkanoo films will be shown. With designing this building my goal is to bring people to a certain location, based on the popularity of the sites while having a focus in mind of maximizing the usage of the sites to intrigue others. The complex ideas and designs are going to be used to attract the public to a certain area for certain reasons. This focuses my project around attraction and multipurpose use to our buildings.

Hourigan, Amy "An Investigation Of Carbon Cycling In An Urban Karst Groundwater System" (Jason Polk)
Climate change is a crisis humanity is now facing. Increasing atmospheric CO2 is correlated to rising global temperatures. The global carbon cycle accounts for the storage, sequestration, and emission of carbon between Earth's reservoirs. Rock represents a significant carbon sink capacity and carbon is dynamic in processes in karst landscapes. Most karst landscapes are formed by chemical weathering as a result of conditions like precipitation, temperature, and vegetation on the surface. Weathering processes are influenced by local climate and CO2 transport in groundwater and surface water. Carbonate rock is a reservoir that removes CO2 in dissolution processes but releases it in precipitation processes. Lost River Cave lies beneath Bowling Green, Kentucky, visible on the surface through karst windows, sinkhole collapses, and blue holes. This is a longitudinal study to characterize and quantify the carbon cycling processes underway in this karst groundwater system by using geochemical and δ13CDIC analysis. This

research should contribute to the quantification of urban karst systems as potential carbon sinks and give insights on processes affecting carbon flux in karst systems. A better understanding of all carbonate processes, including those related to karst landscapes, is important to successfully mitigate climate change.

Howard, Katherine "The Romania Pavilion: A Look At Cultural Education Through Architecture And Tourism" (Shahnaz Aly)
Tourism is an educational tool that can be used to further develop minds of all ages through personal experiences. The World Showcase in Disney's EPCOT Park is a wonderful example of educational tourism. As guests tour "around the world," they interact with the culture each pavilion represents through people, folklore, and architecture, thus gaining knowledge and understanding of other groups. However, the Showcase is currently lacking Eastern European representation, and the country of Romania can fill this void. In design, the Romania pavilion features two attractions, two restaurants, a bar, a gallery, and three merchandise locations. The pavilion will serve an underrepresented area of the world, educate guests on the customs, culture, and architecture of Romania, and revitalize attendance to the World Showcase as the first new addition in over 30 years.

Hussung, Rhianon "Nature and Preservation" (Aly Shahnaz)
This project creates a space that unifies people and their local environment. The fantastical and whimsical nature of the building mirrors the "magic" that nature inspires in children and young people; also, to remind adults of this "magic" of outdoor spaces. The combination of museum and animal rehabilitation center allows people to understand all the key elements of wildlife appreciation and preservation. Understanding of local environments and involvement with the world outside your door is vital to preserving it for generations to come. With a focus is on sustainability, not only for natural resources, but for the ecosystem itself. While the local wildlife is often seen, healing and protecting these animals is fundamental to ensure the longevity of each species. Through rehabilitating and healing local wildlife, we help maintain the balance of nature. This experience is particularly empowering for young people, and we enter a new era of time where sustainable practices are the future. Magic and preservation are the fuel of this project. To capture the magic of nature while also appreciating the practicality of preserving local environments. By presenting the fantasy and magic of nature, we can light or reignite the passion we all have for our planet.

Indulkar, Ajinkya Vishwas "K-means Clustering Using Gravitation As Distance Measure" (Qi Li)
K-means is a well-known clustering method. It generally uses Euclidean distance to measure the dissimilarity of two data points. The standard K-means tends to evenly split data into smaller clusters during a clustering process and thus fails in the presence of unbalanced data. We propose a gravity-based distance measure to address the clustering of unbalanced data. The basic idea is to iteratively estimate the gravity of a cluster during its evolution. The estimated gravity is then used in the assignment of a cluster identifier to data points. Our extensive experiments show the superiority of the proposed K-means over the standard K-means.

Ingram, Kole "Weight of the Matter: Correlations in Access to Parental Leave to Birth Weight

and Preterm Births" (Lauren McClain)
The United States continues to be behind the rest of the developed world as one of the only nations lacking a mandatory federal paid parental leave policy. The lack of a mandatory paid parental leave policy is associated with women working longer into their pregnancy and returning to work shortly after birth – factors that may also be associated with child infant health, specifically preterm labor and low birth weight. Lower birth weights and preterm births correlate with increased health problems during infancy and long-term development. Babies born to Black and Hispanic or low-income mothers are more likely to be born preterm and experience low birth weight than babies born to white mothers or mothers with higher income. The Parental Leave Study (n = 2649) surveys parents in the US on their access to leave, child health, socioeconomic status, maternal and paternal health, and relationship quality. Using the new Parental Leave Study, this study will examine how sociodemographic characteristics are associated with child health (measured by preterm delivery and child underweight) and whether that relationship is moderated by parental leave (i.e. if it was used, how long was usage, when did they return to work, etc.).

Jarvis, Xander "Climate Reconstruction Of Early Iron Age Khoton Lake Through The Use Of Sediment Stratigraphy And Palynological Remains" (Jean-Luc Houle)
Khoton Lake, situated in the Mongolian Altai, has hosted late spring to early summer campsites for the pastoralists of the region. However, from about 2600 BP to 1200 BP, this region appears to be unoccupied, as no monumental structures or burials are found dating to this period. Lake cores suggest that the climate during this period was cold and dry, similar to the conditions in the region today. This evidence is at odds with climate reconstructions from the surrounding Altai, which suggest that this period was marked by warmer, wetter conditions and greater variability. No research has been conducted to reconstruct the environment in the Khoton Lake region beyond the lake core analysis, and the implementation of more precise methods could serve to alleviate these discrepancies. Furthermore, a more detailed reconstruction of the environment could suggest reasons for the occupation hiatus. Stratigraphic data and chronology from sediment cores, along with analysis of pollen and other plant remains within the sediments, would produce a more in-depth view of the environment during this period of hiatus, allowing us to hypothesize the causes for it. This research may have modern implications, given current climate change in the greater Altai region.

Karn, Isabella; Gani, Nahid; "Salty Shrinkage and climate change-driven aridification: A satellite-based environmental investigation of the Great Salt Lake in Utah" (Nahid Gani)
In a time when we are constantly worried about rising sea levels and the risk of bigger natural disasters, changes in smaller bodies of water can be overlooked. The Great Salt Lake in Utah offers many ecosystem services to the surrounding area. For starters, it is a tourist destination and has generated revenue for Salt Lake City. It can also be linked to Salt Lake City's continuous rise in population over the years. Additionally, the area is home to a niche and diverse ecosystem that thrives off the salinity of the water. The lake has begun shrinking, leaving behind salt deposits on the surface soil. Dried out and salty soil is a dreadful combination for the surrounding ecosystem. It hurts everything, all the way down to the microbial species that reside there. We used temporal Landsat and Sentinel satellite data in an ArcMap workflow to

investigate this Great Salt Lake area. We analyzed satellite data from the year 1984 to 2021. We found variation in the salt deposits and a substantial retreat in the lake's coastline, proving how much, it has shrunk in 37 years. Therefore, this study indicates an ongoing and rapid climate change-driven aridification occurring in this lake in Utah.

Kawata, Kentaro "Effect of collagen concentration on meat emulsion stability and product quality" (Luiz Silva)
Meat products such as sausages and meatloaf are made from a combination of finely chopped meat and fat with condiments, salt, and water. As fat does not bond with water, this mix is stabilized by emulsifiers, which in meat are mainly proteins. However, different muscle proteins may have a distinct emulsion ability. Therefore, the study was designed to evaluate the effect of collagen concentration on emulsion stability and cooked meat product texture. Three levels of silver skin (0, 5, and 10%) were included to create meat emulsion with incremental levels of collagen. Raw emulsion was analyzed for pH, final temperature, water activity, and color. Emulsions were cooked and evaluated for water and fat losses, and texture. Silver skin inclusion linearly increased final temperature ($P = 0.01$) and fat loss ($P = 0.02$). Raw emulsion pH, water activity, and color were not affected by silver skin level ($P > 0.05$). Cooked emulsion hardness, springiness, and chewiness decreased ($P < 0.01$) as silver skin level increased. Altogether, these results suggest that increasing emulsion collagen concentration may reduce product yield and texture characteristics. In conclusion, the inclusion of silver skin reduces meat emulsion stability, increasing fat loss, and reducing product firmness.

Kendrick, Mia; Kendrick, Mia; Burch, Katrina; "Examining Gender Differences In Academia Within A Pandemic: Exploring The Relationship Among Social Comparisons, Emotional Demands, And Just Saying No." (Katrina Burch)
The Covid-19 pandemic has had an evident impact on the workforce. Pandemic related job demands have been linked with an increase of emotional exhaustion (Barello et al., 2020) and burnout in healthcare workers (Cotel1 et al., 2021). Other studies show that emotional demands and social comparison are linked with emotional exhaustion and worker affect, respectively (Geisler et al., 2019; Tuxford & Bradley, 2015; Fischer, 2009; Buunk, Ybema, et al., 2001). Studying these constructs in conjunction furthers the research of Covid-19's ramifications on the workforce and are therefore part of this study. Not saying "no" to extra work is an understudied phenomenon within industrial/organizational psychology and is mostly observed through anecdotal evidence (O'Brien, 2014). More research regarding this construct is needed, and is subsequently included in this study. Additionally, this study will examine gender discrepancies as the pandemic has disproportionately affected women's home/child care load and work production (Zammaro, 2020). We had approximately 460 participants, tenured and non-tenured faculty members at institutions in the United States. They were recruited via snowball sampling and data was collected during the Spring of 2020. Statistical analyses through SPSS will be used to test a moderated mediation model. Results are forthcoming.

Kerpestein, Sara "Sustainability In Design" (Aly Shahnaz)
As the world's climate crisis continues to exponentially worsen, lessening our carbon footprint becomes an even more critical part in ensuring a better future for our planet. Creating and

building sustainable architecture is a crucial part of this mission. The purpose of this presentation is to examine ways in which active and passive systems can be implemented in new commercial structures and what impact these systems have on the environment. The results and research are shown through the design of the Bowling Green Science Museum that I created for my senior capstone. In the project, I examined how sustainability can be implemented in an affordable way by using both active and passive systems in the museum. Throughout the design process, I discovered that creating more sustainable architecture is another great way to be creatively challenged as an architect while also doing good for the community and the environment. This presentation shows the results of my project and the ways in which I implemented sustainable design to create a building that is creatively eco-friendly.

Kerrick, Chloe "Understanding The Mental And Emotional Impacts Of Being A Caregiver Of Socially Isolated Residents During The Covid-19 Pandemic In Kentucky." (Gary English)
The mental health and emotional wellbeing of individuals has declined in many ways over the course of the COVID-19 pandemic. Some groups have seen more drastic changes in their mental health and emotional wellbeing, especially those working in healthcare. While all healthcare facilities have experienced an increased burden dealing with the repercussions made apparent by the pandemic, long-term care facility workers have been tasked with caring for a group of individuals that for periods of time experiences complete social isolation. This project will aim to answer the question of if caring for a group of socially isolated residents over an extended period of time had negative impacts on the emotional wellbeing and mental health of the healthcare workers both inside and outside the workplace. This data collection for this study is coming from a survey that is being distributed to a group of long-term care facilities to be taken by nursing assistants, nurses, and facility administrators. I hypothesize that there will be an increase in prevalence of mental health issues as a result of caring for socially isolated individuals. Data collection is still in process and all conclusions and results will be based on the answers to the distributed surveys.

Khashimov, Mardan; Skipworth, Tristan; Bratcher, Fox; Zhang, Rui; "Synthesis And Kinetic Studies Of High-valent Chromium(iv) And Chromium (v)-oxo Species Supported By A Highly Electron-deficient Porphyrin" (Rui Zhang)
Cytochrome P450 enzymes have been the inspiration behind many synthetic metal complexes as biomimetic catalysts. This is due to their incredible and natural ability to catalytically oxidize many compounds through a high-valent transition metal-oxo intermediate, which serves as the oxygen atom transfer (OAT) species. Chromium (III) 5,10,15,20-tetrakis(pentafluorophenyl)porphyrin, a highly electron-deficient compound, was first synthesized and characterized. The complex was used to generate both CrIV and CrV-oxo intermediates using iodobenzene diacetate as the oxygen source to obtain CrIV-oxo that can be further oxidized by silver perchlorate to afford CrV-oxo intermediate. Kinetics studies were conducted with thioanisoles to probe the reactivities of CrIV-oxo and CrV-oxo species in two-electron oxidation reactions. Hammett correlation studies were made with the obtained rate constants to gain insights into the mechanisms of the metal-oxo intermediates.

Khuzhakulov, Zikrulloh; Kylychbekov, Salizhan; Hakimov, Somon; Er, Ali Oguz; "Magnetically enhanced shockwave-assisted 3-dimensional imprinting on NiTi Shape Memory Alloy applications" (Ali Oguz Er)
Shape Memory Alloys (SMA) have unique characteristics to memorize their structure and retain them when activated by heat or stress, however, there is still much to be done in terms of fatigue life and phase modifiability. In this project, we propose a tunable treatment method using shockwaves created by nanosecond and picosecond pulsed lasers assisted with magnetic field to create 3-D structures on NiTi SMA. When the laser pulse hits the surface, its energy is partially absorbed, which ablates the surface resulting a plasma plume. By confining the plasma with water layer and magnetic field, the shockwave is tuned for vertical transfer of the pressure gradient on the surface. Optical profilometer and SEM results confirm that the shockwave pressure became uniform when magnetic control was used. The less heat affected zones on the crater, and equal depth across the crater indicates a stable surface morphology due to magnetic field. Moreover, Shape-memorization properties were also investigated with differential scanning calorimetry (DSC) measurements of NiTi samples, and the results indicate significant phase broadening, reaching up to 33% from the initial, and shifts in austenitic and martensitic phases of 5 °C. The tunability of the shockwave using magnetic field and water confinement expands the usage in treatment and imprinting of SMAs for biomedical and industrial applications.

Kilgore, Albert; Seymour, William; "Development Of Collaborative Robotics To Assist Healthcare Staff And Facilities" (Farhad Ashrafzadeh)
Collaborative robotics (Cobots) is an advancing field within the robotics industry which focuses on the human-robotic interface and interactions to complete tasks. These robots can allow for great advancements in optimizing workflow and service within two main industries – healthcare and manufacturing. In the healthcare industry, Cobots can be used to complete operations such as delivering items to patients in infectious disease wards, reducing the spread of infection to nurses, or assisting within an operating room by delivering tools to human operators to focus their attention more fully on procedures. The concept of tool grabbing can also assist workers in industrial applications. The WKU Center for Energy Systems has begun to develop capability within the collaborative robotics space through a Kentucky NSF ESPCOR grant in partnership with other Kentucky universities to complete the goal of developing more robust robotic systems with human-robot interfaces. Using the Kinova Gen III Lightweight Arm has allowed the development of object recognition, pick and place, drawing, and voice control algorithms. The research team is currently working to mobilize the stationary arm through the development of a semiautonomous cart.

Koontz, Andrew "Servant Leadership And Adult Volunteers In The Boy Scouts Of America" (John Baker)
The Boy Scouts of America (BSA) features several leadership theories and models in their trainings and programs for youth members and adult volunteers. Servant leadership is an integral model in BSA trainings and influences the attitudes and approaches of youth and adult leaders in the organization and beyond. However, there is only a small body of scholarly work on the relationship between servant leadership and the BSA. Additionally, scholarship on the

topic has overlooked the key nature of BSA leadership trainings and the adult volunteer perspective in the overall relationship. Through a literature review, historical narrative, and qualitative interviews with adult volunteers, this study clarifies key aspects of servant leadership practices and attitudes in the BSA. The primary source and historical analysis found that servant leadership was heavily integrated into BSA trainings and became one of the leading models and attitudes in the organization. The qualitative interviews seek to understand the servant leadership skills, attitudes, and qualities of adult volunteers in the BSA. This ongoing study helps to clarify the importance of servant leadership in the BSA and the widespread integration of the theory into the organization.

Kreuzer, Greta; Dick, Olivia; Brown, Jamison; Rodriguez, Jacqueline; Aguirre, Rose; Teeters, Jenni; Woodward, Matthew; "The Utility Of The PTSD Checklist As A Screener Of Trauma Symptomology" (Matthew Woodward)
Posttraumatic Stress Disorder (PTSD) is a mental health disorder involving the development of negative emotional, behavioral, and physical symptoms following trauma exposure. In order to qualify for a diagnosis of PTSD, one must have directly experienced or witnessed a traumatic event which exposed them to “actual or threatened death, serious injury, or sexual violence.” The PTSD Checklist (PCL-5) is one of the most used self-report measures of PTSD, but it is often unclear whether individuals are referencing events considered traumatic. The present study will examine the types of events participants reference when completing this measure and how PTSD symptoms relate to event exposure. Participants included 393 young adults attending a large midwestern university who completed an online survey assessing PTSD symptoms using the PCL-5. Participants were also given an open-ended question about what event they were referencing while completing the PCL-5 and responses were coded into various event types. Analyses will examine the frequency of event types and compare PTSD symptoms tied to traumatic vs. stressful events. Results from this study will provide important information regarding the utility of the PCL-5 as a screener for PTSD and the debate over distinctions between stressful vs. traumatic experiences.

Krishnani, Sahil; Gover, Harrison; Anekere, Nishu; "Water Pollution Detection Using Autonomous Drone Hardware and Software" (Farhad Ashrafzadeh)
Drone development has been rising recently and has expanded greatly for government and commercial uses. Most drones tend to be expensive and have limited capabilities and feature sets. For this reason, our research aims at creating an autonomous drone capable of water pollution detection, specifically macroplastics, oil, and nitrate pollution, to combat the issues close to home in the Ohio River and Barren River Lake. The drone was designed to hold an infrared and RGB camera and have a range far enough to be effective for our intended applications. In order to make the drone powerful and expand the scope of its applications, we used an open-source flight computer which allowed for many different processing capabilities. Once the drone was designed, we created a mobile interface by which all drone features could be controlled. We then expanded the mobile interface to include autonomous flight, video streaming, and virtual reality (VR) Control to increase the drone capabilities beyond water pollution detection. We proceeded to test the drone, where we saw that the drone paired with the mobile interface accomplished all intended goals showing how drones can be effectively

used to monitor environmental issues.

Kylychbekov, Salizhan "Coating biomedical implants with a CaP to resolve metal corrosion and toxic ion release problems" (Ali Oguz Er)
Biomedical implants are getting abundant as the demand for implant surgeries is increasing day-by-day. Stainless steel 316L, Ti-6Al-4V, and cobalt chromium are the most commonly used materials for biomedical implants. Although they are successfully applied to resolve hip, knee, shoulder, wrist, and elbow joint replacement or spine regulation surgeries, their corrosion in saline human body fluid and release of toxic ions from the metal implants are incredibly frequent, posing huge threats to patients. Over the last 40 years, 5% of overall patients are reported to suffer from this problem. Increase of metal debris within human body endangers the patient, and hearing loss, heart problems, headache, visual and cognitive deteriorations are typical for metal poisoning. In this project, we propose to coat implant surfaces with a CaP as a potential solution. CaPs are inorganic materials that exist within human bones and can make metal device human-friendly. Our results show that covering the metal surface with a biocompatible CaP layer can induce cell adhesion and prevent metal corrosion in acidic environments. Moreover, attaching silver nanoparticles on the coating is expected to prevent bacterial activities on the implant surface. Therefore, coating the implants with a bioactive layer has a high potential for industrial applications.

Lawler, Trayson "A Predictive Flood Model For Urban Karst Environments" (Jason Polk)
Urban karst environments are plagued by groundwater flooding, which occurs when water rises from the subsurface to the surface through the underlying caves and other karst features. The interconnectedness of karst systems often makes them unpredictable, especially during intense storm events; urbanization exacerbates the problem with the addition of many impervious surfaces. Residents in such areas are regularly burdened by the effects of these expensive floods. The Federal Emergency Management Agency (FEMA) offers limited protection to citizens living near flood-prone karst areas, as they primarily focus on surface flooding. The City of Bowling Green, Kentucky is built entirely upon karst and experiences frequent, unpredictable groundwater flooding making it the ideal study area. This research will attempt to aid the flooding problem in Bowling Green by producing a predictive flood model for the urban karst area. The model will be created primarily by analyzing relationships between precipitation, fluctuation of the potentiometric surface, and discharge measurements in the associated basins. High-resolution data monitoring will be employed to ensure accuracy of the model. As a result, this study will allow residents to better prepare for rain events, offer additional information on the storage and response times of an urban karst aquifer, and create a strong methodology for other flood-prone, urban karst areas to utilize for flood prediction.

Lenihan, Avery "Catalytic Properties Of Heteropolytungstate On Furfural Acetalization" (Bangbo Yan)
Adding alkoxymethyl furfurals to diesel fuels decreases pollutive exhaust emissions. Additionally, furfural acetals are used in consumer products such as paint and fragrances. Acetalizing furfurals requires acid catalysts. These catalysts are better when they contain active sites such as those on heteropolyacids. Several compounds containing Keggin heteropolyacids

have been made in our lab, and their catalytic ability on furfural acetalization is furthered study in this project. One of these materials is [Cu(en)2(OH2)]2[H2en][{Cu(en)2}P2CuW17O61]·5H2O (en = ethylenediamine).The catalytic runs is performed and evaluated via UV spectroscopy. Other variables such as temperature and type of solvent are also evaluated.

Lewis, Abigail; Bolinger, Emily; Hilbrecht, Matthew; Williams, Blairanne; "Effects Of Cisplatin And Dichloro(ethylenediamine) Platinum Ii In Melanoma Cancer And Fibroblast Cell Lines" (Blairanne Williams)
Platinum-based chemotherapeutics are one of many drugs used to treat cancer. In 1978, The first platinum based anticancer drug, cisplatin, was FDA approved. The efficiency of cisplatin as a cancer treatment varies based upon the tissue in which the cancer originates and is reflected in its cellular toxicity. To better understand the role of the cisplatin structure in cell type specific toxicity, along with dichloro(ethylenediamine) platinum II (Pt(en)Cl2) to determine their toxicity amongst two mammalian cell lines and evaluate the differences based on the structure of the non-leaving ligand of each compound. The two human cell lines used are SKMEL5, melanoma, and HEK293, fibroblast cells; cell viability was determined using the MTT Assay procedure in which cells were exposed with increasing concentration of either compound. From this study, it is concluded that cisplatin is more cytotoxic than Pt(en)Cl2 in SKMEL5 and HEK293. Going forward, we will perform assays that show how platinum is taken into the cell, which could provide evidence that increasing levels of toxicity result in cellular accumulation of platinum. Additional uptake assays will be completed for other metals, such as iron and copper, to determine if platinum uptake is achieved through similar pathways.

Llarena, Andy "San Andres Eco Resort" (Shahnaz Aly)
Imagine leaving your daily problems and stress at home to go enjoy a place which is all about luxury, privacy, and tranquility. A place that is dedicated to the preservation of nature and the creation of a unique experience. Where the mission is quality over quantity. That is San Andres Eco Resort. Located on the outskirts of Patulul, Guatemala and part of Farm San Rafael, this resort is an iconic piece of tourism. A resort composed of private villas which are part of a rubber tree forest, a community building which offers a spa, gym, library, coffee shop, and many more services. Solar energy, rainwater collection, recycling, and gray water filtration are technologies used around the resort to protect and preserve the environment. Envision yourself walking through a garden picking up fresh vegetables and fruits for your breakfast so you have energy to go on your coffee field tour and knowing that tonight you will be sitting next to a pool with your favorite book. San Andres Eco Resort is this and much more. The perfect balance of nature and the future.

Logsdon, Emma; Rodriguez, Sophia; Boamah, Daniel; Mkanta, William; Starks, Saundra; "Public Health Implications Of A Food Assistance Program Among Hiv/aids Patients" (William Mkantaa)
One of the major medical breakthroughs of the 20th century is the invention of antiretroviral drugs (ARVs), a group of medications that suppress the HIV virus. The use of ARVs has led to the management of HIV as a chronic condition with the key outcome of prolonging the lives of the patients. However, the attainment of optimal results from the use of the ARVs requires adherence to corresponding nutritive support in order to combat the side effects of the

medications. In 2017, a group of students while in a global learning program in the country of Tanzania initiated a food assistance project targeting people living with HIV/AIDS in the city of Dar es Salaam. A partnership between a global learning program (KIIS Tanzania) and one of the leading non-governmental organizations in HIV care in Tanzania (WAMATA) created a path to reach out to the patients for monthly food supplies. The partnership has been collecting data since the inception of the project to learn about the impact of the program on patient welfare and adherence to ARVs. We report the results of the ongoing study for an evaluation of the public health implications of the program from the patient's perspective.

Lohano, Sarisha; Norman, Bella; "Genfind - Predicting Mycobacteriophage Gene Start Sites Using Artificial Intelligence" (Claire Rinehart)
When exposed to antibiotics for long enough, a bacterial population can evolve to become resistant. This prompts the creation of innovative therapeutics such as bacteriophage therapy. "Phage Therapy," using doses of bacteriophage to combat infections, may be the new alternative to antibiotics. This requires extensive analysis and characterization of bacteriophages. This research project aims to contribute to the genomic analysis of mycobacteriophages, bacteriophages that infect Mycobacterium. GenFind – a gene prediction program – was coded into Wolfram Alpha Mathematica, a computational software. To make predictions, a Support Vector Machine was trained with the coding and non-coding regions from Mycobacterium tuberculosis and Mycobacterium smegmatis. A scoring matrix was created using codon frequency in coding versus non-coding regions. A query sequence, normalized by the scoring matrix, can be fed into the trained Support Vector Machine, which returns a numerical confidence score in both "gene" and "non gene" predictions. Another Support Vector Machine is used to score and classify the Shine-Dalgarno ribosomal binding site upstream of the start codon of an open reading frame. A full genome analysis finds every open reading frame (ORF) and displays only those that have a confidence score of 97.5% or greater. A single gene analysis displays the coding capacity and confidence scores of all ORFs.

Malone, Grant; Buoncristiani, Nicholas; "The Validity Of The Repetitions In Reserve Based Rating Of Perceived Exertion Scale In Single Joint Exercise" (Whitley Stone)
Regulation of resistance training schemes are imperative when structuring a resistance training program. The repetitions in reserve-based rating of perceived (RIR-RPE) scale is a perception-based scale used to autoregulate variables of resistance exercise. This allows for the user to govern programming variables such as load and volume on a day-to-day basis. The aim of this study was to assess the validity of the RIR-RPE scale in single-joint exercise. Twelve healthy participants volunteered for this three-session study, each separated by a minimum of 48 hours. Session one included anthropometric assessments, familiarization to the scale, and 8RM tests for unilateral bicep curls and leg extensions. In session two, participants completed three sets at 70, 75, and 80% of predicted one repetition maximum. After completing the assigned number of repetitions, participants paused to indicate a value on the RIR-RPE scale before continuing the set to technical failure. Session three was a replication of session two. Agreement between predicted and actual RIR ranged from high to low (ICC 0.92 – 0.3) which was significant in all but one trial ($p = 0.00000016 – 0.071$). These results can be applied by athletes and lifters as a method of adjusting training variables to best suit the individual.

Mayo, Jack "Utilizing GIS to link research and land management: A case study of the Green River Nature Preserve" (Pat Kambesis)
Within the last two decades, Geographic Information Systems (GIS) have become effective tools for natural resource management all over the world. Effective land administration is requiring more and more data integration, multi-disciplinary and complex analysis. GIS, which has a strong capacity in data integration analysis and visualization, has become the natural platform for land administration as a result. Recently, the use of GIS has enabled necessary data in land administration at the Green River Preserve (GRP) such as records, data insight, and public engagement to be efficiently delivered. The GRP is a 1,600-acre ecological diverse site managed by Western Kentucky University (WKU) that sits on the Green River in Hart County, Kentucky. Several interacting bodies are linked with the GRP including state agencies, WKU departments, student/faculty researchers, land managers, and different funding sources. Due to the disconnection between the participating bodies management of the GRP remains a difficult task. As a result, the GRP required an adaptable framework to streamline its varied needs like grant proposals, accurate land management data, and analytics for research projects. This project will showcase the different ways GIS is integrated into the GRP and how these efforts will help the GRP function more effectively as an ecologically researched and managed site.

McCollum, Diamonde; Moskal, Katie; Teeters, Jenni; "Lifetime Cannabis Use Is Associated With Suicidal Ideation And Non-suicidal Self Injury" (Jenni Teeters)
Objective: The present study aimed to examine the association between cannabis use, suicidal ideation, and non-suicidal self-injury. Previous research has shown that cannabis use increases suicidal ideation and attempts and non-suicidal self-injury (NSSI). However, little previous work has examined this relationship to lifetime cannabis use frequency. The current study hypothesized lifetime cannabis use frequency would be linked to greater risk of lifetime suicidal ideation, lifetime suicide attempts, and lifetime NSSI. Method: Participants were 401 emerging adults (ages 18-29) recruited from an online research platform (Prolific). Participants completed measures related to cannabis use, NSSI, and suicidal behaviors. Results: Three logistic regression analyses were conducted to determine the associations between lifetime cannabis use, suicidal ideation and behavior, and NSSI. It was found that lifetime cannabis use was associated with lifetime suicidal ideation ($p = < .001$, OR = 1.197) but not with suicide attempts ($p > .001$, n.s). Moreover, it was found that lifetime cannabis use was associated with lifetime NSSI ($p = < .001$, OR = 1.160). Conclusion: These results indicate that lifetime cannabis use potentially influences the connection between lifetime suicidal ideation and NSSI and should be considered in education and prevention efforts to reduce suicidal ideation and NSSI.

McElfresh, Brennan; Srivastava, Ajay; "A Survey of WD40 Containing Genes in Drosophila melanogaster" (Ajay Srivastava)
The overall aim of this research is to analyze the role that WD40 domain containing protein encoding genes play in tumorigenesis. To study this we will utilize a tumorigenesis model in Drosophila melanogaster. WD40 repeat domains are found in many eukaryotic proteins that serve a wide variety of functions. These domains consist of conserved tryptophan (W) and aspartic acid residues (D) with a repeat length of 40 amino acids. Through the resources provided via flybase.org, we observed the presence of 223 WD40 protein encoding genes in

Drosophila melanogaster. Data for individual genes was collected and placed within a spreadsheet. By focusing on the various functions, it is possible to analyze which of the 223 WD40 domain containing genes may have a role in tumorigenesis or other disease states. The various functions were sorted into the following categories: development, reproduction, transport, metabolic processes, cellular organization, lethal phenotypes, unknown/other, and cancer related. From this list two promising candidate genes will be selected within the cancer-related category that will be analyzed further for their role in tumorigenesis.

Merkel, Caroline; Puckett, Ethan; Jachowske, Allison; Roehm, David; Morris, Madisyn; Davenport, Jairus; Carpenter, Gunther; "Perception Of The Male Body: Mind Or Mirror" (Dr. Frederick Grieve)
Muscle dysmorphia, a subtype of body dysmorphic disorder, in which individuals believe they are smaller than they appear, leads individuals to having poor body image. Within this study, we are examining male body image and the subject's perception. The main goal of this experiment is to see if looking in a mirror influences males' body awareness and symptoms of muscle dysmorphia. We are administering the study to undergraduate college-aged males. The age range is from 18 to 24 years of age. In the study, men answer a series of questionnaires (demographics, Muscle Dysmorphia Questionnaire, and a paragraph describing themselves). Half of them will take the questionnaires while sitting by a mirror, and half will take the questionnaires without the mirror. We are looking to see if the mirror will sway how the participants perceive themselves, focusing on their body awareness and muscle dysmorphia (MD). Thus far, this study has only had around 20 participants. Results of the study will be presented and discussed.

Mers, Zachary; Riney, Kristina; ; Diaz, Diego; DiMeo, Chris; Terry, Sarah; "Using Hand Tracking For Physically-based Interactions In A Virtual Environment" (Kristina Arnold)
In the WKU XR Lab, we've begun a number of projects meant to place people into realistic virtual settings. To better simulate reality, we implemented hand tracking as an alternative to using controllers. Hand tracking uses one of the key benefits of VR. With the built-in hand tracking recognition hardware, the WKU XR lab began using the Unity game engine and C# coding language to improve upon existing solutions. Feedback on the user's hands collected via a virtual reality headset is interpreted by the program and translated into movement for the user's virtual hands. The distinction between our program and previous hand tracking systems is primarily the interaction with the environment. Most systems let the user's hands phase through virtual objects, while the user's hands in our model are halted by them. This allows those objects to gain a sense of physical presence, and by extension makes the program feel more realistic. In turn, our larger projects become more immersive.

Miles, Adam; Stokes, Michael; "Seed Herbivory by Small Mammals on Plants of Conservation Concern in Western Kentucky" (Michael Stokes)
Seed predation is an important ecological process that can affect the success of individual plants and plant populations as a whole. However, seed preferences of herbivores have received little detailed attention in comparison to seedling predation studies (Hulme, 1994). Additionally, prior research of seed preference of herbivores was mainly on tree seeds and not

on herbaceous plants. In this project I research how rodents may facultatively prey on seeds of plant species of conservation concern in Western Kentucky. This predation may affect the recruitment and survival of these plants. I use live traps to catch rodents in the genera Peromyscus (deer mice and white-footed mice) and Microtus (voles). Once caught, each rodent is placed in a trial arena with seeds from Silphium perfoliatum (cup plant), Baptisia australis (blue false indigo), Silphium lanciniatum (compass plant), and Arisaema triphyllum (Jack-in-the-pulpit). I provided other food sources in these trial arenas so predation on the test seeds was facultative. After 24 hours, the seeds were counted to determine if the rodents selected them. This research will contribute to the plant community restoration efforts at the Green River Preserve.

Millay, Shaleena "Students' Perception of Campus Covid-19 Safety Strategies" (Grace Lartey)
Due to the Covid-19 pandemic, college campuses around the globe have implemented prevention strategies to stop the spread of the virus among its students. But how do college students feel about these protocols, and how well are they complying with them? This study focuses on the students at Western Kentucky University and how relevant they perceive different prevention practices to Covid-19 control.

Miller, Allie; Salifu, Aisha; Baker, Addison; Williams, Blairanne; Hall, Megan; "Uptake of Cisplatin and Dichloro(ethylenediamine)platinum (II) in Human Embryonic Kidney Cells (HEK 293) and Melanoma cells (SKMEL5)" (Blairanne Williams)
Platinum-based chemotherapeutic drugs are commonly used to treat cancer. These drugs induce apoptosis by distorting the DNA, and leading to p53 mediated cell death. The mechanism by which these compounds cross the cellular membrane is unclear. Platinum may enter the cell through metal transporter systems. If this is the case, platinum would compete with iron transport, resulting in lower iron levels as platinum enters the cell. To test this hypothesis, HEK293 and melanoma cells were exposed to cisplatin and dichloro(ethylenediamine)platinum (II) (Pt(en)Cl2). These compounds have different non-leaving ligands. The non-leaving ligands remain attached to the platinum atom after entering the cell and alter toxicity. This study will examine the role of these structures in platinum uptake through transferrin. MTT assays were used to determine cell survival rates after exposure to each compound in each cell line, establishing the IC50 values. To determine the relationship between cell survival and platinum uptake, four plates of each cell line were exposed to different concentrations of compound. The cells were harvested and divided into samples for protein analysis and for atomic absorption. The intracellular platinum and iron levels for each treatment are expressed as a ratio of metal to protein (n=1).

Miracle, Sebastian "Elemental Abundances of Planetary Nebulae" (Ting-Hui Lee)
We present preliminary results of abundance analysis from an optical spectroscopic survey of compact planetary nebulae (PNe) in the Galactic disk. This is an ongoing survey to build a comprehensive database of Galactic compact PN chemical abundances. The optical spectra of 14 PNe were obtained with the 4.1-meter Southern Astrophysical Research Telescope. The elemental abundances for these PN were calculated using the Nebular Empirical Analysis Tool (NEAT). Here we present the oxygen abundance for each PN and compare them to results

available in literature. This material is based upon work supported by the National Science Foundation under Grant AAG-1616807.

Monroe, Lee; King, Rodney; "An Analysis Of Bacteriophage Sunflower1121" (Rodney King)
Bacteriophages, viruses that use bacterial cells as their hosts, compromise the majority all biological entities on our planet. Because of the highly genetically diverse nature of bacteriophages, they represent the largest untapped reservoir of genetic information. The goal of this project was to explore this genetic diversity by isolating and characterizing phages from the environment. Using a common soil microbe, Mycobacterium smegmatis, a novel bacteriophage was discovered and named Sunflower1121. Electron microscopy revealed that this bacteriophage belongs to the Siphoviridae family. Genomic DNA was isolated from Sunflower1121 particles and characterized by restriction enzyme digestion and gel electrophoresis. The sequence of the genomic DNA was then determined and students in the Bioinformatics course at WKU are in the process of identifying and cataloging all of the phage genes. The complete annotated genome will be published on Genbank, the national DNA sequence database.

Morris, Kaitlin; Torelli, Jessica; Noel, Christina; "Evaluating the Effects of Reciprocal Peer Coaching on Teachers' Use of Classroom Management Strategies" (Jessica Torelli)
Teachers commonly cite classroom management as a challenging aspect of their job. New teachers often have more difficulty managing student behavior as they may fail to use research-supported class-wide behavioral strategies, such as behavior specific praise and opportunities to respond, that positively impact student academics and behavior (Moore Partin et al., 2010). Reciprocal peer coaching is one promising approach for increasing teachers' use of class-wide behavioral strategies. During reciprocal peer coaching, teacher pairs observe each other and provide feedback on targeted strategies. Combined with virtual training, reciprocal peer coaching may improve teacher usage and student outcomes. The purpose of this study was to evaluate the effects of reciprocal peer coaching and virtual training on teacher implementation of strategies using single-case experimental design. Graduate-level participants submitted videos of instruction and received training and peer coaching on at least one strategy. We used event recording to measure teachers' use of target strategies during baseline and intervention. Results suggest teachers increased their use of target strategies. We will discuss implications for practice and future research.

Moskal, Katie; McCollum, Diamonde; Teeters, Jenni; "Sleep Quantity Moderates the Effects Of Cannabis Use And Cannabis-related Problems" (Jenni Teeters)
Heavy cannabis use has negative consequences. However, there is variability in the frequency and severity of consequences experienced by heavy cannabis users. One variable that may confer increased risk of cannabis-related problems (CRP) for cannabis users is poor sleep. Heavy cannabis use is linked to poor sleep, which is problematic since many cannabis users endorse using cannabis to fall asleep. The present study investigates whether the connection between cannabis use and CRP is moderated by sleep, such that the relations between use and consequences is strongest for those receiving lower average nightly sleep. 824 college students (78% female; 83% Caucasian; average age = 24.3) completed an online survey assessing CRP,

typical hours of nightly sleep, and frequency of cannabis use. Bivariate correlations were conducted between hours of sleep and CRP ($r = -.082$, $p = .022$). A moderation analysis revealed average hours of nightly sleep moderated the relationship of cannabis use and CRP (95% CI [-.068, -.0173]). These results indicate that one potential factor influencing the connection between cannabis use and related problems is average nightly sleep. Focusing connections between sleep and CRP may be worthwhile in education and prevention efforts aimed at reducing heavy cannabis use and related problems.

Mulzer, Kerragan "The Art of Revitalization" (Shahnaz Aly)
To awaken a dormant town, infrastructure can be a catalyst that revives and stimulates the economy, community, and culture for future success. The goal of this research was to revitalize a rural town through the creation of a downtown street plaza with an emphasis on stimulus and unity. Through case studies, observations, and conversation with experts, the design of this space achieved that goal. Data collection consisted of demographic information and precedent research to better accommodate community needs. The observations consisted of visiting this rural town and noting the surrounding infrastructure to ensure unity within existing infrastructure and local culture. The conversation with architectural experts helped ensure a successful design of the space. Implementing these findings into this plaza allowed for the project to become successful. This success is found in the integration of populations in the town through communal gathering spaces. The local economy was stimulated by the commercial business that was introduced to the town. Lastly, the culture of the town was captured within the style of its architecture and design. Those that visit or reside in this town now have an icon for the future that they can gather and utilize however they desire.

Munoz, Samuel "WKU E-sports Complex" (Shahnaz Aly)
The WKU E-sports Complex brings together a community of gamers in an open and high-tech space. The E-sports complex brings together a community that would normally be physically distant from each other. The open spaces invite this group to come together and share their passion in the many Game Lounges, Game Labs, and streaming rooms. The arena creates a place for this group to share comradery for their favorite games and E-sports teams. The arena allows for competitions among students on campus as well as a place to cheer our E-sports team on in various events. The E-sports complex brings together this community of gamers to share what they love in competition and Leisure. The high-tech equipment and class rooms also allow this group to further pursue what they love with E-sports, editing, and other various gaming related classes.

Naidugari, Divya; Pauig, Joaquin Santiago; King, Rodney; "The Genomic Discovery and Analysis of Mycobacteriophages Aquila and Syrinx" (Rodney King)
Bacteriophages are the most diverse and abundant entities in the world. However, there is a large gap in scientific knowledge of phages because only a small percentage of them have been characterized at the DNA level. The purpose of this project is to contribute to the scientific community's growing knowledge of bacteriophages by isolating and characterizing novel mycobacteriophages that infect Mycobacterium smegmatis. Mycobacteriophages Syrinx and Aquila were recovered from a soil sample collected from the campus of Western Kentucky

University. Serial dilutions of an enriched lysate were performed to purify the phages and to observe plaque morphologies. After growing large numbers of these phages, they were examined under an electron microscope to determine their physical properties. To compare their genomes, DNA was purified from the phage particles, digested with restriction enzymes, and examined by gel electrophoresis. Although Syrinx and Aquila have similar plaque morphologies and physical structures, the DNA analysis showed they are genetically distinct.

Neupane, Shreya; Banga, Simran; "Functional Analysis Of Ravq, A Legionella Pneumophila Effector Protein" (Simran Banga)
Legionella pnuemophila is a gram-negative bacterium that causes Legionaire's disease (a severe form of pneumonia) in humans. L. pneumophila is able to cause severe infection by utilizing its Type IV secretion system, a protein secretion system for transport of proteins from bacterial cytosol to the outside of the cell or into the infected macrophage. More than 300 effectors are released from the Type IV secretion system that allows L. pneumophila to create a safe environment to replicate and eventually cause infection. One such effector RavQ, inhibits cell proliferation of mammalian HEK 293T cells and localizes to the nucleus of the cell, possibly interfering with a cellular activity in the nucleus. To detect its function, we performed RNA sequencing analysis to look for transcriptional gene expression changes. The data showed global downregulation of transcriptome in comparison to the cells expressing a control protein. Using KEGG pathway analysis, we found that cell cycle signaling, and regulation pathways are most perturbed in cells expressing RavQ protein. Further experimental design will enhance our understanding and elucidate the underlying mechanism that bacterial pathogens use to alter gene expression patterns in host cells.

Norman, Bella; Lohano, Sarisha; Vilt, Dexter; King, Rodney; Rinehart, Claire; "Determining Functions of Genes in Mycobacteriophage MooMoo" (Rodney King)
Bacterial populations can rapidly evolve to become resistant to antibiotics. As an alternative to antibiotics, there has been some success using viruses, called bacteriophage, to eliminate pathogenic bacteria. In this project, we attempted to bypass the need to use whole virus particles for therapeutic applications by identifying bacteriophage encoded proteins that are toxic to host cells. Thirteen genes from mycobacteriophage MooMoo were chosen for analysis. These genes were chosen because they have no known function according to the genome annotation published on Genbank, the national DNA sequence database. The targeted genes were amplified from the bacteriophage MooMoo genome using Polymerase Chain Reaction, cloned into a protein expression vector and recovered in E. coli cells. After purifying the recombinant plasmid from E. coli, the plasmids were electroporated into M. smegmatis cells. The M. smegmatis transformants were screened for cytotoxicity as compared to previously characterized control strains. None of the cloned MooMoo genes prevented cell growth. This result was surprising since we have discovered a number of other MooMoo genes that are toxic when expressed in M. smegmatis cells.

Norman, Katie; Bledsoe, Lee Anne; "Exploring Laboratory Techniques in Fluorescent Dye Tracing" (Lee Anne Bledsoe)
Karst aquifers are complex and dynamic systems which can result in highly variable field

conditions that are difficult to predict. Karst hydrologic basins are different from surface watersheds in other geologic settings because groundwater flow and surface topography are decoupled. To map groundwater flow paths, fluorescent dye tracing methods employ activated charcoal receptors to “capture” fluorescent dye along a flow path. To explore the potential enhancement of laboratory methods, we conducted a series of experiments to determine if increasing the amount of charcoal processed for analysis would result in an increased concentration of dye detected in a single sample. We evaluated results from both a controlled benchtop experiment as well as testing of samples from multiple field locations. Samples from field testing included a range of confirmed positive detection concentrations and non-detect results for fluorescent dyes using current laboratory methods. We found that the controlled lab experiment followed our hypothesis of the increased charcoal surface area showing increased dye concentration. However, field samples analyzed did not follow a similar pattern. Further research is in progress. As dye tracing is often applied to solve environmental problems, improved methods mean improved data for important water resource management and protection decisions.

Novak, Kathryn "Gender, Community and Interpersonal Relationships in the Professional Body Piercing Industry" (Tim Frandy)
When I began the research resulting in this paper, I set out to explore what role gender plays within the professional body piercing industry. I was interested in how gender influences and informs the various roles piercers play. During the course of my research, the role of interpersonal relationships between staff, mentors and clients emerged as a more prominent theme that also deserved attention. Piercers navigate the intimate relationships they build with their coworkers, other members of the industry around the world; but the most prevalent relationship that emerged was between the client and piercer. I conducted a series of personal interviews with employees of a female-owned and operated piercing-only shop based out of Reno, Nevada. This shop has been open for over 25 years and has positioned itself as a leader within the industry. In these interviews, I explore the topics of gender and interpersonal relationships and what those subjects mean and how they differ for each person. These interviews uncovered common themes like the influence of social media and the mentor-mentee relationship, but also not so common themes, like the ancient practices of body piercing and what they look like today.

Okocha, Assumpta "Examining Student Resource Officer Use Related to Minority Students" (Thomas Gross)
The presence of school resource officers (SRO) may impact student success in K-12 schools. Impacts of SROs include introduction of safety protocols and promoting a positive environment. However, many schools are quick to introduce an SRO without taking the measures to ensure their presence has few negative impacts. For instance, SROs can create a negative space for African-American students. SROs may target theses students at a harsher rate, which in turn negatively impacts student safety and defeats the purpose SRO. Establishing trends in SRO use could help with identifying if they are being used more equitably over time. The purpose of this presentation is to examine the trends in SRO use related to URM group. We collected publicly available data from the Kentucky School Report Cards (KYSRC) at the district level from the

2015-2016 to 2019-2020 academic years. URM students will likely have (a) greater level of SRO engagement, compared to majority students over time; and (b) have higher proportionate levels of SRO engagement at each academic year compared. We will compare the results to demonstrate trends in one state's data and how the trends can be useful for understanding how to establish baseline data as policy shifts occur.

Park, Andrew "Identifying the Transcription, Translation, and Functionality of Circular RNAs Using High-throughput Sequencing Data" (Samuel Earls)
Circular RNAs (circRNAs) have been a novel discovery in the past two decades. Formed by a different type of alternative splicing called back-splicing, circRNAs have been found to have functionality in developmental tissues, cancers, and neurodegenerative diseases. Although circRNAs have been detected using various tools, there has not been a method to holistically analyze circRNAs and their functionalities through detecting the transcription, translation, and miRNA binding sites. This project attempts to develop this method and find evidence for functionalities of specific, novel circRNAs. By analyzing high-throughput RNA-seq and Ribo-seq dataset obtained from the cerebral cortex of mice in wild-type and mettl3 conditions, 2081 circRNAs with possible functionalities were found. Further analysis indicated possible translation of a circRNA involved in the metabolic system and turnover of fatty acids. Moreover, the miRNA-binding sites of differentially expressed circRNAs showed evidence for 170 impacted biological processes. The highest-confidence processes involved functionalities in biological development and regulation. A pipeline was created, allowing for the entire procedure to be completed in one run. Thus, circRNAs can be detected efficiently with any publicly available dataset in various tissues of different organisms, revealing circRNA's critical roles in the biology and physiology of all living organisms.

Patel, Dhruvinkumar "Developing Model for the Predictive Accuracy of Probability of Default on Credit Card Debt" (Lily Popova Zhuhadar)
Patel, Dhruvinkumar "Developing Model for the predictive accuracy of probability of default on credit card debt" (Lily Popova Zhuhadar) The research study aimed at the case of clients' defaulting on cash and credit cards in Taiwan and predicting the power of the client accuracy of probability of default. From the perspective of a Financial Analyst at the bank, the results of predictive accuracy of the estimating probability of default will be more valuable to the bank to increase the market share along with balance the risk of clients who would default, and who would not. The study developed the model, naÏve bayesian classifier, logistic regression, deep learning, decision tree, random forest, and gradient boosted tree, on the clients' data collected in Taiwan, to predict the probability of default with the highest accuracy with the utilization of machine learning algorithm. The decision tree model computed the highest results favoring research focus at the lowest runtime and predicating clients who would not default at utmost accuracy.

Patterson, Kellen; Schulte, Connor; Nee, Matthew; "Polystyrene Beads for Photocatalysis" (Matthew Nee)
The goal of our project is to create polymer beads which would float on the water and be capable of degrading pollutive materials through use of a photocatalyst. A photocatalyst is a

substance that use light to speed up reaction, in this case, the light of the sun to break down pollution. Our group has previously synthesized polydimethylsiloxane (PDMS) beads that are buoyant and can have a photocatalyst attached to them. Similar beads composed of polystyrene as opposed to PDMS would be a cheaper alternative. Our polystyrene beads are a steppingstone towards creating beads that are cost effective and biodegradable when introduced to a body of water. These beads would also contain a photocatalyst which will allow pollutants such as spilled petroleum to be photo-catalytically degraded over a surface of water. We have synthesized multiple variants of polystyrene beads with a goal of achieving a small and porous structure. Trials have indicated that heating a mixture of the monomer styrene, a cross linker, as well as water is conducive to producing beads with these ideal characteristics. We have successfully created a promising variant that fits our desired criteria and are currently working on combining it with a photocatalyst.

Pauig, Cristina Isabel; Wilson, Nathan; Nee, Matthew; "Optimizing Surfaced Enhanced Raman Spectrometry Substrates Through Analysis of UV-visible Absorbance Spectrum" (Matthew Nee)
It is important to monitor any type of chemical reaction, whether it be in academia or in the physical world. Monitoring reactions in aqueous solutions, however, leave much to be desired. There are difficulties in detecting low concentrations and effectiveness that Raman Spectroscopy solves. However, to use Raman Spectroscopy for proper analysis, we must create Surface Enhanced Raman Spectroscopy (SERS) substrates. Our lead study focuses on analyzing photolytic reactions using gold nanoparticles aggravated by different salts and analyzing the reactions using Raman Spectroscopy. In order to optimize these reactions and understand the basics, a variable study on SERS substrates is needed to perform the most efficient experiments and ensure quality results. To create SERS substrates, a gold colloid must be created and refluxed so it will be used to form gold nanoparticles. We then aggravate it with paraquat and stabilize it with sodium dodecyl sulfate (SDS) to prevent precipitation. Testing the variables volume, concentration, and time allowed for aggregation, we studied the UV-Visible absorbance spectrum and how the variables affect the graphs. We used a UV-Visible spectrometer since the absorbance correlates to the SERS intensity. By having a strong intensity, we have more efficient Raman readings.

Pauig, Joaquin Santiago "Molecular Evolution of the Cancer-related Parafibromin (cdc73)" (Chandrakanth Emani)
The present study deciphers the molecular biological evolution of the CDC73 protein. Mutations of CDC73 were shown to correlate with parathyroid cancers and have the ability to become oncogenic. The protein's primary function is to provide instructions to create the protein parafibromin, which is most likely used to regulate gene transcription. In this study, we analyze FASTA sequences of CDC73 from a diverse array of life forms using computational tools. Analysis was performed using bioinformatics software databases NCBI and EXPASY. Conserved domains and evolutionary ancestors were identified through PSI-BLAST and neighbor-joining phylogenetic trees. The initial BLAST analysis has identified a hypothetical evolutionary ancestor, the blue tit.

Peake, Susanne "Nocturnal Surface Inversions as Observed by The Kentucky Mesonet" (Eric

Rappin)
Nocturnal near-surface temperature inversions are an important component of the Agricultural, Transportation, and Public Health areas of Kentucky, as they lead to the development of stable air masses such as fog and smog. This presentation will display a collection of inversions for approximately twenty-five of the seventy-five Mesonet stations across the energy constrained climate of Kentucky. Two micronet inversion locations were additionally developed, each with three to five monitoring stations located within a 0.5 km buffer. The study investigates inversion development, strength, depth, duration, and decay in the context of key land surface characteristics (elevation, relative elevation, soil moisture, etc.) and atmospheric quantities (humidity, wind shear, near-surface stability.) Results of a new machine learning-based forecasting model, dubbed Micro-Macro, will be briefly discussed in the context of inversion development. The model takes micro inputs from Mesonet stations, and macro inputs from the High Resolution Rapid Refresh model outputs to develop effective and precise predictions on weather parameters in a finely detailed resolution. Micro-Macro takes the pre-existing large atmospheric computed datasets and surface observation data as its input to produce fine-grained weather forecasting in an expedited time for distinct regions of interest.

Pekara, Brittany "Climate Statistics for Kentucky Based on Mesonet Observations" (Eric Rappin)
The Kentucky Mesonet is a great asset for the Commonwealth of Kentucky and is currently working to develop a detailed climate record. This record would provide valuable information regarding climate variability and climate extremes, especially since we are in a non-stationary climate. Additionally, this record would work as a valuable asset for policymakers and stakeholders when making future decisions, such as infrastructure, and other decisions that impact the regions major economic sectors. The Kentucky Mesonet has over 75 stations across the state that are recording approximately 75 developed indices based off of five-minute data. These indices measure frequency, extremes, range, duration, trends of precipitation, droughts, and temperatures. Calculations and observations are performed in multiple aggregation periods including daily, weekly, monthly, seasonal, bi-annual, and annual periods. The station locations displayed in this research range from the Southern Mississippi River Valley in the west to the Appalachian Mountains in the east, while also covering the subtropical in the southern portion of the state and continental humid in the northern portion of Kentucky. A discussion will include the observed relationship between moisture, temperature, and precipitation between the four locations presented.

Pfeifer, Maria; Tinius, Rachel; Brewer, Kristen; "College-Aged Women and Their Knowledge and Attitudes of Reproductive Health" (Rachel Tinius)
Reproductive function and knowledge of healthy hormonal cycles is often ignored in many young women until they are interested in starting a family. This is problematic in that the female reproductive system serves many other important roles in health. The purpose of this study was to better understand knowledge and beliefs about reproductive health among college-aged women. College-aged women (N= 419) were surveyed (via email or social media) using an instrument developed with questions from existing validated surveys. 57.3% of the surveyed population report using some form of birth control, and 57.2% of those women report

utilizing it for medical reasons and/or to regulate their cycle. 64% of the population surveyed answered that they do want to have children someday. College-aged females had 7 basic reproductive questions in which over 50% of respondents either did not know the answer or answered incorrectly, showing gaps in knowledge. These results can help to identify existing gaps in college-aged women's reproductive education. With a better understanding of these gaps, educators and health professionals can address these areas and better equip the population with supportive health information.

Phelps, Reagan; Nilsson, Katie; "Stress and Performance Theories: A Primer and Synthesis" (Steven Wininger)
Performance stress is the principal reason athletes seek help from sport psychologists. This help begins with understanding how stress impacts an individual's performance, i.e., identifying the mediating variables. There are over a dozen theories addressing the "how," each touting different variables, evidence, and pragmatic application. Yet, there have been no attempts to analyze all of these theories in one document. We sought to examine which theories are most common in sport psychology textbooks, succinctly summarize each theory, and compare them with the goal of identifying common variables and their hypothesized relations. To analyze previous literature attempts, we compiled sports psychology textbooks and identified the theories covered. Our procedure consisted of 13 texts, analyzed by two coders to create frequency tables of the theories. These tables organized the variables and measurement devices of each theory. Key references were identified based on citations within texts and searching EbscoHost search engines/Social Science Citation Indexes using classic references. The table's results revealed overlapping variables and ideas between the theories. Variables such as emotional arousal, cognitive stress, physiological stress, and task-complexity, remained consistent across multiple theories and unveiled connections between the experimental data and theories, providing a better understanding of stress and performance.

Philpott, Laurel "Changes in the Zooplankton Community in Barren River Lake (South Central KY) Between 2008 and 2020" (Philip Lienesch)
Zooplankton are small aquatic animals that serve an important role in transferring energy in lake ecosystems. I compared zooplankton community composition in Barren River Lake from 2008 and 2020 to describe seasonal population dynamics and determine if an invasive zooplankton, Daphnia lumholtzi, was present. Daphnia lumholtzi is characterized by a long spine that aid it in avoiding predation. Feeding trials were conducted to determine if there was spine-induced damage to mouths of Juvenile Bluegill while feeding on D. lumholtzi (introduced) and Daphnia magna (native). Bluegill tongues were observed under a scanning electron microscope to check for damage. While D. lumholtzi was found throughout Barren River Lake in 2008, it was absent from both sampled sites in 2019 and 2020. This, along with erratic patterns of emergence in several zooplankton species, indicates that zooplankton composition in Barren River Lake can be highly variable. Additionally, because 2008 D. lumholtzi peaked in summer, when native species of Daphnia were in decline, probability of competition is low. Feeding trials showed Bluegill fed readily on D. lumholtzi and D. magna; spine impacts will be discussed. It is likely that D. lumholtzi is having minimal impact on native fish and zooplankton in Barren River Lake.

Pimienta, Angelo Matthew "Development of neural network architecture for Material Classification" (Ivan Novikov)
In this presentation, I discuss the use of machine learning (ML) methods to automatically classify scents. Using the Applied Physics Institute gas chromatographic column, the team collected data set containing gas chromatograms of scents from various scents. The experimental setup and obtained results will be discussed in another talk, “Development of Machine Learning Algorithm to Generate Verbal Description of Scent from Gas Column Chromatograms”, by Alexandra Driehaus. Typical ML-based algorithms train on labeled data by learning a combination of parameters that achieves a certain goal (for example, classification). To confirm the learned parameters from training, an independent validation dataset is used temporarily to judge an algorithm’s accuracy. ML-based methods generally perform better on larger datasets, where they can learn high level patterns. The number of data points from the set can be artificially boosted by data transformation. If the data set is a collection of images, each image can be stretched and rotated to generate a new image. Each transformed image is treated as an independent data point. Since the data set of experimental chromatograms is limited, we introduce a novel approach for data transformation and use extended data set to train various machine learning architectures to classify scents.

Pitts, Mary; Sisler, Julie; "Finances, Mental Health, And Bad Singing: Openness Vs. Closedness Dialectic In Romantic Relationships During The Covid-19 Pandemic" (Blair Thompson)
The COVID-19 pandemic and its quarantine period created a variety of challenges for romantic partners, whether they chose to quarantine together or separately. However, the pandemic also provided couples with the opportunity to increase their quality time together as well as increase their interpersonal communication as partners. This qualitative study examines the role COVID-19 played in romantic relationships through the lens of Baxter and Montgomery’s (1988) Relational Dialectic Theory, specifically the Openness vs. Closedness dialectic. Twenty partners, making up ten couples, were individually interviewed concerning their quarantine experience with their partner before, during, and after the initial height of the pandemic. Findings indicate that couples experienced an increase in their communication, which led to both learning more about their partners and disclosing more about themselves. Key terms: COVID-19, pandemic, Relational Dialectics Theory, Openness, Closedness

Poore, Ethan "The Study of Blazar Variability with the Tess Mission" (Michael Carini)
Some of the brightest objects in the universe are supermassive black holes ejecting relativistic jets at nearly the speed of light. These objects are not only incredibly bright in all spectra, but also vary brightness within multiple magnitudes. Beginning in May 2021, I catalogued, classified, and created light curves for a total of 87 different blazars. Currently I am verifying the accuracy of the created light curves by replicating them using different forms of data reduction. Within this presentation I will be going over the original method of data reduction, the new regression method being applied, and light curves from each to compare.

Powers, Jackson "Cinemanarrative Dissonance in The Conformist" (Ted Hovet)
Throughout the 1970s, Italian directors looked past the neorealism of the late 1940s and early

1950s in hopes of pathologizing Fascism, the political system that dominated the country for so long. Bernardo Bertolucci's The Conformist marked the beginning of the decade with an acclaimed “visual masterpiece.” Though this film is and was well-received, it was criticized on the basis of strong aberrant readings from critics. Digging into The Conformist, it reveals a romanticization of Fascist Italy through its cinematography, production design, and editing. Along with presenting conflicting messages on the political system it attempts to condemn, Bertolucci compares Fascists to those in Plato’s Cave. This paper argues that, like his characters, Bertolucci and other Italian directors were similarly limited in perspective due to their circumstances, leading to their films’ cinemanarrative dissonance.

Poynter, Matthew; Aydin, Ahmet; Stewart, Logan; "Wolfram Demonstration Projects To Simulate The Control Of Vibrations On A Three-layer Beam" (Ozkan Ozer)
We consider the problem of simulating vibrations in a perfectly bonded three-layer beam, consisting of stiff outer layers and a viscoelastic core layer. The vibrational interactions between the shear of the middle layer and the overall bending motion is governed by a system of Partial Differential equations (PDEs). The system is known to be uniformly observable by a sensor at the tip of the beam. However, to obtain numerical results for any particular system, it must first be discretized by known methods, such as Finite Differences, which often fail to preserve the desirable observability property, or match physical models. To remedy this, we consider modifying the blind use of the Finite Difference method, by the addition of a numerical filtering (viscosity) term to the discretization. To demonstrate this technique, we built a Mathematica program that allows a user to manipulate initial conditions and relevant constants, including material properties, control parameters, and a choice of a variety of initial conditions, single box and pinch-type discontinuities, as well as sinusoidal, sawtooth-type, square-type, and triangle-type waveforms, with variable frequencies. The demonstrations and codes being used in the presentation is about to be submitted for publication at the Wolfram’ Demonstration Project website. Arbitrary number of layered sandwich beams will also be discussed.

Puhakka, Erika "Public Perceptions of Providing Aid to North Korea Among South Koreans" (Timothy Rich)
This paper examines factors that affect South Koreans' support for providing aid to North Korea. In the context of inter-Korean relations, the implications of foreign aid policy are immense. Inter-Korean engagement, especially through aid flows, is conducted with reunification as an end goal. However, the South Korean government must balance hopes for reunification with North Korea’s bellicosity and violation of international norms. Using an original 2020 Macromill Embrain survey with 1034 respondents from South Korea, this paper aims to empirically identify individual-level factors that influence support for increasing humanitarian aid to North Korea. Generally, this paper finds that receiving information on the dollar amount of humanitarian aid allocated to North Korea is associated with a decrease in support for providing further aid. Factors that are likely to affect an individual’s support for providing aid are gender, party identity, and existing views towards inter-Korean relations. These results have significant foreign policy implications for the Ministry of Unification and can help them frame bilateral aid in terms that increase public support for giving humanitarian aid to North Korea.

Quire, Michael "Satellite and Radar Analysis of the May 9, 2016, Katie/Wynnewood Ef-4 Tornado" (Joshua Durkee)
On the afternoon of May 9, 2016, an EF-4 tornado touched down between Katie and Wynnewood, Oklahoma as part of a four-day outbreak of tornadoes in the Great Plains. This EF-4 was the strongest tornado from the four days and one of the strongest of 2016. This paper will serve as a reanalysis of this event from a remote sensing perspective. This tornado will first be analyzed using satellite imagery. Different bands of the Geostationary Operational Environmental Satellite (GOES) will provide insight into the factors that helped produce this storm, such as a dry line and deep convection. The second part of the analysis will use multiple RADAR products to further investigate the storm and its progression through Garvin County, OK. This reanalysis will help show how strong tornadoes occur and will show how remote sensing can be used to better forecast and understand these kinds of storms.

Rai, Armaan "Examining Men's Preferences in Psychotherapy" (Frederick Grieve)
A need for tailored approaches towards men's depression and suicide prevention has been identified from the higher risk of suicide and lower rates of seeking help by males. Because of this, ongoing research and effort have gone towards understanding men's barriers towards seeking help and treatment for their mental health. Less attention, however, has been put towards understanding what method of treatment men prefer. Though, studies have found, through diverse sample groups, that men may prefer psychotherapy over medication and other nonprofessional modalities- executive life coaching, etc. Given the preference towards psychotherapy, it is crucial to gain knowledge in the preferences in psychotherapy of help-seeking men. A recent study shows that 80% of men with a mental health concern don't know what to look for in a psychotherapist. The purpose of this study is to better understand the preferences of help-seeking men in psychotherapy and to denote any possible patterns with known factors that affect mental health, i.e., LGBTQ, military time, etc. The identification of these preferences and patterns will hopefully help morph the process of psychotherapy with men and make the possibilities of psychotherapy more accessible.

Rashada, Mya "Healing Through Architecture" (Shanaz Aly)
This research project is a presentation exploring the relationship between healing and architecture. The research on how the mind will respond to certain spaces in a building, as well as the flow of the building itself is a vital part of building design. Often times architects will ask themselves, how will people interact in my structure, as well as the building itself. Healing the environment is also a large component that architects have been considering in their designs in recent years. My study explores the relationship building design has on healing the mind, spirit, body, and the environment. I studied different cases and looked at buildings that were designed with healing in mind, along with psychological effects colors, materials and textures have on the human mind. These cases were a vital part of my overall design process, and the research that they did helped other architects in their design develop processes as well. The outcome of my research has concluded that materials included in designs that have a very important impact on the way that a person will behave in certain structures. My project is a mental and physical health facility that includes materials that will create an environment that

people will respond positively to based on the research that I've made.

Reinhard, Ashley; Vargas Berroa, Gabby; "Designing for All Walks of Life" (Shahnaz Aly)
Disabilities impact children's daily life: despite the programs in schools designed for their special development, many of the children age out of these programs. For their constant success and independent growth, they need spaces that fully potentialize their capabilities and aspirations. Consequently, it will increase their chances of accessing diverse job opportunities and connect with the community around them. Over 18 million immigrant children became part of the United States population in 2020, from which 4.3% have disabilities. These children represent the minority of the minorities. Moving to a new country can be intimidating. Therefore, it is essential to provide children with secure, comfortable, and motivational learning areas to enhance their process of adaptation while highlighting the immigrant students' values and cultural identity that enrich US social diversity. The creation of a space that is designed for all abilities and backgrounds means that inclusivity is at its highest. This educational building structure will provide the necessary community for immigrant children and their families to connect with others in the same situation and learn skills to help them assimilate into American culture. These structures provided innovative areas and services to assist students with special needs in reaching their maximum academic potential.

Relva, Carolina; Korner, Sean; "Synthesis of Peptide Metal-organic Frameworks using L-histidyl-l-serine (his-ser) and Zinc Ion" (Bangbo Yan)
This project aims to synthesize a new catalyst mimicking the carbonic anhydrase (CA). The new catalyst is a metal-organic framework (MOF) made from oligopeptides and metal ions. To simulate the active centers of CAs, we use L-histidyl-L-serine (His-Ser) as the ligand and zinc ions as the reactive center of the new MOF, in which the zinc ion has a similar coordination geometry to that of CA. This presentation will report the structure and the catalytic properties of the new MOF on the reaction of carbon dioxide with water to form bicarbonate.

Robertson, Shelby "Inquiry Based Learning & Its Impact on Student Perspectives" (Natalie Mountjoy)
Professors are always searching for the best ways to engage students and improve their educational experience. Inquiry-based teaching practices involve students learning through making connections outside the classroom with problem solving and unique methods. This cutting-edge idea has piqued teachers' interest in the effectiveness of this method for student learning. I had the opportunity to analyze the impact inquiry- structured curriculum can have on students view of the importance of science across a range of different areas. Methods include using CURE survey data previously collected from three different biology lab courses using the data to find the average response and conducting statistical analysis on the data. The classes ranged from introductory level to upper-level biology courses each with a different level of inquiry embedded in the curriculum.

Robinson, Chaney "Finger Snaps and Tilted Hats: A Study of Bob Fosse's Jazz Style" (Amanda Clark)
Bob Fosse—a dancer, choreographer, writer, and director—was an incredibly influential figure

in jazz dance. His style, characterized by turned in feet, hunched shoulders, hats, and strip tease, left a lasting impact on the dance world and has helped shape modern jazz dance. Starting Spring of 2021, I began this research project with the intention of researching jazz dance through the lens of Bob Fosse and using this knowledge to explore a choreographic project. The first semester of this research included literature review into Fosse's life and choreographic style as well as learning several dances he choreographed. I continued my research the second semester by choreographing a piece for The Department of Theatre and Dance's Fall Last Chance to Dance that was inspired by and included select movements choreographed by Bob Fosse. In Spring 2022, I will choreograph an original work for Spring Last Chance to Dance that reflects my own style of jazz that has been impacted by Fosse's style. This research project has allowed me to gain a personal understanding and appreciation of Bob Fosse's movement style and use this knowledge to explore my own choreographic style.

Rodgers, McKenzie "Promoting A Walk/run Event to Expand Services for Individuals with Disabilities" (Leisa Hutchison)
This project seeks to promote the LifeSkills Autism Walk/Run, a primary fundraiser for the Suzanne Vitale Clinical Education Complex (CEC). The CEC is a nonprofit organization focused on enhancing socialization and communication skills, as well as the quality of life, for individuals and families impacted by autism spectrum disorder and developmental disabilities. The goal is to combine the disciplines of business administration and speech-language pathology to increase event participation, fundraising total, campus support, and overall awareness of the organization and the population it serves. By combining research with content from previous coursework, business communication skills will be utilized to decide how to best reach the targeted demographics, marketing skills to target those groups, management skills to lead volunteers, and finance skills to manage the funds obtained. The projected outcome of this project is to increase the fundraising total by $5,000, increase the number of participants by 100, include at least 5 campus organizations in the event, and raise overall awareness. By supporting the CEC, more individuals with autism spectrum disorders and/or developmental delays will have the opportunity to acquire services and the campus and community's awareness of the organization will increase.

Rodriguez, Alexis "2021 Winter Storm Of The Century" (Joshua Durkee)
The falling of snow in the United States is truly a sight to behold, since the country alone does not experience it much, especially the further east you go. Just this year alone, around mid-February, the United States received one of the largest snowfalls to be recorded up to date in 2021. The total snowfall alone from this winter storm is over twenty inches of snow and ice. Throughout the entire United States, population had difficulty coping with this dangerous storm; severe power outages, driving through the slippery ice, and even a few deaths were reported. Having snow through the south-central US is not common, having some years where states like Kentucky and Tennessee do not receive any snow at all. The 2021 snowstorm is not one of the biggest storms reported, but it is not the smallest either, hitting some states more than others. Some states report only five inches of snow during its entirety; some states got buried with over 25 inches of snow, such as in Texas, Oklahoma, and Arkansas. It may be a surprise that Tornado Alley would get the worst treatment from this storm, however it would

affect more in greater numbers.

Romero, Haven Gabrielle; Harris, Jacob; Katherine Vanderpool; "Evaluating Effects Of Task Difficulty On Motivation" (Sungjin Im)
Motivational Intensity Theory posits that effort is proportional to perceived task difficulty as long as success is possible. However, there is a dearth of literature that tested this theory empirically. The current study examined the effects of task difficulty on effort and cardiovascular activities and the role of personal characteristics. A total of eighty-three undergraduate students completed questionnaires about motivation, trait anxiety, and grit as well as the Attention Network Task (ANT). To manipulate task difficulty, the target onset was varied as follows: 1,000ms (easy), 250ms (medium), 100ms (difficult), and 10ms (very difficult). Electrocardiography (ECG) and impedance cardiography (ICG) were recorded to compute high-frequency heart rate variability (HF HRV) and pre-ejection period (PEP) as an index of parasympathetic and sympathetic activation, respectively. Repeated measures ANOVAs suggested that there was a significant effect of effort on HF HRV ($F(1, 82) = 4.83$, $p = .031$), but not on PEP ($F(1, 82) = 0.45$, $p = .505$). Post-hoc analysis indicated that although effort increased from easy to medium conditions but decreased from medium to very difficult conditions. These results provide insight into one's transient motivational state, especially how effort covaries with the activities of the sympathetic and parasympathetic nervous systems.

Rugerio, Analu "Future of the Franchise" (Shahnaz Aly)
Being a professional football player can be very physically and mentally demanding. From having to train and practice at the highest level to being able to study and learn new systems and game plans. The project involved the construction of a brand-new training facility for the Jacksonville Jaguars football team. This facility provides state of the art equipment and spaces so the team will have every opportunity to train at the highest level. Health of the players is the number one priority in the NFL and the best way to achieve good health is to get the proper training and recovery. This facility has a state-of-the-art weight room and practice fields so the players can get into the best physical shape that they can. The players will be able to work on the mental aspect of the game with the help of the auditorium so they can study the big picture of their game and then go to the media center to study more in depth to improve their own game. The NFL requires their athletes to be in the best possible shape and this facility will allow Jacksonville Jaguars to reach that level.

Rzayeva, Manzar; Muradova, Yasmina; Cassidy, Chloe; Fields, Cameron; Ashley, Noah; "Comparison of Effects of Sleep Fragmentation on Pro-inflammatory Cytokines of Male and Female Mice" (Noah Ashley)
Sleep plays an essential role throughout the body by affecting the physiological function of many systems. One of these systems is the immune system. Previous studies have shown the effects of sleep fragmentation upon the inflammatory response, as measured by cytokine gene expression. However, sexual differences in inflammation to sleep fragmentation have not been studied. To analyze this, male and female adult mice were subjected to sleep fragmentation (SF) for 24 hours in an automated SF cage that includes a bar sweeping across the cage every two minutes. Meanwhile, the control group of male and female adult mice were undisturbed.

Following 24 of SF or control conditions, the brain, spleen, liver, and white adipose tissue (WAT) of both SF and control groups of mice were collected and stored in RNAlater solution. Total RNA of each of the tissues was then isolated. Additionally, RNA was reverse transcribed into cDNA. Then, gene expression of proinflammatory cytokines was assessed using RTPCR with Taqman primer/probes. The collected data were analyzed to determine whether differences occurred in cytokine gene expression of these tissues among SF male and female mice.

Sadeq Ibn Emran, Md Rafi As "Boundary Sensor Design Leading to the Exponential Stability of Piezoelectric Beam Vibrations" (Dr. Ahmet Ozkan Ozer)
Piezoelectric materials are multi-functional materials having the ability to interchange mechanical energy (vibrations) and electromagnetic energy during motion. Therefore, they can be used as both sensors and actuators. A coupled PDE system, describing the mechanical vibrations and their interactions with electromagnetic fields, is considered with the design of two sensors placed at the tip of the beam. The sole task of these sensors is to collect data and feed it back to the actuator. In this talk, the exponential stability of the vibrations for the closed-loop design is proved first. To obtain the same result (for the implementation of the sensor design in practice), a Finite-Differences-based approximation technique is adopted for the PDE system. However, a blind use of this technique leads to the lack of uniform observability (sensor design) as the approximation parameter tends to zero due to the "artificial" computer-generated high-frequency vibrational modes. Recently, a direct Fourier filtering technique is successfully utilized for obtaining a uniform observability with respect to the approximation parameter, obtained by a former graduate student [Horner, Ozer, GAPA, 2021]. This result is essential for proving the exponential stability result. Further use of the so-called "discrete multipliers" technique is essential to prove the exponential stability result. Preliminary results together with certain mathematical hurdles and open problems will be discussed.

Salifu, Samirah; Johnson, Cole; Grace Young, Emma; "UAV Cave Mapping and VR Experience - Software" (Jeffrey Galloway)
The UAV (unmanned aerial vehicle) project is tasked with the goal of making cave mapping a safer process. The UAV drone is planned to capture data from the cave to make a perfect replica within virtual reality (VR). The drone can collect data faster and more accurately than humans can. Caves in virtual reality have many applications including accessibility for the disabled in cave exploration, as well as the ability to study a cave that is thousands of miles away without needing to travel. The goal of the software component of this project is to transform the LAS point-cloud data into code that can be read by the VR headset machines. Unity, a game engine with software to create VR environments, is installed on all computers. The process starts with two Lidar sensors attached to the drone that will collect point-cloud data as the drone slowly passes through the cave. After retrieving the data, we can then apply textures to the point-cloud data and overlay images of the cave. The images are taken by a camera that is also attached to the drone. The point-cloud data provides depth to the images so that the user sees a 3D image of the cave rather than a 2D image.

Schiess, Jaclyn "Pedagogical Methodologies Through the Lens of Inclusion in Dance" (Meghen

McKinley)
I believe anyone and all bodies should be able to experience dance as an artform. Not only is a dance a form of exercise, but it also helps teach vital life skills including communication, teamwork, and overall body awareness. Dance should be accessible to everyone, regardless of a physical or mental disability. Dance studios are a dime a dozen in cities across the U.S., but have you ever heard of a place dedicated to teaching dance to persons with disabilities? I had not before this research, and I have been dancing my whole life. I have researched the positive aspects of dance on people and found that it stems past just physical attributes. People involved in dance are shown to have higher confidence, self-worth, and discipline. Research through classes, observations, and my own pedagogical views has led me to multiple methodologies and approaches to teaching. This research has been conducted online and in both the Louisville and Nashville areas. I am currently in the process of obtaining a certification in accessible teaching from The Dance for Parkinson's Disease Program. This program utilizes dance to encourage people with Parkinson's to explore movement.

Schulte, Connor; Patterson, Kellen; Ainembabazi, Lovence; Nee, Matthew;
"Polydimethylsiloxane as a Substrate to Enable the Use of Photocatalysts to Treat Organic Water Pollution" (Matthew Nee)
Organic water pollutants are difficult to treat using traditional methods like filtration. Photocatalysts have been shown to be effective at increasing the rate at which these pollutants decompose; however, they form a suspension in water which can be difficult to remove. Our group has tested the ability of polydimethylsiloxane (PDMS) beads, acting as buoyant, inert substrates, to increase the both the ease with which photocatalysts can be used in water treatment and the ease with which they can be removed afterward. Three photocatalysts were tested: titanium dioxide, zinc oxide, and tungsten trioxide. The photocatalyst powder was incorporated into the structure of the beads during production via dispersion polymerization. The structure and surface-area-to-volume ratios of the beads were observed using Scanning Electron Microscopy, and Brunauer-Emmet-Teller isotherms. Energy dispersive X-ray spectroscopy, X-ray diffraction, and Raman spectroscopy were used to determine that the photocatalysts had been incorporated successfully and that the photocatalysts' structure remained unchanged. UV/vis spectroscopy was used to measure the rate at which the photocatalytic PDMS beads degraded methylene blue, a sample pollutant. This rate was found to be close to the rate measured using a photocatalyst suspension. Current work is focused on transitioning to polystyrene to reduce production costs.

Sheets, Caitlyn "Occupation of The Mountains: An Appeal for Documenting Environmental Protests"" (Timothy Frandy)
The construction of the Mountain Valley Pipeline has been met with significant resistance in various forms of protest from local communities. In this paper, I contend that the field of Folk Studies or folklorists should critically observe a set of environmental protests surrounding this construction and consider the importance of documenting such protests as culturally significant folk performances. This project details two case studies of environmental protests over the last two years within the mountains of the Appalachian region by examining the context of the protests in political, environmental, personal, and ethical aspects. By viewing protests through

the lens of performance, we will be able to see the "nuanced expression of intangible cultural heritage and a phenomenon that arises out of everyday life" (MacCath-Moran 2020). These acts of resistance help us better understand what is deemed essential and what a culture finds worth protesting should be given more thought within the field of Folklore.

Sheffield, Catherine "Using Grammaticalization to Create a Fictional Language" (Trini Stickle)
Fictional languages are often developed for various effects for the characters of entertainment media. In my novel, as seen in excerpts presented here, the effects are specifically designed to explore the role of creative work in SLA from both the perspectives of the teacher and a creator. The method I am using to create this fictional language is capitalizing on natural processes of linguistic change within a plausible evolution of the English language. Key is the process of grammaticalization (lexical constructions that serve grammatical functions and develop new grammatical functions) (Hopper & Traugott, 2003). In this presentation, I analyze processes of grammaticalization alongside excerpts from the novel to give the audience a better understanding of how languages change. Additionally, I provide insights gained through my field research as I taught English at a local immigrant/refugee center. My field work augments the compilation of other resources I draw upon such as SLA theories and both ethical and unethical linguistic research studies, the latter of which figures prominently in the plot of my novel. Within this presentation linguistic research on language creation and pedagogy as well as the role of creative writing activities in the SLA classroom are examined.

Shrestha, Niroj; Gani, Nahid; "Inferring Tectonic Signals Using River Longitudinal Profile Models And Geomorphic Proxies At The Fold And Thrust Belt, Eastern Himalayan Range, Bengal Basin" (Nahid Gani)
More than 200 million people live in and around the Bengal Basin, which is one of the tectonically active areas due to the ongoing continent-continent collision and subduction between the Indian, Eurasian, and Burmese plates. However, the active tectonic deformation in the area remains ambiguous due to the sparse dataset, thick vegetation cover, and the Basin's complicated geology. We investigated the eastern Fold and Thrust Belt of the Basin using river longitudinal profile models and different geomorphic proxies to capture ongoing tectonic signals. The observations suggest that the rivers towards the northeast are largely disturbed, likely due to high erosion and/or tectonic activities while the rivers towards the southwest are under equilibrium conditions. Our results also suggest that the Basin is experiencing a drainage divide migration from the coastal areas towards the east with higher elevations. The new datasets generated from this study could be critical for the region's geotechnical investigations such as site selection for infrastructure development as well as for the government and non-government officials, and emergency responders to plan and prepare at the onset of natural hazards.

Sipes, Lindy "A Critical Biography of John Algeo: From Historical Linguist to Dialectologist" (Trini Stickle)
This critical biography of lexicographer, linguist, and dialectologist Dr. John Algeo delves into his corpus of research data and notes as it seeks to analyze his methods and the resulting wealth of publications derived from their compilation, as well as providing an overview of his life and

career. Algeo experienced many changes within these fields, perhaps most notably during the advent of new technological advances that have made data collection and storage easier, namely the Internet and the aid of computer processes. As a result, his work lends itself as an incredible historic model and, as such, will be compared to current techniques of dictionary-making. Insights on Algeo's methods and influence are provided through interviews with Dr. Joan Hall, editor of the Dictionary of American Regional English (1975-2013); Erin McKean, the first woman editor of the Oxford English Dictionary and creator of the online, people-sourced dictionary Wordnik; as well as Algeo's co-author and professor of composition and research, Dr. Carmen Acevedo Butcher. Additionally, this presentation, and subsequent thesis, describes the development of the archival process presently underway to digitize Algeo's field notes in order to make them publicly accessible for further research and/or study.

Sisler, Julie "Unification Through [dis]identification: A Rhetorical Analysis Of A Student-run Newspaper's Organizational Identification Strategies" (Angie Jerome)
Despite recent expansion of research into organizational identification, existing literature does not address instances where social movements, and even related entities, boost organizational identification through disidentification. This rhetorical analysis examined the organizational identification strategies used by a student-run newspaper in response to an ongoing lawsuit between themselves and their affiliated university. Through analyzing 47 articles and editorials published over a 5-year period and comparing to Cheney's (1983) identification inducements, techniques encouraging audiences to disidentify with the university while still identifying with and supporting the affiliated student publication emerged. This analysis contributes to not only to the study of organizational identification through a unique lens, but can also provide direction application to the fields of organizational and social movement rhetoric.

Skau, Madeline; Horn, Jackson; Tess, Rheanna; "An Analysis Of The Patient Coordinator Program To Close Patient Care Gaps At The Bowling Green Medical Center" (Natalie Mountjoy)
As patient care gaps, defined as discrepancies between the care patients receive and what is recommended, become a more prominent concern in healthcare, some institutions attempt to close these gaps with "patient coordinators" (PCs). PCs identify gaps in individual patients' care by reviewing charts and scheduling patients to fill those gaps (have a Wellness exam, receive a flu shot, etc.) In August of 2021, the Bowling Green Medical Center implemented a PC program utilizing undergraduate biology students enrolled in a co-op class. Our project aims to analyze the impact of the PCs on closing care gaps in the Bowling Green Medical Center's diabetic population (of which is relatively large in Kentucky).

Skipworth, Tristan; Khashimov, Mardan; Bratcher, Fox; Zhang, Rui; "Synthesis And Kinetic Studies Of High-valent Chromium(v)-oxo Species Supported By A 5,10,15,20-tetramesitylporphyrin" (Rui Zhang)
In Nature, the superfamily of cytochrome P450 enzymes catalyzes numerous oxidation reactions that have inspired the use of various synthetic metal complexes as biomimetic catalysts. In enzymatic and synthetic oxidation catalysis, a high-valent transition metal-oxo intermediate is typically formed as the active oxygen atom transfer (OAT) species. In this study, 5,10,15,20-tetramesitylporphyrin(TMP) and its chromium (III) complex, i.e. CrIII(TMP)Cl, were

synthesized and characterized by UV-vis spectroscopy. The corresponding chromium(IV)- oxo intermediate was generated by the chemical oxidation of CrIII(TMP)Cl with iodobenzene diacetate as the oxygen source. Chromium(V)-oxo species was further generated from the one-electron oxidation of chromium(IV)-oxo intermediate by silver perchlorate. Kinetic studies of oxidation reactions of the generated chromium(V)-oxo species with a variety of organic substrates including thioanisole and its derivatives, and single-electron reductants were carried out, providing mechanistic insights into the identities of the active oxidants and oxidation reaction pathways of important catalysts.

Steele, Macy; Moskal, Katie; McCollum, Diamonde; Teeters, Jenni; "Trauma Type Differentially Impacts Alcohol Use Outcomes and Coping Motives Among Emerging Adults" (Jenni Teeters)
The present study aimed to examine differences in alcohol use and related problems in individuals who experience interpersonal trauma (IPT; traumas perpetrated intentionally; e.g., sexual assault, combat) compared with those who have experienced non-interpersonal trauma (NIPT; e.g., car accidents, natural disasters). Trauma exposure has been linked to using alcohol to cope. However, little research has examined whether survivors of IPT endorse greater levels of alcohol use, alcohol problems, and coping motives compared with survivors of NIPT. Participants were 401 emerging adults (ages 18-29) recruited from an online research platform. Participants completed validated measures of trauma exposure, alcohol use, alcohol-related problems, and drinking motives.

Stewart, Logan; Crouch, Trey; Ozer, Ahmet Ozkan; Poynter, Matthew; Aydin, Ahmet; "Numeric Filtering Vs. Non-filtering: Boundary Control Of Vibrations On A String" (Ahmet Ozkan Ozer)
A one-dimensional wave equation, describing vibrations on a clamped-free string, is considered. The corresponding partial differential equation (PDE) is known to be fully controllable by a boundary feedback controller (force) applied at the tip of a string. However, its well-known space-discretized approximations (a system of difference differential equations) by Finite Differences or Finite Elements are not fully controllable without proper filtering of the numerical scheme. It is simply due to the artificial high-frequency vibrational modes caused by the blind use of these approximations. To avoid the discrepancy, an indirect filtering technique is adopted to retain the controllability, mimicking the PDE-counterpart. Moreover, an alternate order-reduced numerical scheme, utilizing a clever use of Finite Differences without filtering, is also introduced for comparison. Approximate solutions are built to where all control parameters can be controlled, including different types of initial conditions, such as sinusoidal, box-type, and sawtooth wave, with low or high frequencies. All of these parameters can be manipulated via a Mathematica program (called a Wolfram Demonstration). We were able to find that the results from the numerical schemes matched what was happening in the real world. All three approximation techniques are compared side-by-side in terms their computational costs during the presentation. This project is fully funded by a KY NSF EPSCoR grant.

Swift, Alyssa; Lickenbrock, Diane; "Examining Associations Between Infant Behavioral Inhibition, Cardiac Physiology, and Regulatory Behaviors" (Diane Lickenbrock)
The capacity to regulate is critical in achieving positive socioemotional outcomes. Respiratory

sinus arrhythmia (RSA) and specific behaviors are known indicators of infant self-regulatory capacity (Conradt & Ablow, 2010). Temperamental behavioral inhibition plays a large role in regulation development; infants who display heightened sensitivity/avoidance are at risk for internalizing problems (Fox et al., 2014). The current study examined longitudinal associations between infant behavioral inhibition, RSA, and regulatory behaviors. The current study included 4 and 8-mo data from a larger study on socioemotional development (n=99). Mother-infant dyads completed a modified Still-Face Paradigm (Tronick et al., 1978) with cardiac physiology recorded (infant RSA suppression) and regulatory behaviors rated (Ekas et al., 2013). Behavioral inhibition calculated from experimenter ratings (IBR, Stifter et al., 2008). Preliminary results with a portion of the sample (n=60) revealed main effects of irritability, looking at the parent, and distraction during play. Inhibited infants may be less likely to utilize the most effective regulatory behavior (i.e., distraction). Additional models will be examined and reported.

Sword, Mia "Identifying Immunizations of Infectious Diseases: A Decision Tree Analysis on Flu Shot Vaccinations" (Lily Zhuhadar)
According to the World Health Organization (WHO), immunizations help stop 2-3 million annual deaths. Also, the website says that nearly 19 million infants have missing vaccinations. In some cases, reports about vaccination results, such as links to other diseases, have led to distrust, along with personal, religious, or moral objections, and have caused children not to be vaccinated. Past studies have attempted to review factors associated with vaccination. Factors examined include education, age, religion, socioeconomic status, health usage, urban and rural areas, and media exposure. The yearly Centers for Disease Control and Prevention (CDC) schedule includes several immunizations and updates. Hypothetically, Mia Sword is a Health Analyst who works for WHO[1]. She used an immunization dataset retrieved from CDC. Following the 7-Step Business Analytics Process, she started by dividing the dataset into training and validation datasets. The training dataset is used to fit the model, and the validation dataset is used to validate the model. Several models were examined. She used decision tree, logistic regression, and neural networks. Finally, she proposed some recommendations to her manager.

Terrell, Nathan "A study exploring the perceptions of Kentucky Family Court Judges and Attorneys regarding the effectiveness of parental involvement in achieving positive permanency for a child" (April Murphy)
My research is using a mixed methods approach to explore the perceptions of Kentucky Family Court Judges and family law attorneys regarding the effectiveness of the current Family Court model. Specifically, their perceptions about attributes of parental involvement and the likelihood of re-unification or permanency in child welfare cases that involve concerns of dependency, neglect, and abuse (DNA) resulting from substance misuse and/or mental health issues. The qualitative component of this study includes one-on-one interviews with Kentucky Family Court Judges. These interviews are asking questions regarding their personal perception of the court’s effectiveness as it relates to attributes of parental involvement within DNA cases. The quantitative portion includes a survey the opinions of attorneys with experience working inside the Kentucky Family Court System. This survey has 15 items measured on a Likert Scale that assesses lawyers' attitudes towards parental involvement in DNA cases that either help or

hinder achieving positive permanency. In my presentation, I will be highlighting the results of early survey data and summarizing the findings of some judges interviewed.

Terry, Sarah; Minaya Diaz, Diego; DiMeo, Chris; Whittle, Madison; "The Connection of STEM and Art & Design: A Visual Study of the Importance of Digital Arts in the Traditional Gallery Space" (Mark Simpson)
In October of 2021, four students curated WKU's first-ever augmented reality gallery, which was also the first STEAM and computer animation exhibition on campus. The overall goal of the gallery was to bring more representation to the digital arts. Because modern audiences have become desensitized to computer-based arts, there is now a stigma that digital arts are not as "profound" as the fine arts. By featuring this work in a traditional gallery space, the intention was to show that these mediums are just as thoughtfully and emotionally executed. Student and faculty works ranging from graphic design, illustration, animation, 3D/CAD models, and screen prints were considered eligible for the show. Over 25 works in total from creatives from a wide range of disciplines were collected and transformed into corresponding QR codes that guests could scan on their smart devices in the gallery space. The gallery received enormous public support, being featured in broadcasts by Spectrum and WBKO news, as well as the College Heights Herald newspaper. An estimated 170+ attendees visited the gallery. It "raises serious questions about the future, the nature of art, and how AR can start to intersect with that world," one attendee commented.

Thomas, Ryan "Exploring Weather and Climate in Kentucky with Mesonet Observations" (Eric Rappin)
Kentucky is classified to have a either a humid subtropical or continental climate which is dependent on the county you live in. One can experience different weather than the county over. During the last couple of years, the Kentucky Mesonet has collected data to help understand the weather differences from county to county. The Kentucky Mesonet has set up around 80 permanent stations and three portable stations across the state to track these weather patterns. The portable tower stations are set up to track the temperature, humidity, precipitation and windspeed at a nine-meter and three-meter height, collected this information every five minutes. From our research we have investigated severe weather, flooding, droughts and heat waves effect each county differently based on their local environments. This data has allowed us to recognize patterns in how elevation, land cover, and terrain all play important factors with Kentucky's weather and climate. With this data it can be important for multiple government departments to help find ways to improve the energy-transportation-water-agriculture nexus and even help predict future weather patterns.

Thornhill, John "Electing To Take On Risk: How Political Uncertainty Affects The Stock Market" (Alex Lebedinsky)
In financial economics, the relatively high average returns on stocks are understood to be partly a function of the greater risk taken on by investors when investing in stocks as compared to debt securities. One source of this risk is the uncertainty regarding future political policy. This uncertainty, though, is not constant across time; it is greatest around an election, when new policies are unknown and the impact of the policies will be relatively immediate. As uncertainty

resolves following the election, risk premiums should decrease & prices should rise. Thus, investors who buy stocks during this period of uncertainty should be compensated with higher average returns in the months following the election. We test this hypothesis empirically, using United States election data from 1927-2015. Since political risk is a systematic risk, we attempt to quantify this risk by determining the portion of returns attributable to systematic risk both before and after the election. We find evidence that returns are higher in the post-election period, that these returns vary across companies in different industries & of different size, and that systematic risk explains a higher portion of returns in the pre-election period.

Timmons, Kody "An Experience on the Water”" (Aly Shahnaz)
Kody Timmons 1/31/2022 AS 490 Aly Shahnaz “An experience on the water” For this senior capstone, I designed and re-modeled Creekwood marina from my hometown Hendersonville, Tennessee that is focused on attraction. I have chosen a complex series of design and ideas to maximize the usage of my site and building. This has given me the opportunity to create this building strictly around a multi-purpose usage. I have achieved just that. The marina has a food court and retail areas which attracts visitors. This creates a fun and relaxing experience for others. Also being that the city of Hendersonville is not too far from Nashville I decided to add a rooftop bar that give the building a maximum usage. Lastly, I have added a outdoor stage for bands and musicians to perform to keep that culture of the Music City. In conclusion, the goals for this capstone are to completely make this building muti-use and maximize the attraction to the area by adding fun and relaxing things for the general public to enjoy on the lake. This design will provide cultural related standpoints to enhance an amazing experience for everyone.

Tran, Christina; Srivastava, Ajay; "The developmental effects of a V-Type ATPase down regulation in Drosophila melanogaster" (Ajay Srivastava)
V-Type ATPases are ATP-driven enzymes that are responsible for organelle acidification in compartments of the cell such as lysosomes, which need to maintain a low pH in order to function properly. Lysosomes must maintain an acidic pH to activate hydrolytic enzymes and carry out their function to degrade internalized macromolecules. The acidic nature of the lysosome is also a possible factor needed for protease activation in the lysosomes. Proteases in lysosomes oversee catalyzing the hydrolysis of proteins which is essential to lysosome functionality. Using the GAL4/UAS system, phenotypes from the perturbation of this gene were found. The GAL4/UAS system is used to control gene expression in organisms such as drosophila. A driver line of drosophila containing the GAL4 gene were crossed with responder lines containing the UAS gene to induce a phenotype expression. The GAL4 genes acts as a transcriptional activator which binds to UAS enhancer sequences inducing gene expression. The progenies resulting from the cross were examined for the produced phenotype. The results provide further understanding of the role of acidification in development and an insight into protease activation.

Turner, Kimberly; Weaver, Hunter; Ashley, Noah; "Effects Of Glucocorticoids Upon Pro-inflammatory Responses In Peripheral Tissues To Acute Sleep Fragmentation In Mice" (Noah Ashley)

Fragmented sleep is commonly observed in humans who suffer from obstructive sleep apnea (OSA) and can induce inflammatory responses, leading to increased levels of pro-inflammatory cytokines such as interleukin-1β (IL-1β) and tumor necrosis factor-α (TNF-α). During sleep fragmentation, glucocorticoids are released and are considered anti-inflammatory and immunosuppressive at high doses but on an acute level may stimulate immune function. We hypothesized that glucocorticoids are involved in regulating these inflammatory responses during acute SF. To investigate this, C57BL/6J male and female mice were subjected to adrenalectomy (ADX), ADX + Corticosterone, sham-ADX, or sham-ADX + Corticosterone, followed by a recovery week. Mice were then subjected to acute (24 h) SF which is simulated using cages in which bar sweeps occurred every 2 minutes for 24 hours. After SF, peripheral (liver, spleen, heart, adipose, trunk blood) tissues were collected from the mice. Corticosterone and IL-1β ELISA assays were used to assess circulating concentrations in serum. RNA was extracted and used for RT-PCR to assess cytokine gene expression (IL-1β & TNF-α) levels in peripheral tissues. The results obtained from this study will aid in identifying potential pathways mediating inflammatory responses that could lead to better therapeutic treatments for OSA and other sleep disorders.

Uland, Charles; Yan, Bangbo; Patel, Amar; "Metal-peptide Complex for Carbon Sequestration" (Bangbo Yan)
The level of carbon dioxide in the atmosphere has recently been denoted as dangerous because it may cause severe weather and climate change. It may also increase the acidity of seawater in the oceans. The human body can synthesize a catalyst called carbonic anhydrase to catalyze the conversion of carbon dioxide to carbonic acid. Our research aims to create a metal complex that uses peptides as ligands to mimic the functions of carbonic anhydrase. In order to make the complex, a metal salt is dissolved in a solvent and mixed with a peptide ligand. The pH of the mixture is adjusted using a base, and the mixture is heated in an oven to increase reactivity. The catalytic property of the metal-peptide complex is tested by bubbling carbon dioxide into a calcium chloride solution. The amount of calcium carbonate precipitated in this process will be analyzed to evaluate the activities of the complex.

Velders, Adianne "Hurricanes In Relation To Precipitation Levels" (Xingang Fan)
Over the past twenty years the United States has seen a record number of powerful hurricanes, specifically those that made landfall. The wrath of these storms have left the states with significant amounts of rainfall, which often results in more destruction. In using precipitation data from NASA's Global Precipitation Measurement (GPM) mission and Hurricane Best Track data from HURDAT2, many notable comparisons were discovered regarding the intensity of the hurricane and the resulting amount of rainfall. The amount of precipitation varies by the area in relation to the storm's path, as well as whether or not it made landfall, and cannot be determined by category. For example, Hurricane Florence downsized from a category 4 to a category 1 because its winds were diminishing, but the storms grew larger, producing more rainfall and major flooding. Considering this, there appears to be a pattern between the landfall in relation to the amount of precipitation that could prove to be beneficial in the future for forecasting and preparedness across the U.S.

Voegerl, Brody "Making A Community Stronger Through Architecture" (Aly Shahnaz)
This research project is an architectural concept representing the strength of architecture and how it can bring a community together. I chose to research community centers because a place such as a community center does not exist in my hometown of Huntingburg, Indiana. The community center will allow for the citizens of Huntingburg, regardless of differences, to come together and better oneself. Over the course of this project, I have completed case studies on multiple community centers to understand what creates a inclusive place best suited for people to better themselves. I have found that incorporating spaces such as pools, gyms, collaboration spaces, and event space along with others, have been proven to increase camaraderie amongst those who engage in activities within the community center. The conclusions that I have come to, are that people want a space that is open, inviting, inclusive, and offers a multitude of various of activities. This center incorporates a wide range of activities, clubs, and programs for all ages of the community to gather and take part in. This will allow Huntingburg and surrounding towns to come together as one to be healthier and stronger.

Vyas, Bhavya "Individual Differences in Neuromyth Beliefs" (Jenni Redifer)
Need for cognition can be described as the need to structure situations in a meaningful and integrated way. It also describes one's tendency to engage in enjoy cognitive processing. Impulsivity in a cognitive sense can be described as quick decision making without putting much thought to it. We studied the correlation of these two individual differences in relation to belief in neuromyths. Neuromyths are misconceptions about the brain that are widely believed to be true. We hypothesized that people high in need for cognition would be less likely to believe in neuromyths, but those high in impulsivity would be more likely to believe neuromyths. We also examined the relationship between the Big 5 personality traits and belief in neuromyths. Our study included 222 participants who completed a survey on neuromyths. Our results from the Pearson correlations revealed that three individual difference characteristics were significantly correlated with being more likely to believe specific neuromyths, but overall, more frequent belief in neuromyths did not differ as a function of personality traits or other individual differences.

Walker, Lauren "Molecular Evolution of the Cancer-related Her2 Gene (erbb-2)" (Chandrakanth Emani)
Abstract. This study evaluates the molecular biological evolution of the ERBB-2 protein. ERBB-2 dysfunction and over expression was shown to correlate with breast, lung, ovarian and colorectal cancers. ERBB-2, also called HER2, is a transmembrane-glycoprotein with a tyrosine kinase activity and is involved in regulating cell growth and stabilizing peripheral microtubules. The membrane-protein exists in an inactivated state, and when activated forms heterodimers with EGFR receptors in the cell membrane to trigger downstream pathways such as PI3K MAPK, pathways associated with cell division and cell proliferation. Select mutations can increase the expression of the protein or continuously activate the protein in both instances allowing spontaneous formation of heterodimers. In this study FASTA sequences of ERBB-2 were analyzed from a broad scope of life-forms using computational tools. NCBI and EXPASY were used to perform analysis of the protein. PSI-BLAST and phylogenetic trees were used to identify conserved domains and related evolutionary ancestors. Keywords: Cancer, ERBB-2

Ward, Zoe; Keelee Pullum; Greta Morrissette; Ashley, Noah; "Effects of Melatonin Implantation on the Activity Levels of Captive Snow Buntings (Plectrophenax Nivalis)." (Noah Ashley)
In vertebrates, melatonin regulates many components of the circadian rhythm. As the pineal gland produces melatonin as a response to darkness, the organism's location and the time of year dictate melatonin synthesis, which controls the sleep-wake cycle and breeding physiologies. However, locations with latitudes greater than 66.3° North or 66.5° South experience periods of complete 24-hour daylight and 24-hour night in their respective summers and winters, which presents unique problems for the organisms living there. One such organism is the snow bunting (Plectrophenax nivalis), an arctic-breeding songbird. The snow bunting spends its breeding season in the Arctic, where the sun does not set for months at a time. Rather than sleeping throughout the night like birds in lower latitudes, the snow bunting experiences a period of relatively low inactivity – a "quiescent" or "restful" period – from 12 AM to 4 AM. In this study, twelve snow bunting test subjects were implanted with either a melatonin capsule or an empty control capsule, then fitted with movement-tracking accelerometers and observed in an outdoor aviary for the following 48 hours to monitor resulting activity levels. We predict that melatonin treatment will shift and/or prolong the quiescent period in these arctic-adapted songbirds.

Weaver, Hunter; Ashley, Dr. Noah; Turner, Kimberly; "Effects of Glucocorticoids upon Pro-Inflammatory Responses in the Brain to Acute Sleep Fragmentation" (Dr. Noah Ashley)
Fragmented sleep is commonly observed in humans suffering from obstructive sleep apnea (OSA). Sleep regulates immune responses, including inflammatory responses. Using mouse models, we have previously reported that sleep fragmentation (SF) induces an increase in pro-inflammatory gene expression in brain tissue. Glucocorticoids are also released during SF and are considered anti-inflammatory and immunosuppressive at high doses but may stimulate immune function on an acute level. We hypothesized that glucocorticoids are involved in regulating these inflammatory responses during acute SF. To investigate this, C57BL/6J male and female mice were subjected to adrenalectomy (ADX), ADX + Corticosterone, sham-ADX or sham-ADX + Corticosterone, followed by a week of recovery. Mice were then subjected to acute (24 h) SF and thereafter, brain (prefrontal cortex, hippocampus, hypothalamus) tissues were collected. Corticosterone and interleukin-1b (IL-1b) ELISAs were used to assess circulating corticosterone and IL-1b concentrations. RNA was isolated and reverse transcribed into cDNA for RT-PCR to assess pro-inflammatory cytokine gene expression levels in the brain. The results obtained from this study will help identify potential pathways mediating inflammatory responses that could lead to better therapeutic treatments for OSA and other sleep disorders.

Welch, Tess "An Informative Speech Regarding Christianity's Theological Influence on the Social Construction Of Disability: Biblical Stories, Their Modern Impacts, and Implications" (Ganer Newman)
Christianity is one of the modern influences in the social construction of disability. In this research, influences from Biblical stories in both the Old and New Testament were examined to explore how disability is framed. Disability is framed as an impurity, punishment, and vehicle for inspiration. These framings can be traced in modern conversations surrounding

accommodations and cures. Such analysis tracing the theological backing to systems of power is a beneficial advocacy tool and lends itself to the interpretation of biblical passages focused on empowering the disability community.

Whalin, Symone "Liquid Chromatography with Tandem Mass Spectrometry Method Development For The Determination Of β-defensins In Bovine Milk" (Eric Conte)
Bovine mastitis, caused by a wide array of pathogens, results in a substantial economic loss for the dairy cattle livestock industry. β-defensins are a part of bovine's innate immune system and act as the first line of defense against mastitis. Only foundational research has been done on β-defensins' ability to treat and prevent mastitis. There has been no method reported in the literature to analyze β-defensins in bovine milk. Milk is a very complex matrix, a major reason why β-defensins have not been analytically characterized. Thus, preparation (sample clean-up) of raw milk for Liquid Chromatography – Mass Spectrometry analyses using size exclusion and revered phase solid phase extraction was explored. This resulting cleaner sample ensured a reproducible method could be created to detect β-defensins using LCMS. This presentation will discuss the details of the method development process, analysis of resulting mass spectra, and semi-quantitative estimation of concentration of β-defensins in prepared sample fractions. Future research will apply this method to explore if using higher concentrations of β-defensins is an effective treatment for mastitis in dairy cattle.

Wheeler, Kendall; Kambesis, Pat; "Distribution of Sulfur-oxidizing Bacteria And Sulfide Resources In Parker Cave" (Pat Kambesis)
In terrestrial ecosystems, primary production is occupied by plants or photosynthetic microbes. However, many bacteria utilize a sulfur-oxidation metabolism and act as primary producers in their ecosystems. Such bacteria have been observed in Parker Cave in Edmonson County, Kentucky, along with naturally occurring hydrogen sulfide. It is speculated these bacteria act as primary producers in this ecosystem, but evidence is insufficient. It is hypothesized when mapped, sulfide resources in the cave system will show correlation with communities of sulfur-oxidizing bacteria. Specifically, analyzing Parker Cave and its proximity to oil wells and deep-water wells could lead to better understanding of distribution of sulfide resources in the Mammoth Cave area and its effect on microbial communities. This study will review relevant literature to construct an ArcGIS basemap of the Parker Cave area, including inputs of hydrogen sulfide (oil and water well logs) and populations of sulfur-oxidizing bacteria. A positive correlation between sulfur levels and sulfur-oxidizing bacteria is anticipated. At present, it is not known whether sulfur-oxidizing bacteria play a major role in primary production within Parker Cave. However, such bacteria occur throughout the Mammoth Cave area, so research may further illuminate these bacteria's ecological role there.

White, Trevor "Community Center" (Aly Shahnaz)
A community center is a place that is held for gathering with families and friends that gives occupants the opportunity to better themselves in many ways. The community center produces diverse ways to build a better lifestyle for themselves. Located in Miami Fl, the building will provide a fitness center, pool, and a basketball court. The community center will influence form by reflecting its surroundings. Florida is known for the Spanish look, so for my community

center It will have a Spanish architecture look with soaring ceilings. The main objective for the community center is to provide the right spaces for athletes, body builders, etc. Providing these spaces gives them opportunities to improve themselves overall. While physical fitness will be an important goal center of attention for the community, social fitness will be some other center of attention via clubs, day-care centers, foyer social areas, and different possibilities for folks who are searching to end up extra involved. The neighborhood's goal and requirements audiences are huge and will consist of all and sundry that lives in the area, the place it will be constructed due to the fact the possibilities it affords have no restrictions on age, gender, or any different kind of issue.

Willhite, Promise "Relatedness Within Stonefly Species" (Scott Grubbs)
Using sequence variation of the mitochondrial cytochrome C oxidase subunit 1 gene (mtCOI) to assess phylogenetic relationships is occurring with increasing frequency. Stoneflies are a small order of aquatic insects. Although there are several dozen species described as new each year, there have been far fewer studies addressing phylogenetic hypotheses. GenBank and the Barcode of Life Database (BOLD) are the standard, where researchers make mtCOI sequences available. This study obtained mtCOI sequences from BOLD to address phylogenetic questions on the Nearctic Forestfly genus Soyedina Ricker, 1952 (Family Nemouridae). There are 13 species in this genus, with 9 species found largely east and the remaining 4 distributed within western mountain ranges. Sequences of 3 eastern and 2 western species are available in BOLD along with sequences of undetermined species. Two questions were addressed. One, are there two primary clades based on region? Two, can the identity of undetermined species be resolved. The answer to the first question appears to be no. One western species, S. species, served as the outgroup taxon to a well-supported 3-species eastern clade. Regarding question 2, all undetermined species grouped with nodal support. This study forms a foundation to help plan and execute extensive phylogenetic assessment of Soyedina.

Williams, Abigail "Improving Best Management Practices for The Siting, Maintenance, and Design of Urban Karst Groundwater Injection Wells" (Jason Polk)
Class V injection wells in urban karst areas generally lack effective regulation and guidance to prevent sediment and pollutants from entering surface and groundwater supplies. Bowling Green, Kentucky, is home to over 1,500 mapped Class V wells; pollutants can flow unimpeded through these wells, impairing water quality and causing well obstruction. The objective of this study is to determine proper management practices for drilling, maintaining, and closing injection wells by monitoring and analyzing injection well performance in the City of Bowling Green. These data should lead to science-based policy recommendations on Class V injection well implementation and maintenance, which could result in improvements in flood control and stormwater runoff quality.

Wimsatt, Hunter "Classifying Dice Rolls Using Convolutional Neural Networks" (Warren Campbell)
Dice are prevalent in tabletop games around the world. As such, many superstitions and suspicions arise regarding their fairness. The chi square test is often used to test if a die is fair or unfair, but this test is done manually, requiring the tester to roll and gather data around 3,000

times for each die. This project aims to facilitate the process of testing for dice unfairness by creating convolutional neural networks (CNNs) to classify dice rolls by their face up number with the highest accuracy possible. We use CNNs because they are the top technology for image classification in the machine learning industry. Thousands of images were cropped, converted to grayscale, and placed in training and validation folders to train our CNNs. Combined with an automated dice roller, this project would ideally make testing for dice unfairness completely autonomous. Initial results indicate that CNNs are a viable solution.

Wood, Jeffery "Hurricane Irma (2017) Analysis During Initialization, Intensification, and Decay Using Satellite And Radar Data" (Joshua Durkee)
The 2017 Atlantic Hurricane season was an active season that saw a total of seventeen named storms, ten hurricanes (category one - two), and six major hurricanes (categories three – five). One hurricane that made several landfalls and had a somewhat erratic behavior in its final track was Hurricane Irma. Hurricane Irma made its final landfall in the contiguous United States on September 10, 2017 near Marco Island, Florida. Hurricane Irma contributed to approximately fifty-two billion dollars in damages to the United States. Through various satellite and radar analytical techniques, we discovered the primary reasons that Irma had such erratic track behavior before its landfall in Florida as a major hurricane and during its track through Florida. Using the same analytical techniques, we discovered the primary reasons that lead to an explosive intensification period as it approached the Leeward Islands. While the scope of this paper will focus primarily on Hurricane Irma, we also analyzed synoptic conditions of the Atlantic Ocean and found that the 500mb heights were a key factor in Irma's track. We found several factors that contributed to this environmentally friendly environment such as low wind shear profiles, warm ocean water temperatures, little dry air, all of which we were able to discover utilizing satellite and radar analysis.

Xing, Eric "Investigating Motorcycle Safety In Kentucky Using Machine and Deep Learning Techniques" (Kirolos Haleem)
This study aims to analyze the factors affecting motorcycle crash severity outcomes in the state of Kentucky by applying machine learning and deep learning techniques, specifically, the random forest classifier, principal component analysis, and neural networks. Severe motorcycle crashes were the main severity level outcome analyzed in this study and they are defined as those crashes resulting in either serious injury or fatality. Recent five-year motorcycle crash data (2015 to 2019) from Kentucky were used in the analysis. The random forest classifier was applied to rank each feature's importance in influencing serious injury or fatality (i.e., severe) motorcycle crashes. Results from the random forest classifier indicated that crash time, geographic location, roadway condition, motorcyclist age, number and type of vehicles involved, and helmet use were the most important features contributing to severe motorcycle crashes. The principal component analysis produced composite features that were then fed into a neural network model to predict whether or not a crash was indeed severe. The neural network model demonstrated that driver-related (e.g., age), vehicle-related (e.g., number and type of vehicles), and environmental-related factors (e.g., lighting and weather conditions) could successfully predict the motorcycle crash severity with a high degree of accuracy (above 90%).

Yaro, Fatin "Nonprofit Accountability: Effects of Subsector on Online Accountability" (Nicolas Brake)
Scandals within the nonprofit sector over compensation and management have increased calls for nonprofits to demonstrate accountability. Many organizations have responded by disclosing information online and providing tools that allow web-based interactions with stakeholders. The literature on nonprofits' online accountability has found that the level of nonprofit online accountability is affected by their size, age, asset, revenue, and location, but hasn't been examined in terms of how subsector influences online accountability. Through a web-content analysis of fifty-five nonprofits, this research investigated how subsector (arts and culture, education, health, and human services) influences online accountability using a framework of four types of online accountability: financial disclosure, performance disclosure, stakeholder input, and interactive engagement. The findings show that subsectors differ depending on the type of accountability being measured. Except for asset size, previous findings regarding revenue size, personnel size, and location were confirmed. Also, this research found that the arts and culture subsector demonstrated higher online accountability than health nonprofits. Human services nonprofits are more engaged in financial disclosure than organizations in the health subsector. Finally, it was found that as personnel size increases, stakeholder input and interactive engagement increases.

Young, Dawson; Zhao, Qin; "Beliefs About Personality Affect Resilience and Interpersonal Relationships" (Qin Zhao)
Believing that people can change is correlated with reduced aggressive desires (Yeager et al., 2013) and more adaptive responses to social adversity (Schleider & Schroder, 2018). The current study involves both beliefs about others' and one's own personality. It examines if believing that personality can change would yield greater resilience to challenges and more positive inter- and intra-personal relationships. Participants responded to questionnaires about beliefs about personality (both of others and oneself), resilience, and feelings/thoughts/behaviors toward a person who wronged them and toward oneself after recalling an incident of self-offense. The results showed that believing that "I can change" is associated with greater resilience (r =.28; p =.007). Believing that "others can change" is linked to reduced negative feelings (B = -.16; p =.03), reduced negative thoughts (B = -.22; p =.007), reduced negative behaviors (B = -.16; p =.04), and greater forgiveness (B = .25; p =.001) toward the offender, after controlling for factors such as severity of offense, intentionality, and if the offender has apologized. The results are largely in line with the hypothesis. Future research should provide causal evidence for the observed relationships and examine the underlying mechanisms.