Pittsburg State University

Student Research
Abstract Writings
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Sciences and Technology

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Colloquium

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Topical Literature Review

Presenter(s): Taylor Michael, Luke Headings, Christine Brodsky, & Andrew George
Student Status: Undergraduate
Major: Biology
Title: Ecological clines complicate identification of chorus frogs near range boundaries

Abstract:
A north-south clinal gradient has long been recognized in the body proportions of North American trilling chorus frogs (*Pseudacris spp*). Current identification keys and field guides suggest that morphometrics can be used to separate *P*. *maculata* and *P*. *fouquettei*, which occur north and south of Kansas's southern border, respectively. However, these sources are based on the most recent taxonomic revision of *Pseudacris*, which reports averages of morphometric measurements across the entire geographic range of each species. Prior to the reclassification, *P*. *maculata* and *P*. *fouquettei* in Kansas and Oklahoma were considered the same species based on similarity of morphometric measurements. We took morphometric measurements from 40 *P*. *maculata* specimens that were collected in and around southeast Kansas and compared them to values reported by Lemmon et al. (2008). While results varied, tibia length and head size of southeast Kansas specimens were intermediate between published values for the two species. Morphometric measurements alone may be insufficient to distinguish between trilling chorus frogs near the periphery of their range. We suggest that additional specimens be measured to better quantify clinal gradients that may confound species identification.

Presenter(s): Isabelle Villafañe, Austin Abram, John Jameson, & Christine Brodsky
Student Status: Undergraduate
Major: Biology
Title: Human dimensions survey of park visitors at the Southeast Kansas Nature Center

Abstract:
The management of our natural resources is often a complex task, as many actions have direct or indirect human consequences. Not only do natural resource managers have to evaluate species' needs and the quality and availability of habitats, the human dimension of the resource needs to be integrated into planning and management efforts. As our society becomes more diverse, natural resource agencies should understand stakeholder values and behaviors in order to manage the resource in an informed, adaptive manner. In collaboration with the Kansas Department of Wildlife, and Parks (KDWP), we developed a survey to assess the demographics and environmental values of visitors to the Southeast Kansas Nature Center in Galena, KS. The Center and surrounding parkland provide a diverse array of resources to park visitors, threatened and endangered herpetofauna, and rich bird community. Data will be collected by students in the Human Dimensions of Natural Resources Management class at Pittsburg State University. We will use a snowball sampling methodology to distribute an online survey to adult park visitors. We anticipate presenting data on how park visitors found out about the Center, how visitors utilize the park, their interests in the environment, and how they perceive various aspects of nature. Data will be used by the director of the SE KS Nature Center to inform their park management objectives and actions, promotional materials, and relationships with park visitors.

Presenter(s): Lukas Amershek, Ely Parks, Kelsey Reeves, Mathew H. Long, & Jeanne Norton
Student Status: Undergraduate
Major: Plastics Engineering Technology
Title: Optimizing Process Conditions of Immiscible Polymers for 3D Printing Applications

Abstract:
Recently, 3D Printing has become increasingly prevalent within the plastics industry. 3D printing allows for prototypes or short production runs to be rapidly and inexpensively created without the need for intricate tooling. Polylactic acid (PLA) is a commonly-used thermoplastic for 3D printing due to its strength. However, PLA lacks the flexibility and toughness that is desirable in 3D printing applications. The immiscibility of PLA and thermoplastic polyurethane (TPU) pose challenges to processing a consistent filament. Our goal was to successfully blend PLA with a TPU in order to create 3D printer filament with both the strength of PLA and the flexibility and toughness of TPU. It was critical to optimize the filament diameter in the resulting blends in order for the blended filament to be compatible with the 3D printer and produce consistent parts. Extrusion parameters, such as the screw speed, winder settings, and barrel temperatures, were adjusted to achieve a circular filament with a diameter of 1.75 mm (+/- 0.05 mm). PLA and TPU were blended at different ratios and extrusion processing was performed on a Yellow Jacket single-screw extruder in PSU Processing Labs. Filament was subsequently analyzed for thermal, mechanical, and morphological properties. Thermal analysis methods included differential scanning calorimetry (DSC), and thermogravimetric analysis (TGA). Mechanical properties were determined via Instron tensile testing. Morphological analysis was accomplished via scanning electron microscopy (SEM). Filament with properties intermediate to PLA and TPU were successfully produced. Further work will concentrate on producing cylindrical filament, regardless of PLA/TPU ratio.

Presenter(s): Emma Buckardt
Student Status: Graduate
Major: Biology
Title: Landscape Composition affects Anuran Occupancy Patterns on Mined Lands

Abstract:
The loss and fragmentation of habitat has altered amphibian populations across North America. Southeast Kansas's landscape has been dramatically impacted by urbanization, agriculture, and a rich history of coal mining, which has left few native habitats intact. Amphibian populations are varied in these human altered habitats and their distribution could be influenced by landscape composition. Our study aims to assess the connection between Anuran distributions and landscape composition in sites that have been heavily disturbed by strip-mining. We conducted call surveys six times from March 16 to June 12, 2021 at 65 sites throughout Crawford and Cherokee Cos. in southeast Kansas. Nine anuran species were recorded calling throughout the survey area, with naïve occupancy varying from 18% to 100%. Two Species in Need of Conservation were heard: Spring Peepers (*Pseudacris crucifer*) and Crawfish Frog (*Lithobates areolatus*). Results varied by species, but preliminary models suggest that multiple species are positively associated with forest cover and negatively associated with built environments, and that naturally revegetated mined lands are promoting Anuran occupancy in the area. Future analyses will be conducted to support conservation efforts in the area.

Presenter(s): Luke Headings
Student Status: Graduate
Major: Biology
Title: Avian community composition and nest success on strip mined land

Abstract:
The formally mined land of southeast Kansas and southwest Missouri represent a diverse patchwork of ecosystems in varying stage of succession, including grasslands, shrublands, rangeland and forests. The goal of our study is to assess the conservation value of strip-mined land for bird communities. We conducted fixed radius point counts, vegetation sampling, and nest monitoring at 84 locations in Crawford and Cherokee in Kansas and Barton and Jasper counties in Missouri across two years. A total of 75 species were detected, including 14 species of greatest conservation need, as identified in the Kansas Wildlife Action Plan. We also located and monitored 71 nests from three shrub-nesting species, 14% of which fledged young. Preliminary analyses indicate that reclaimed mined land may support similar bird communities to those in adjacent unmined areas. However, it remains unclear if sites dominated by invasive plant species are negatively affecting individual species' presence or nesting success. Ongoing work will continue to evaluate the relationships between mined land habitat and vegetation structure on bird communities, and to inform habitat restoration efforts on mined areas.

Presenter(s): Zachary Palumbo
Student Status: Graduate
Major: Nursing
Title: UNCOVERING THE EDUCATIONAL AND SELF MANAGEMENT NEED IN PEOPLE WITH INFLAMMATORY BOWEL DISEASE

Abstract:
The purpose of the study was to assess the current knowledge of inflammatory bowel disease (IBD), self-management skills, and resources for IBD in people suffering from the condition. Self-management skills and education have been shown, along with medical treatment, to show improvements in symptom activity and overall quality of life (Conley & Redeker, 2016). The study used Orem's Self-Care deficit theory as the theoretical framework. A mixed methods design was chosen for this particular study. The project provided an educational video and a pre and post-survey through email. The questionnaire and pre-test (Appendix A) were given before the education, and Appendix C was given after receiving the education (Appendix B). The information obtained was used to assess the individuals' knowledge and self-management of IBD. Inclusion criteria: participants were 18 years and older, able to read and understand English, and have a diagnosis of Crohn's disease or ulcerative colitis. Exclusion criteria: individuals under the age of 18, not able to read and understand English or does not have a medical diagnosis of Crohn's disease or ulcerative colitis. The study demonstrated that people with IBD are willing to learn more and participate in similar studies. The study concluded that the knowledge over medications and management increased (medications: 28% to 33.6%) with the educational resource. The study demographics were found to be unbiased towards sex, race or disease process. The study also looked at qualitative data providing different resources, and needs wanted by the participants.

Presenter(s): Prasadi Abeysinghe Arachchil, A.A.P.R.Perera, Prashant Kote, Felipe M. De Souza, & Ram K. Gupta
Student Status: Graduate
Major: Chemistry
Title: Flame Retarded Rigid Polyurethane Foams with High Mechanical and Thermal Properties

Abstract:
Due to growing environmental issues, there has been a rising interest in bio-based raw materials for polyurethane production from researchers as well as industry over the past decade. The interest in using castor oil to make rigid polyurethane foam (RPUF) is due to its inedibility, low cost, presence of hydroxyl groups, and carbon-carbon double bonds. In this research, firstly castor oil was modified by converting double bonds into hydroxyl groups to increase its functionality towards isocyanate. The modified castor polyol was characterized through Fourier Transformed infrared spectrum (FTIR), gel permeation chromatography, viscosity, iodine value, and hydroxyl number. The castor oil-based RPUFs were prepared by a one-shot free-forming process with isocyanate, blowing agent, catalyst, surfactant, and flame retardant (triethyl phosphate, TEP). The cellular structure, mechanical, thermal, and flame retardant properties of RPUFs were studied by performing scanning electron microscopy, FTIR, apparent density, compression test, thermogravimetry analysis, horizontal burning test. At the same time, the effect of TEP concentration on RPUF properties was also studied. All the RPUFs maintained a regular cell structure. The RPUFs were lightweight and strong, with a density ranging between 35-40 kg/m3. All the foams showed a closed-cell content of over 90% suggesting their possible applications in thermal insulation. Also, the thermal stability of RPUFs was increased with increasing FR percentage. When 13.2 wt% TEP was incorporated, RPUFs presented a drastic decrease in burning time (57 to 7 seconds) and weight loss from 54% to 7.4%. Our research suggests that a small amount of TEP can significantly reduce the flammability of the castor oil-based RPUFs without much affecting their mechanical properties.

Presenter(s): Michael Daines
Student Status: Graduate
Major: Biology
Title: Distribution of Astragalus amnis-amissi (Fabaceae), a plant endemic to east-central Idaho

Abstract:
Astragalus amnis-amissi (Fabaceae), also known as Lost River milkvetch, is a plant endemic to East-central Idaho for which no published surveys have been completed in the last 17 years. A search of several previously-documented populations in canyons of the Southern Lemhi Range and the Lost River Range, in Butte and Custer Counties, Idaho, documented the species in four canyons. However, it was not relocated in an unnamed canyon in the Southern Lemhi Range, indicating potential extirpation of that population. No new populations of A. amnis-amissi were found.

Presenter(s): Theresa Umscheid & Gena Coomes
Student Status: Graduate
Major: Nursing
Title: IMPROVING VENOUS THROMBOEMBOLISM PROPHYLAXIS KNOWLEDGE AMONG REGISTERED NURSES ON A MEDICAL-SURGICAL INPATIENT UNIT IN THE MIDWEST

Abstract:
Venous thromboembolism (VTE) is the third most common vascular disease and includes approximately 900,000 cases annually in the United States. It is commonly a problem in critical care and surgical patients, although all patients are at risk of experiencing VTE. The purpose of this quality improvement project was to enhance education regarding VTE prophylaxis for registered nurses on a medical-surgical inpatient unit at a hospital in the Midwest. This study was initiated due to one nurse's perception that staff on a medical-surgical unit in a hospital in the Midwest lacked confidence and expertise on the importance of VTE prophylaxis interventions. Participants completed a VTE knowledge pretest, followed by an educational intervention on VTE prophylaxis utilizing Health Stream. After the intervention, participants completed a VTE knowledge post-test. The study had a total of 19 participants and good variability of demographic information. Based on the results, the null hypothesis was rejected. There was a statistically significant difference between the pretest and posttest means ($t= -9.795$, $df=18$, $p<.001$), which was less than the alpha value ($p< .05$). The VTE educational intervention significantly increased the nurses' knowledge about VTE prophylaxis. The nurses gained an average of 28.316% points on the posttest after completing the educational intervention. This supports the hypothesis that the educational intervention increased the nurses' knowledge of VTE prophylaxis. It is imperative that nurses and the health care team recognize the risk and significance of VTE. More staff education regarding VTE prophylaxis can lead to better patient outcomes.

Presenter(s): Haley Price
Student Status: Graduate
Major: Biology
Title: Population monitoring and habitat use of gray bats in southeast Kansas

Abstract:
The gray bat (Myotis grisescens) was listed as federally endangered in 1976 after studies revealed significant population declines due to habitat loss. Mitigation efforts implemented in the 1980s allowed for the recovery of gray bats, but the emergence of white-nose syndrome in North America has left their status poorly understood. The objectives of this project are to examine population dynamics and habitat use of the only known colony of gray bats in Kansas. We surveyed bats in Crawford and Cherokee counties using exit counts, capture-mark-recapture, and acoustic monitoring from May to August, 2020 and 2021. Initial estimates indicate a colony size of 1,512 +518 bats in July and August 2021. Weekly exit counts showed that the colony increased by >400% in size from May to late summer, corresponding with breeding activity. Calls of seven bat species were detected at 32 sites across 64 survey nights. All detected species have been previously documented in the area. Gray bats were detected at 47% of the sites. Statistical models are currently being developed to assess the links between bat occupancy, habitat structure, and food availability.

Presenter(s): Teddy Mageto & Ram K. Gupta
Student Status: Graduate
Major: Department of Physics and Kansas Polymer Research Center
Title: Mechanical Properties of a Carbon Fiber Reinforced Polymer Composite using a Biobased Polyurethane as a Thermosetting Resin

Abstract:
Carbon fiber reinforced polymer composites (CFRPs) are gradually being used to replace metals as structural materials in the aerospace and automobile industries. This is especially the case in applications where lightweight, high strength and high modulus are required. In this research, a biobased polyurethane (PU) was used as a thermosetting resin in a CFRP, and mechanical testing was carried out on the resulting composite material. The biobased PU was synthesized by reacting sunflower oil-derived polyol with isocyanate. Characterization of sunflower oil, epoxidized sunflower oil, and polyol was carried out via FTIR Spectroscopy and GPC. Five CFRPs were then fabricated using different numbers of carbon cloth sheets ranging from 1 to 5. Flexural test data shows modulus of elasticity in bending increases with an increase in the number of carbon cloth sheets used in the composite, with values of 437 GPa, 484 GPa, 631 GPa, 643 GPa, and 782 GPa for composites made from 1, 2, 3, 4, and 5 sheets of carbon cloth. Similarly, the composite hardness values measured via the Shore D hardness test showed an increase with an increase in carbon cloth sheets. Hardness test results showed hardness values of 88D, 89D, 94D for the composites made from 1, 2, and 3 sheets of carbon cloth respectively, and values of greater than 100D for composites made from 4 and 5 sheets of carbon cloth. Our research suggests that biobased polyurethanes could be used to prepare carbon fiber reinforced polymer composites.

Presenter(s): Danielle Bennett
Student Status: Graduate
Major: Nursing
Title: Factors influencing vaccination in children under 2

Abstract:
A large Federally Qualified Health Center (FQHC) in Southeast Kansas has a 36.7% compliance of children completing the recommended combo 10 primary vaccination series before their second birthday. An additional 20% of children would be compliant if the flu vaccine was excluded, raising the compliance rate to 56.7%. This low vaccination rate leaves many children in Southeast Kansas unprotected from preventable childhood diseases. The purpose of this scholarly project was to identify barriers to vaccination, including vaccine hesitancy and socioeconomic barriers affecting completion of the primary vaccine series, or combo 10, in children under age 2 in Southeast Kansas. This descriptive study used a validated questionnaire, the Searching for Hardships and Obstacles to Shots (SHOTS) survey to gather information about parental attitudes toward vaccination and socioeconomic barriers that may be affecting vaccination rates in children under the age of 2 in Southeast Kansas. Concerns about shots was the most problematic for this population (mean 0.70), followed by importance of shots (mean 0.43), then access to shots (mean 0.29). Although concerns about vaccines may contribute to low vaccination rates, demographic data indicate that 77% children are fully vaccinated to the knowledge of the parent/guardian, indicating that parents are not withholding vaccines due to their concerns.

Presenter(s): Kayla Tinsley
Student Status: Graduate
Major: Nursing
Title: PREGNANCY EDUCATION IN RURAL AREAS

Abstract:
Educating of the pregnancy population before, during and after pregnancy can help to ensure a healthy pregnancy and in turn reduce maternal mortality. The purpose of this research project was to understand education provided in the clinic and hospital setting in a rural area by those who take care of and talk to pregnant women and their support persons. A descriptive research design was utilized to discover the important education topics that are discussed, and the routine tests that are done throughout the pregnancy, during labor and at delivery, and even ask how prepared they feel they are equipped to handle high risk situations. There were 20 participants that voluntarily filled out a 21-question questionnaire, including questions on place and county of work as well as longevity at the job. Participants worked as either a M.D., D.O., N.P., R.N., or L.P.N., with the pregnancy population in either the clinic, hospital, or both. Results were then entered into computer software program and found that majority of those who work with a pregnancy population have worked less than five years, and most work in the hospital setting. The participants spent 5-15 minutes educating the pregnant population they interacted with, and majority covered various topics with the patient and provided different means of education. Most of those who were interviewed felt that they were equipped to handle high risk situations if needed. The population used was small, but it shows how prepared staff is to provide education to pregnant women and family.

Presenter(s): Tricia Combs, Isaac Lewis & Alicia Mason Collins
Student Status: Undergraduate
Major: Communication
Title: Finding the Meaning in Memes: The Persuasive Effect of Social Advocacy Through Memetic Communication

Abstract:
Communication with memes, also known as memetic communication, has taken media platforms such as Instagram and Twitter by storm. Today, programs such as ImgFlp and Meme Generator allow these messages to be developed and distributed in a simple and rapid manner. While the diffusion process is said to be complex, memetic communication in itself is regarded as an innovation that can serve as a lens for worldwide events, from politics and social interests to social advocacy. This study aims to analyze the effect of memetic communication from a human rights advocacy standpoint by investigating the influence, relationship, and impact of exposure behind social advocacy memes on general attitudes towards human rights, diffusion intention, and behavioral intentions. For this experiment we developed a series of pro-human rights memes intended to draw attention to the human rights issues taking place in China during the time of the 2022 Beijing Olympics. Using MTurk by Cloudbase Software we recruited participants into an online experiment hosted by the Pittsburg State Communication Research Lab. Survey measures included issue importance, general attitude, media consumption, perceived message sensation value, perceived message cognitive value, information processing style, and behavioral intentions. All materials and measures were approved by the Pittsburg State Institutional Review Board. At the time of abstract submission, data analysis is ongoing and a detailed presentation of results will be delivered orally at the 2022 Spring PSU Research Colloquium.

Presenter(s): Bailey Yoakam
Student Status: Undergraduate
Major: Economics
Title: Determinants of Metropolitan Area Gross Domestic Product

Abstract:
According to the U.S. Census Bureau, about 80.7 percent of the entire U.S. population currently resides in urban areas (2021). This study seeks to identify those factors that help determine whether large metro areas are in fact growing economically due to the natural attraction to the city life. This study will look at the Kansas City metropolitan area which incorporates both the Kansas and Missouri sides of the city. This study also defines which factors are most likely to have the strongest relationship with the economic growth of the city. The methodology for this study includes a time series regression analysis from 2001-2020 that utilizes ordinary least squares to measure the impacts of incomes, wages, population, unemployment, and various industry employments on the gross domestic product for the Kansas City metropolitan area. Studying these factors can help understand why cites are growing, and which factors most affect economic growth for metropolitan areas.

Presenter(s): Christopher Burg
Student Status: Undergraduate
Major: Business Economics
Title: Micropolitan Population Determinants

Abstract:
Micropolitan areas are a relatively new classification of an urban area determined as an urban area with between 10,000 and 50,000 inhabitants. Prior research has investigated population growth of these communities, determining amenity attractiveness to be a large determinant. The goal of the research was to determine how to increase migration to micropolitan areas and better understand the recent trend of migration from metropolitan areas to micropolitan areas. The statistical software EViews was used to perform a Huber-White-Hinkley regression analysis and to correct for heteroskedasticity within the model. The regression model estimated the correlation between the population increase from 2000 to 2010 and demographic, economic, and amenity-based variables provided in the 2000 census. The number of births per 1000 people was used to control for any non-migration-based increases in population. Results indicated demographics for a micropolitan area to experience an increase in migration were less 25- to 49-year-olds with only a high school education, and more married couples and persons of African American descent. The economic characteristics for a micropolitan area to experience an increase in migration are plenty of jobs, lower wages, less manufacturing employment, and low government spending. The amenity characteristics for a micropolitan area to experience an increase in migration are plenty of natural amenities and a short drive to the next city.

Presenter(s): Noah Larson
Student Status: Undergraduate
Major: HPASS
Title: Black Student Movement at Pitt State: Racial Progress in the Post-Civil Rights Era

Abstract:
The black student movement at Pittsburg State University, 1967-1978, highlights academic reform within the understudied era of the post-civil rights era. When writing his book, black campus movement historian, Dr. Ibram X. Kendi, used Pittsburg State University's movement to show how white campus culture resisted black students' integration on campus to reflect upon our current political climate. This begs the question, how did the Black Student Movement change campus culture at Pitt State, and what was that change's legacy? While most Americans often think that today's racial equality standards are based within the civil rights era, most activists and historians are quick to correct this myth as most if not all are based on the post-civil rights era, if not more specifically the black student movement. Such modern-day staples as critical race theory, equity over equality, and the black lives matter movement have roots dating back to this movement and their young people in education in general. The post-civil-civil rights era, the universities within the state of Kansas unified to act in what is deemed the era of inclusion. Pittsburg State University implemented African studies, black history week, offices of student diversity, and all-around inclusivity within their campuses to influence academia during the black power movement. Through studying the relationship of the Black Student Movement at Pitt State, we can not only understand better understand how our Academic has improved its own racial inclusion programs, but also how it still has a long way to go.

Presenter(s): Benjamin Watkins
Student Status: Graduate
Major: Economics
Title: Wage Determinants in the United States

Abstract:
The purpose of this study is to find what wage factors play a part in determining wages across the United States. Wages are very important to the work force when it comes to an increasing standard of living in America. Employee's that are satisfied with their wages will be more productive and have better quality of work. This also decreased the turnover rate for companies in the U.S. which is beneficial to employers. The study analyzed average wages, CPI (Consumer Price Index), productivity, government expenditure on education, and union affiliation from 2001-2021, using data from the U.S. Bureau of Labor Statistics and FRED (Federal Reserve Economic Data). I then used a regression software called EViews to run a times series regression. Annual average wages in all industries across the United States was my dependent variable in this study. Once I ran the regression model it resulted in being significant and causing a positive correlation to wages.
Key words: Wage determinants, United States, and productivity

Presenter(s): Andrew Meinert
Student Status: Undergraduate
Major: School of Business
Title: The Effects of Socio-Economic Factors on Crime Rates

Abstract:
The Growing rise of income inequality within the United States has spawned an increase in economic instability causing individuals and their families, particularly of lower classes, to find themselves in ever more desperate situations to provide a suitable living standard. Such stressors, while not limited to them, can often serve as key motivation for justifying irrational behavior in the way of commiting crime. Previous research regarding this topic has analyzed criminological theory to better understand the human rationale for committing crime that could help to identify which socio-economic factors may act as primary motivating factors for doing so. Prior research has also utilized cross sectional and times series analysis in attempting to determine the existence of a predictable relationship between varying socio-economic factors within identified communities and their propensity to commit crime. We use data provided by the US Census Bureau, US Department of Commerce, and official FBI statistics in order to decompose the possible relationship between a set list of socio-economic factors and the rate at which crime is committed within major metropolitan areas within the United States from 2005 to 2019. Our findings suggest that major metropolitan areas within the United States with rising factors of income inequality, poverty, and low educational attainment saw a predictable corresponding rise in propensities to commit crime within their same respective communities. Having a predictable understanding as to the factors that contribute to increasing crime rates can help lawmakers in shaping policies aimed at better improving their standards of living.

Presenter(s): Jacob Burns
Student Status: Undergraduate
Major: Kelce Undergraduate School of Business
Title: Economic Determinants of Increasing Restaurant Sales

Abstract:
Restaurants are a ubiquitous aspect of American culture, but although the restaurant landscape has gone through several changes over the years, one fact always remained: people eat the vast majority of meals at home. Recently though, this may not be the case. According to a publication by the Federal Reserve Bank of St. Louis in 2020, restaurant spending has caught up to spending on groceries (both adjusted for prices) over the last 30 years. The purpose of this research is to better understand this trend by examining the relationship between US restaurant sales and a vector of economic and demographic factors. Using Ordinary Least Squares, a regression analysis was conducted on a combination of Federal Reserve, Census and OECD data. This time-series dataset covers the period of 1992 to 2019 and includes annually measured, nationwide variables. The results of the regression show that real personal disposable income and average household size have a positive relationship with restaurant sales. The results also show negative relationships between restaurant sales and SNAP expenditure, unemployment rate, average hours worked, employment level of women, and educational attainment. Each of these relationships are statistically significant at 1% except for women's employment level which is significant at 10%. These findings suggest that the increase in restaurant sales over the last 30 years has largely been driven by increases in real personal disposable income.

Presenter(s): Devon Nugent
Student Status: Undergraduate
Major: Economics
Title: Determinants of Housing Prices

Abstract:
Year after year the cost of housing prices has been increasing, sometimes at a pace faster than wages can keep up and this is apparent across America. Some certain geographical areas within the United States have seen an above average increase in the prices of homes in recent years. This has led to various issues that need to be addressed. This topic has been studied thoroughly and while economists pay close attention to prices of houses as an indicator for the economy, it has shown to be difficult to accurately conclude what specific causality(s) are involved in the fluctuation of housing prices. The purpose of this study is to explore multiple different variables and attempt to find determinants that affect the prices of homes on a more consistent and accurate basis and expand the knowledge available on this subject. With the use of the statistical program EViews, a pooled regression analysis was conducted using available data collect from the U.S Census Bureau that examined multiple variables from all 50 states. Then the 50 states were divided into 4 regional categories bases on geographical locations. Due to the size of the U.S, what may be a determinant in one region may not be the case in another. Overall, it was shown that some of the variables studied were significant but not substantial enough to make a meaningful impact on the price of houses in some regions.

Presenter(s): Cooper Brown
Student Status: Undergraduate
Major: Business Economics and Marketing
Title: Determinants of Total Firearm-Related Deaths in the United States in 2021

Abstract:
This study examines which economic/social factors contribute most to the total firearm-related deaths in the United States in 2021. My goal is to determine if there is a deeper reason for why these firearm-related deaths are occurring. Researchers in the past have speculated that implementing strict gun laws and initiating more background checks will decrease the total firearm-related deaths in the United States, but I would challenge that statement. Based on my research, it can be concluded that the unemployment rate is a very important economic/social factor due to its impact on the total firearm-related deaths in the United States in 2021. Ironically, when the unemployment rate increases, the number of total firearm-related deaths decreases – i.e., when fewer people are working, the number of firearm-related deaths decreases.

Presenter(s): Emerson Tice, Tanner Glenn, Brooklyn Peterson & Alicia Mason Collins
Student Status: Graduate
Major: Communication
Title: Facilitating Resistance to the Persuasive Influence of Conspiracy Theories

Abstract:
Conspiracy theories are popular. Research suggests half the U.S. population believes at least one (Oliver & Wood 2014). Studies reveal that some individuals tend to be general, rather than specific, conspiracy theorists; meaning that if they believe in one theory then they are more likely to believe in others (Byford, 2011). At the time of this project the U.S. Department of Homeland Security issued the following statement: “The United States remains in a heightened threat environment fueled by an online environment filled with false misleading narratives, conspiracy theories, and other forms of mis- dis- and mal-information introduced and/or amplified by foreign and domestic threat actors.” It is not just the U.S. government concerned. Extant literature indicates that susceptibility to conspiracy theories may result in severe, negative consequences both psychologically and socially. The aim of this study is to determine if a broad-based inoculation message strategy will undermine the persuasive influence of conspiracy theories. In order to do so, a 2-Phase Information Processing Study was developed using experimental methods with a repeated measures research design using quantitative analysis techniques. Research subjects completed an online Qualtrics survey hosted by the Pittsburg State University - Communication Research Lab (CRL). At the time of abstract submission data collection is ongoing; results and analysis will be provided at the time of oral presentation.

Presenter(s): Amanda Trout
Student Status: Undergraduate
Major: English and Modern Languages
Title: Decálogo del formalista (The Ten Commandments of the Formalist): A Micro-Chapbook

Abstract:
This project consists of a series of Spanish-language poems inspired by the writings, ideas, and tropes of famous hispanic authors. The title poem, "Decálogo del formalista," or "The Ten Commandments of the Formalist," sets the stage for the collection as a whole through its connection to Horacio Quiroga's "Decálogo del perfecto cuentista" (Decalogue of the Perfect Storyteller), as well as its contemplation of what it means to be a formal poet. The rest of the collection's poems follow the guidelines presented by the decalogue with their construction, exploring themes ranging from hidden anger to societal pressure to the vagabond nature of stories themselves. While the original project was completed in Spanish, each poem has been presented in a dual-language format (Spanish and English) to allow for ease of comprehension and to exemplify translation technique.

Presenter(s): Ellen Davis
Student Status: Graduate
Major: English
Title: Bird Brain: The Unconscious and Conscious use of Aviary Symbolism in Literature

Abstract:
After writing my thesis, I discovered each work utilized birds as a central symbol. I had not consciously chosen to do this, and their appearance prompted me to analyze their function within my work, as well as to conduct outside research on their expansive symbolism in classic and contemporary fiction. Birds are used universally and often represent two seemingly opposing ideas: freedom and captivity, life and death, war and peace. Birds are also thought of as spiritual messengers of omens good and bad. In my own collection, which focuses on natural and unnatural death, and thus the physical and the spiritual world, birds were often intrinsically linked with a living character contemplating a supernatural or literal afterlife. Shooting pigeons is the last task a dying father gives his resistant son in “Pigeons,” animated geese are the imaginary antagonist of a character contemplating hell after a friend’s suicide in “Dear Friend,” and a cooked goose is the personification of a man discovering his son is not biologically his in “Beloved Goose.” This symbolic and unconscious use of birds helped my work navigate between abstractions of life and death, love and grief, and the natural and supernatural world.

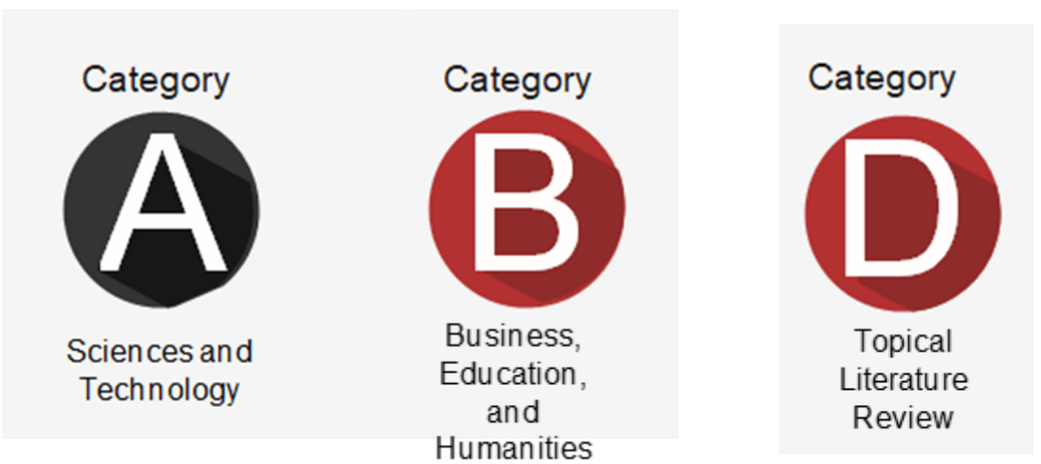
Presenter(s): Alexis Melson
Student Status: Graduate
Major: English
Title: Teaching the "Write" Form

Abstract:
Entry level creative writing workshops are stepping-stones for many writers as they learn about the short story and most common among those experiences is genre fiction. Students come to these workshops with diverse experiences with reading and writing fiction, and most common among those experiences is genre fiction. Intro level fiction writers are writing what they've been reading, which makes sense, however, in the creative writing workshop, they are often taught to write literary fiction which can be frustrating for writers who do not have the basic knowledge of literary fiction and to this point have only been exposed to genre fiction. This presentation aims to make use of both genre and literary fiction in a two-story workshop class wherein the first story may contain limited elements of genre while the second story would be literary in nature. By allowing students to use genre fiction as a stepping-stone into literary fiction, professors would be encouraging students to see the benefits to both types of fiction within the class and beyond.

Presenter(s): Jillian Sinosa
Student Status: Undergraduate
Major: Nursing
Title: The Use of Clubhouses as an Alternative to In-Patient Psychiatric Hospitals

Abstract:
In attempt to decrease national disparities and to help Americans with serious mental illnesses access care, clubhouses such as Fountain House need to be made more accessible to patients. By doing so, this may also reduce the rate at which those with serious and chronic mental illnesses cycle through the streets, shelters, emergency rooms, and jails. Ineffective and costly approaches to mental health care in this generation and generations prior, have taken away the integrity, dignity, and humanity of these patients. It is Fountain House's aspiration to close these gaps and provide holistic and realistic care. They achieve this by being nonprofit, providing jobs, and creating programs such as "College Re-Entry" and "Social Practice." Social Practice was especially pioneered by this organization and helps individuals learn new skills, to hone their talent, build dignity, develop a sense of belonging, and make progress towards their goal. Systematic barriers will also be addressed by advocates participating to shape a national mental health policy agenda. This organization does admit patients, send them off, and label them as "frequent flyers" upon return. Fountain House takes care of the individual as a whole, treats each member as family, and sets them up for success.

Poster Presentations



Presenter(s): Jeanne Norton, Hadley Cole, Ryan Dziadula, Connor Pope, McCormick Snyder, William Virtue, Shianne Zillifro & Paul Herring
Student Status: Undergraduate
Major: Plastics Engineering Technology
Title: Installation of Upgraded Extrusion Equipment in the Plastics Engineering Technology Processing Lab

Abstract:
One of the largest sectors of plastics manufacturing uses machines called extruders to melt, mix, and pump polymers through a variety of equipment creating blended materials, film, sheet, pipe and other products. In order to stay current with developing technologies, PSU started to replace outdated equipment with state-of-the-art extruders in 2021. Additionally, the PET program is expanding capabilities in compounding and plastic film production. We purchased the following equipment: twin-screw extruder, single-screw extruder, water bath, haul-off puller, vacuum sizing tank, blown film tower, and cast film line with 300 mm coat hanger flat die. Our team used different grades of polyethylene to test the equipment. Our goal was to install equipment, prove equipment functionality, and create work instructions for the processing labs. Each team member was assigned a piece of equipment and studied product documentation, prepared their machine for startup, successfully started their machine, and tuned the equipment once started. Once electricity was live to the extruders, we performed a heat soak and purged material. We addressed issues including blown fuses for heaters, bad thermocouples, and motors turning backwards, and are working toward proving each production line. Proving equipment is accomplished by attempting production on each new line. Attempting a product includes initial attempts, troubleshooting, recording process errors, implementing changes, and attempting production again with changes until an optimal product is created. Once the new extrusion equipment is running properly, we will continue consistent production and create work instructions to be used in the processing labs.

Presenter(s): Paul Worsley
Student Status: Undergraduate
Major: Chemistry
Title: New Biodegradable Polymer-Derived Precision Nanomedicine for Targeted Drug Delivery and Treatment of Prostate Cancer

Abstract:
Aliphatic polyester polymers are suitable for delivering cancer therapeutics for targeted treatment. Herein, we synthesized a linear, biodegradable polyester polymer using polyethylene glycol-300, sorbitol, glutaric acid and 4-pentynoic acid as monomers. The synthesis was carried out using standard melt polymerization technique and catalyzed by Novozyme-435, an enzyme that is more environmentally friendly than traditional organic catalysts. Therapeutic agents and optical imaging dyes were encapsulated by the polymer during the formulation of water-dispersible nanoparticles via solvent diffusion method. The surface functional alkyne groups were used to conjugate folic acid using “click” chemistry for targeted delivery to tumors over-expressing folate receptors. The efficacy of this nanomedicine delivery system was gauged by targeting prostate cancer cells. The results were analyzed by cytotoxicity (MTT) assays, drug release studies, and fluorescence microscopy and the results will be summarized in this presentation.

Presenter(s): Jonathan Spickelmier
Student Status: Undergraduate
Major: Geography
Title: Using GIS to map M.O.F.E.P bird species nests

Abstract:
M.O.F.E.P (Missouri Ozark Forest Ecosystem Project) is a 100 yearlong study that started in 1991 aiming to investigate the long-term effects of logging on forest ecosystem dynamics. A key pillar of the MOFEP project is the Interior bird study which has the objective to "quantify the effects of even-age, uneven-age, and no forest management on the species composition, density, and reproductive success of forest songbirds". Because of its long-term nature, the early years of the MOFEP bird project saw data collection occurring manually using paper datasheets. Throughout the years much of the data has been digitized in parts or chunks depending on the study and research the data pertains to. One significant area that had been neglected in this digitization effort is the geographic location data for where nests were observed. Recent data collection seasons have employed handheld GPS devices to record nest locations on the spot to mitigate this issue, but there still existed a large dataset without digitally usable location data. Using ArcGIS mapping software, I was able to digitize almost 20 years of nest location data for analysis. This process required the development of automated workflows within ArcGIS as well as careful interpretation of the raw data physically recorded throughout the years. The result of this undertaking that spatial analysis of bird nest locations is now possible using modern software and research methods. Digitized locations from these early years means future data collected can combine with them to create a continuous source of long-term ecology data.

Presenter(s): Sydney Nippoldt, Hallee Belgum, Cassady Utley, Ayushee Dasgupta & Anuradha Ghosh
Student Status: Undergraduate
Major: Biology
Title: Prevalence of ticks and tick-borne pathogens in mined land areas of southeast Kansas

Abstract:
Ticks serve as vectors for many disease-causing pathogens, particularly bacterial and rickettsial pathogens. Diseases such as Lyme, Anaplasmosis, Ehrlichiosis, Rickettsiosis, Rocky Mountain Spotted Fever, and Tularemia can result after bitten by ticks. These tick-borne diseases are more common in the Great Plains region than is recognized. The present study aimed to conduct a three-year long surveillance on various tick species in the mined land area in Cherokee County (KS) using dry ice bait as well as flag-drag technique. Over several visits (June 2020 – November 2021) to the collection site, ticks were collected using both trapping methods. Detailed environmental data was also collected during each visit on-site. The collected ticks were brought to the lab in vials kept in ice-cooler and differentiated by species, sex, and life stage in the laboratory using a dissectoscope. A total of 727 adults and nymphs as well as 112 larvae were collected from both woodland and grassland areas. The majority of which were identified as Amblyomma americanum (93.5%; Males-145, Females-169, Nymphs-366) followed by Dermacentor variabilis (6.5%; Males-25, Females-22). Pathogen testing on these ticks will be carried out by our collaborator at Oklahoma State University. This long-term ecological study will help better understand the variations in tick-pathogen prevalence influenced by various environmental parameters and thus appropriate management programs can be implemented to reduce the risk for human/animal diseases.

Presenter(s): Carlos Palestino, Kelsey Reeves, Garrett Schick, Matthew H. Long & Jeanne Norton
Student Status: Undergraduate
Major: Plastics Engineering Technology
Title: Characterizing Elastomeric Properties of Immiscible Polymers for 3D- Printing Applications

Abstract:
Recently, 3D Printing has become increasingly prevalent within the plastics industry. 3D printing allows for prototypes or short production runs to be rapidly and inexpensively created without the need for intricate tooling. Polylactic acid (PLA) is a commonly used thermoplastic for 3D printing due to its strength. However, PLA lacks flexibility and toughness that is desirable in 3D printing applications. The immiscibility of PLA and TPU pose challenges to processing a consistent filament. Our goal was to successfully blend PLA with a thermoplastic polyurethane (TPU) in order to create 3D printer filament with both the strength PLA and the flexibility and toughness of TPU. This study focused on analyzing the transition between thermoplastic behavior and elastomeric behavior with greater TPU incorporation. In prior studies, filament modulus and glass transition temperatures shifted to values similar to TPU elastomers above 50% TPU incorporation. PLA and TPU were blended at different blend ratios to study this plastic-to-elastic transition in depth. Extrusion processing was performed on a Yellow Jacket single-screw extruder in PSU Processing Labs. Thermal analysis was accomplished via thermogravimetric analysis (TGA), to determine onset of degradation, and differential scanning calorimetry (DSC) to determine the glass transition temperature. Mechanical properties determined by tensile testing demonstrated a change in strength and flexibility with TPU incorporation. Blend morphology was analyzed by scanning electron microscopy (SEM). Filament was successfully extruded, and the properties of TPU-containing filament suggest significant mixing of PLA and TPU, despite immiscibility. Further work will investigate other processing methods, like twin-screw extrusion.

Presenter(s): Kaedra Brenner, Connor Adams, Tabitha Claeys, Autumn England, Tucker Haynes, Mitchell Light, Dan Spielbusch & Jeanne Norton
Student Status: Undergraduate
Major: Plastics Engineering Technology
Title: Improved Clothes Hanger Mold Design for the Engel Injection Molder

Abstract:
The Department of Engineering Technology at Pittsburg State University continues to stand out among other universities through the increased level of hands-on learning experiences incorporated into the curriculum. Plastics Engineering Technology (PET) requires students to work with injection molding machines among other processing equipment. Our senior project team was tasked with completing the design and production processes of a new product mold (a clothes hanger) for use in the Engel Injection Molding machine. The initial steps in the project included gathering different shapes and types of hangers to understand major differences and determine criteria of our product. The maximum capabilities of the Engel were taken into consideration during the process of hanger design. The use of SolidWorks and 3D printing allowed our team to visualize the design progress. Multiple calculations, inspections, and simulations were conducted to decide the ideal hanger shape, injection locations, ejector pin locations, and other aspects of the mold base. Our team was able to utilize the program SigmaSoft to complete these simulations. Our mold base was generously donated by Detroit Mold Engineering (DME), allowing our group to continue development of the final product by machining the mold base with the help of the Department of Manufacturing Engineering Technology. Our team will injection mold clothes hangers using the new mold base. With the help of the Department of Graphics and Imaging Technology, we will create clothes hanger packaging for the PSU Admissions Office to use as recruitment giveaways for prospective students.

Presenter(s): Blake Hansen
Student Status: Graduate
Major: Biology
Title: Lack of high-quality nurseries is not just a human problem: nonnative fish densities in backwater nurseries of the San Juan River, NM, CO, UT

Abstract:
The Razorback Sucker (Xyrauchen texanus) and Colorado Pikeminnow (Ptychocheilus lucius) are federally-endangered species occurring in the San Juan River of NM, CO, and UT. These species have shown little natural recruitment in this system, with a lack of high-quality nursery habitats being one potential explanation for this phenomenon. The young-of-year of both species prefer backwaters, including those that form in secondary channels or in association with islands. Unfortunately, many nonnative fishes that compete with and prey upon these imperiled species also reside in backwaters. However, it is unknown how nonnative fish densities vary between secondary channel and island backwaters during the critical post-spawning window of July-September, so we compared nonnative fish densities between the two backwater types across 20 sites (i.e., 10 of each type) sampled during five sampling occasions in 2021. Overall nonnative fish density was 53% greater in secondary channel compared to island backwaters, as nonnative fish density was greater in secondary channel backwaters in all but the first sample trip in mid-July. Our results suggested that secondary channels may be poorer nursery habitat for imperiled natives compared to islands because of their greater nonnative densities, which has implications for environmental flows management that can manipulate backwater availability.

Presenter(s): Jonghyun Choi, Madeline E. Ellis, Anjali Gupta, Cassia A. Allison & Ram K. Gupta
Student Status: Graduate
Major: Kansas Polymer Research Center
Title: Metal-Oxide Frameworks-based Cobalt Oxides as Efficient Electrocatalysts

Abstract:
Green energy production via cost-effective ways is one of the main requirements in current days. Hydrogen as a green fuel source is very attractive for a sustainable future as hydrogen is considered a zero-carbon emission fuel. Hydrogen can be produced via many routes. Among many approaches, hydrogen generation via water splitting is one of the greenest ways to get green fuel. In most cases, hydrogen production via water splitting requires efficient electrocatalysts to reduce the overpotential (extra cost) of this process. Platinum and rare-earth-based materials are considered efficient electrocatalysts, however, their high cost is one of the limiting factors. process. In this work, metal oxide framework-based cobalt oxides were synthesized and used as efficient electrocatalysts for water splitting applications. The nanostructured MOF-based cobalt oxides were prepared using a facile method that can be easily adapted for commercial applications. The samples were hoghly porous with a high surface area which acted as active sites for electrocatalytic activities. The materials' properties were tuned by calcining the samples at various temperatures. These materials showed low overpotential in the range of 75 to 137 mV to achieve a current density of 10 mA/cm2 for hydrogen production. Depending on the growth conditions, these materials required an overpotential in the range of 370 to 440 mV for oxygen production. These materials showed stable performance for up to 1,000 cycles of cyclic voltammetric studies suggesting possible commercial applications in fuel cell technology.

Presenter(s): Shiva Bardhwaj, Prashant Kote & Dr. Ram K. Gupta
Student Status: Graduate
Major: Department of Physics and Kansas Polymer Research Center
Title: Electrochemical properties of MOF-derived nickel compounds for high performance supercapacitor and electrocatalysts

Abstract:
There are many different ways that energy is used in daily life. From applications that require a high energy density to long-term storage in a stable manner, the requirements for energy usage are diverse. Therefore, the greater the number of uses a designed material exhibit, the more practical it may be for wide-scale manufacture. An emerging class of functional porous materials referred to as metal-organic framework (MOF) has received considerable attention over the past two decades, partially because of their potential use in a wide variety of applications, including gas storage, molecular separations, water splitting, and supercapacitor devices. In addition, an electrode material with high performance as an essential part is highly desirable for supercapacitors. Herein, we synthesize the nickel-MOF (Ni-MIL-77) via an in-situ synthesis route using glutaric acid in a hydrothermal process at different temperatures @ 140, 160, and 180 °C. As an electrocatalyst for hydrogen evolution reaction (HER), Ni-MIL-77@140 displayed the lowest overpotential of 126 mV. On the other hand, Ni-MIL-77@160 showed the lowest overpotential of 330 mV among all samples for oxygen evolution reactions (OER). In terms of energy storage, the Ni-MIL-77@160 had the highest specific capacitance of 603 F/g at a current density of 1 A/g with an energy density of 25 W-h/kg and power density of 272 W/kg. This works offers the facile way to rationally design and synthesize the MOF-based electrodes for powerful and stable supercapacitor and also the efficient way for water splitting.

Presenter(s): Ram Krishna Gupta, Prashant Kote & Sahilkumar Chaudhary
Student Status: Graduate
Major: Chemistry
Title: Bio-based coating of modified limonene via UV light technology

Abstract:
Coating industries expanded the use of petroleum-based commodities for better coating properties, which is rising the pollution concern. In this research, bio-based material such as limonene was used to deplete the usage of petroleum raw-material for coating. Limonene-polyol was prepared through a thiol-ene reaction and then methacrylate with methacrylic anhydride via esterification reaction to proceed further for UV curing formulation. As per FT-IR examination, hydroxyl functional groups held by the structure of limonene were transfigured into the corresponding methacrylate and by analysis of C=C peak after curing, cure percentage was noticed near to 92%. The methacrylated limonene-polyol was formulated for UV curing through the addition of a photoinitiator and an alternate measure of cross-linker, where this combination was applied to a steel surface and relieved under UV light to give a cross-linked formation, which gives solid surface grip and scratch-resistant coating. The coated material was also characterized by FT-IR, thermal, tensile, flexural test whereas results give strong tensile strength about 79 MPa by increasing the 30% of the amount of methacrylated limonene-polyol and banding modulus (flexural) observed 38 GPa. Alter the amount of methacrylated limonene-polyol was also tested. This research presents a convenient synthesis procedure for coating applications by using bio-based material at a lower cost.

Presenter(s): Jonghyun Choi, Anjali Gupta, Cassia A. Allison, Madeline E. Ellis & Ram K. Gupta
Student Status: Graduate
Major: Kansas Polymer Research Center
Title: Effect of calcination on the energy storage capacity metal-organic framework-derived cobalt oxides

Abstract:
High-performance energy storage devices are much needed to meet the growing energy demand. Growing populations, use of smart devices, and increasing demand for electric vehicles are some of the energy-demanding factors. Batteries and supercapacitors are some of the high-performance devices which can meet the growing demand for portable energy. These devices should provide high energy density, long cycle life, improved safety, and eco-friendliness. Supercapacitors are attracting considerable attention due to many characteristics such as high energy and power density with significantly high cycle life. However, to meet the current energy demand, their energy storage capacity has to be improved. In this work, many cobalt oxides-based nanomaterials were synthesized using metal-organic frameworks (MOF). The MOF-derived cobalt oxides provided tunable surface area and porosity. The electrochemical properties of these materials were tuned by calcining these samples at various temperatures which affected their morphology, crystallinity, and surface area. These changes largely affected the electrochemical properties of these materials and thus the energy storage capacity. The electrochemical properties of the synthesized materials were studied using cyclic voltammetry, galvanostatic charge-discharge, and electrochemical impedance spectroscopy. The energy storage capacity of these materials was in the range of 41 to 203 F/g depending on the growth conditions. The energy storage capacity of these materials was increased from 2 Wh/kg to about 9 Wh/kg. This study suggests that facile approaches such as simple calcination could significantly improve the electrochemical properties of MOF-derived cobalt oxide materials and could be used as electrode materials in supercapacitor devices.

Presenter(s): Danielle Evilsizor
Student Status: Graduate
Major: Biology
Title: Preliminary Insights into the Demography of Ozark Chinquapin in Roaring River State Park

Abstract:
The tree species known as Ozark chinquapin (Castanea ozarkensis Ashe) is centralized in the Interior Highlands with outlying populations in Louisiana, Mississippi, and Alabama (Kartez 2015). Like other members of the chestnut genus, the Ozark chinquapin has been impacted by the invasive chestnut blight (Cryphonectria parasitica). By the 1950s, C. parasitica had spread to the Interior Highlands, infecting Castanea ozarkensis (Paillet and Cerny, 2012). Despite its genetic diversity and ecological importance, little is known at a fine ecological scale about the status of Castanea ozarkensis on the Ozark Plateau and in Missouri, where it is classified as a state imperiled species (Missouri Natural Heritage Program, 2021). During the summer of 2021, Roaring River State Park was surveyed using the intelligent meandering technique and the locations of 987 chinquapin trees were recorded and the trees flagged. These coordinates, along with variables of elevation, slope, and aspect, are being analyzed to more fully document in detail its demography in Roaring River State Park. During the next field season, the effect and spread of chestnut blight will be evaluated throughout the park. This project will update conservation agencies on its habitat, health, and population numbers and will contribute to future conservation efforts of the Ozark chinquapin.

Presenter(s): Jonghyun Choi, Kinsey Morey & Ram K. Gupta
Student Status: Graduate
Major: Chemistry
Title: Copper-molybdenum sulfide and phosphide electrodes for superior energy storage and conversion

Abstract:
Ternary transition metal sulfide (TTMS) and ternary transition metal phosphide (TTMP) based materials have received great attention as materials for energy storage and generation devices due to several advantages, such as high electrical conductivity, abundant active sites, and synergetic effects between each transition metal. In this project, the copper-molybdenum sulfide and phosphide materials were designed via facile hydrothermal technique and successive hydrothermal and phosphatization methods, respectively. The copper-molybdenum sulfide and phosphide have cotton-like morphology and each electrode showed high electrochemical energy storage and conversion properties. The electrodes displayed high areal-specific capacitance of 3.5 and 5.2 F/cm2 at the current density of 3 mA/cm2. In addition, compared to the first cycle performance, the electrodes exhibited specific capacitance retention of 86.9 and 69.4 % with ~ 100% coulombic efficiency after 4,000 cycles. Moreover, the copper-molybdenum sulfide and phosphide electrodes showed superior catalytic activities and stability towards overall water splitting. Each electrode required the low HER overpotential of 207 mV and 147 mV at 10 mA/cm2 and showed the Tafel slope of 118 and 109 mV/dec, respectively. Furthermore, to obtain the current density of 10 mA/cm2, OER overpotential of 270 mV and 213 mV was necessary, along with a Tafel slope of 82 and 48 mV/dec. Also, the excellent catalytic performance of all electrodes was observed by the comparison of 1st vs 1k activity and 40 hours chronoamperometry measurements. Based on the electrochemical performance, copper-molybdenum sulfide and phosphide can be effective materials for superior energy storage and conversion.

Presenter(s): Magdalene A. Asare, Prashant Kote, Sahilkumar Chaudhary & Ram Krishna Gupta
Student Status: Graduate
Major: Chemistry
Title: Bio-based polyurethanes foams: Effects of green flame-retardants

Abstract:
The wide range of physical and chemical properties of polyurethanes make them one of the most popular polymers for industrial applications. Polyurethanes are synthesized using isocyanates, polyols, surfactants, additives, and catalysts. Polyurethane foams can be rigid or flexible and find vast applications in the automotive, construction, furniture, and medical industries. Despite the numerous applications of polyurethanes, their high flammability is a major concern for their safe use in many applications. In addition, current research seeks renewable sources such as vegetable oils and other biomass for polyurethane synthesis. In our research, highly flame-retardant polyurethane foams using bio-derived polyol were prepared and characterized. Sunflower oil was used in the synthesis of a bio-based polyol as an alternative to petroleum-based polyols. Epoxidation followed by ring-opening reactions were carried out to synthesize the sunflower oil polyol whose formation was confirmed with other tests. Expandable graphite (EG) and dimethyl methylphosphonate (DMMP) which are non-halogenated flame retardants were used in varying concentrations for the preparation of bio-based rigid polyurethane foams. The effects of these flame retardants on the physicomechanical properties and flame retardancy of the sunflower-based foams were studied. Mechanical and thermogravimetric analysis showed that the foams had a high compressive strength along with high thermal stability. The closed-cell contents of the foams were over 90% with a uniform distribution of cell size. The burning test revealed a significant effect of the flame-retardants on the flammability of the foams. And with the addition of EG, the burning weight loss time was reduced from 80 s to 4 s and that of DMMP from 70 s to 3 s. Our research suggests that sunflower oil could be a potential candidate for the polyurethane industries and the use of non-halogenated DMMP or EG can serve as green and effective flame-retardants in bio-based polyurethane foams.

Presenter(s): Ellie Ridgway
Student Status: Undergraduate
Major: Department of Education
Title: Administrative Ethics and School Climate and Culture

Abstract:
The literature discussed in this review will cover the principles of ethical school leadership, the ethical codes by which educators are supposed to conduct instruction, the traits of effective school climate and culture, and the levels at which administrators can influence the climate and culture of their school. The research of this concept is important because it is critical to student learning and success. Students learn best when they are in a positive environment that provides adequate support and resources for them to succeed. However, this type of environment cannot solely depend on the teacher. The specific topics discussed in this review include but are not limited to: inclusive and toxic school climate and culture, ways to improve climate and culture, administrator influence on climate and culture, ethically leading a school, and current administrative challenges such as the pandemic, critical race theory, and the substitute teacher crisis. Throughout these articles, a common theme is the necessity of fair and equitable opportunities for students as well as the importance of an active and inclusive administrator. An ethical leader that positively influences the climate and culture of a school is one that creates a safe learning environment, creates effective relationships with teachers, considers the consequences of their decisions, values the input of their teachers, and aligns there internal beliefs with their external actions.

Presenter(s): Brent McDowell
Student Status: Undergraduate
Major: History, Philosophy, and Social Sciences
Title: Violence or Parliament: Ireland's Struggles for a Republic

Abstract:
Throughout Ireland's long history of pushing for independence from British overrule, both change by rebellion and through political means has occurred, but times where large and true revolution has arisen always followed acts of violent rebellion against British oppression. One can see this play out numerous times within the history of the nation, starting with the shortcoming of Ireland's "Liberator" Daniel O'Connell. O'Connell was successful in the emancipation of the oppressed Catholic Irish, but when it came to a cease in the union with the British Empire his methods within parliament were not enough. Later rebellious acts were proven more successful in the Irish War of Independence; which after centuries finally granted Ireland a level of freedom from Britain. While this was a sense of freedom which many Irish had desired for centuries, a number of Irish counties remained under British rule, and a number of those from Ireland's republic hoped for a united nation. Decades later, after a stall in progress, again violence becomes necessary and is seen as the era of The Troubles come to fruition. With the violence of The Struggles, Ireland was able to prove to Britain that they were serious about eventually having a united Ireland come into fruition. A guarantee for the eventual uniting of all Irish counties was made, and yet this has not come to be yet today. With Brexit straining the relations between Ireland and the United Kingdom, the question of if violence will occur again looms.

Presenter(s): Andrew Grant
Student Status: Undergraduate
Major: History
Title: The Impact of the Russian Revolution on Great Britain

Abstract:
This paper seeks a better understanding of the global impact of the Russian Revolution of 1917 by focusing on Great Britain in the first years of the interwar period leading to the beginning of the Second World War. A wide variety of sources was used in order to explore different facets of the Communist Party as it existed in Great Britain and how influential it was in the wake of the successful Bolshevik movement. One source discusses the membership of the Communist Party in Great Britain from 1920 to the end of the Second World War in 1945. Another source covers the reconstruction of the Labour Party in Great Britain after the First World War and the development of political ideology within the Labour Party after the Russian Revolution. In the years following the First World War there was a series of revolutions and uprisings that were both ideologically inspired and not ideologically inspired by the success of the Bolsheviks in Russia.

Presenter(s): Shelby Oldham
Student Status: Undergraduate
Major: Nursing
Title: Implementation of the Quick Sequential Organ Failure Assessment in Early Identification of Sepsis in Cirrhotic Patients Outside the Intensive Care Unit

Abstract:
Patients with the chronic condition cirrhosis suffer from an increased risk of infections. These infections can quickly result in a systemic infection known as sepsis. Sepsis in cirrhotic patients results in high rates of septic shock related mortality. Therefore, this research is to determine if the replacement of the systemic inflammatory response syndrome (SIRS) assessment with the new Sepsis 3's quick Sequential Organ Failure Assessment (qSOFA) will aid in assessing the risk of mortality in this patient population. Early, efficient assessment allows prompt nursing interventions and timely transfers when caring for cirrhotic patients outside the intensive care unit. Studies have shown that the current assessment tool, SIRS, has poor sensitivity and weak generic parameters. qSOFA has shown to be better at determining cirrhotic patient's risk for mortality, need for interventions, and need for transfer. Thus, the qSOFA assessment tool provides nurses with a bedside assessment tool that can be implemented to repeatedly assess the health status in this chronically ill patient population.

Presenter(s): Allyson Norton
Student Status: Undergraduate
Major: Nursing
Title: Nonverbal Communication: Does it Make a Difference?

Abstract:
Nonverbal communication (NVC) commonly includes touch, gesture, expression, tone, silence, and physical appearance. In the immediate past and current environment of wearing masks with all patient interactions, NVC might have even added significance. However, compared to verbal communication, less is known about the effects of NVC on patient interaction. The purpose of this literature research project is to determine whether patients experience higher levels of satisfaction and involvement in their care when NVC measures are implemented. To accomplish this, several different studies regarding the effects of NVC on patient satisfaction were examined. The data for the project was obtained by combing through professionally reviewed nursing journals and research articles. Some of the research focused on the impact of educating students on NVC and the importance of NVC when interacting with patients. Other research included feedback from elderly patients explaining how NVC affects their care. These studies found that NVC education promotes awareness and interest in NVC, which leads to increased levels of patient satisfaction and fulfillment. NVC plays an important role in communication and greatly affects a patient's emotional status and overall health.

Presenter(s): K.A.U.Madhushani & Ram K. Gupta
Student Status: Graduate
Major: Chemistry
Title: Smart-Fabric-Based Supercapacitor with Long-Term Durability and Waterproof Properties toward Wearable Applications

Abstract:
The rapid development of wearable electronics and smart textiles has dramatically motivated the generation of flexible textile-based supercapacitors (SCs). However, the rapid evaporation of water moisture in gel electrolytes substantially limits the working durability and performance enhancements of the flexible devices. Therefore, a high-performance multifunctional textile-based SC with long-term durability is highly desired. Herein, a poly (vinyl alcohol) (PVA)/polyacrylamide (PAM) composite gel electrolyte was developed to fabricate a multifunctional device with water-retaining and water-proofing properties based on multidimensional hierarchical fabric. And the assembled SC based on composite gel exhibited superior water-retaining property and long-term working durability (93.29% retention rate after operation for 15 days), whereas the performance of SC based on pure PVA gel declined sharply and only 43.2% capacitance remained. In addition, the assembled SC exhibited enhanced specific capacitance of 707.9 mF/cm2 and high energy density of 62.92μWh/cm2 and maintained good stability of 80.8% even after 10 000 cyclic tests. After water repellency treatment, the integrated device immersed in water could still work normally. What's more, the assembled devices could be charged by a portable hand generator, which could be potentially applied for field rescue and military applications. We foresee that this strategy would be a potential route to prepare high-performance multifunctional textile-based SCs for wearable electronic systems and smart textile applications.

Presenter(s): Brandi Whetzell
Student Status: Graduate
Major: School of Nursing
Title: Provider Education on Non-Pharmacologic Treatment of Osteoarthritis

Abstract:
Osteoarthritis is an arthritic condition of the joints commonly found in the elderly population. This condition occurs as intra-articular cartilage wears down over time. Most patients present with joint pain. The pain that occurs from joint pain often times impedes physical activity, which can ultimately increase pain levels. There are several treatments for osteoarthritis, however, there is no cure. Providers often times prescribe non-steroidal anti-inflammatories and other oral analgesics for pain management. Because osteoarthritis typically occurs in the elderly population, adding medications to what often times is a long list of medications can cause issues such as drug interactions and medication toxicities. Other non-pharmacologic treatments, such as diet and exercise and physical therapy, should be explored and attempted prior to adding in pharmacologic therapy. The purpose of this project is to educate providers on the need for non-pharmacologic treatment modalities for OA related symptoms and the benefits of non-pharmacologic treatment, as well as increase provider knowledge on non-pharmacologic treatment modalities. Data is being collected through means of pre and posttests. Paper tests along with an educational fact sheet were provided to orthopedic and primary care providers within a manila envelope. Data has not yet been analyzed.

Presenter(s): Tenzin Ingsel & Ram K. Gupta
Student Status: Graduate
Major: Chemistry
Title: MOF Derived Co3O4@Co/NCNT Nanocomposite for Electrochemical Hydrogen Evolution, Flexible Zinc-Air Batteries, and Overall Water Splitting

Abstract:
Toward the goal of clean and sustainable energy source, the development of a trifunctional electrocatalyst is a boon for energy storage and conversion devices such as regenerative fuel cells and metal-air batteries. MOF-derived semiconducting-metallic core–shell electrocatalyst Co3O4@Co/NCNT (NCNT = nitrogen-doped carbon nanotube), which was shown to catalyze oxygen reduction reaction (ORR) and oxygen evolution reaction (OER), is also found to be an active electrocatalyst for hydrogen evolution reaction (HER) with a low overpotential of 171 mV. Here, the HER activity of Co3O4@Co/NCNT is presented and is shown as highly efficient and robust trifunctional electrocatalyst. The detailed theoretical calculation has found N-center of Co–N4 moiety to be the H+ binding active site and thus proves Co3O4@Co/NCNT to be active for HER. Further, the ORR and OER bifunctionality of Co3O4@Co/NCNT helped in fabricating secondary Zn-air battery with high power density of 135 mW/cm2. Also, an all-solid-state flexible and wearable battery with Co3O4@Co/NCNT as cathode and electrodeposited Zn on carbon fiber cloth as anode was shown to withstand its performance even under stressed conditions. Finally, the material being trifunctional in nature was used both as an anode and cathode material for the electrolysis of water, which was powered by the Zn-air batteries with Co3O4@Co/NCNT as the cathode material. It is believed that the development of a trifunctional catalyst would help in wide commercialization of regenerative fuel cells,

Presenter(s): Prasadi Abeysinghe Arachchil, A.A.P.R.Perera, & Ram K. Gupta
Student Status: Graduate
Major: Chemistry
Title: Preparation of Flame-Retardant Rigid Polyurethane Foams by Combining Modified Melamine–Formaldehyde Resin and Phosphorus Flame Retardants

Abstract:
In this work, ethylene glycol-modified melamine–formaldehyde resin (EMF) was synthesized from ethylene glycol, paraformaldehyde, & melamine, and then rigid polyurethane foams (RPUFs) were prepared using EMF, polyols, and polyisocyanate. The effects of ammonium polyphosphate (APP) and dimethyl methylphosphonate (DMMP) on the flame retardancy, mechanical properties, thermal stability, and morphology of the prepared RPUFs were studied. It is shown that the flame-retardant performance of EMF-filled RPUFs can be enhanced by the addition of APP and DMMP. Thus, APP and DMMP can synergistically improve the flame retardancy of RPUFs.

Virtual Presentations

Presenter(s): Madison Reese, Niamh Dixon, Monika Jirak, Alex Tush, & Anuradha Ghosh
Student Status: Undergraduate
Major: Biology
Title: Prevalence and characterization of antibiotic resistant strains of Enterococcus spp. and Acinetobacter spp. in community household environment

Abstract:
With increasing prevalence of antibiotic resistance threats, there is an upsurge in the occurrence of community-acquired infections. The purpose of this study is to assess the ecology and prevalence of Enterococcus spp. and Acinetobacter spp. (that are well-known antibiotic resistant nosocomial pathogens) in the household environment. Each household sampling kit contained 5 swabs for each of shoe bottom, restroom, cleaning supply, kitchen top, and door step/handle as well as a demographic data sheet to be filled up. A total of 30 such kits (n=150) have been processed. The swabs were subjected to enrichment using selective media for test bacterial species. A panel of antibiotics were selected for testing using disc-diffusion method. Twenty-two out of 30 (73%) and 28/30 (93%) kits were positive for growth of Enterococcus spp. and Acinetobacter spp., respectively. Door steps, cleaning supplies, and shoe soles (13-20%) were less frequently contaminated with enterococci compared to that of kitchen tops (16/30, 53%) and restrooms (12/30, 40%). Although majority of the locations swabbed were contaminated with suspected Acinetobacter spp., door step/handles were free of any selected microbe. Overall, 102/150 (68%) of the swabbed surfaces were contaminated with Acinetobacter spp. in contrast to 43/150 (28%) with enterococci. Biochemical tests confirmed identity of 34% (140 out of 408) Acinetobacter and 71% (123/172) Enterococcus isolates at the genus level. Susceptibility testing revealed 41 of each of Acinetobacter and enterococcal isolates were resistant to 3-6 antibiotics. Multi-drug resistant isolates are being tested for their capability of forming biofilms in 96-well microtiter plates along with their amylase and protease production using agar-media based assays. The antibiotic-resistant isolates will be genotyped and compared to their relative nosocomial strains. The community will be outreached with recommended cleaning protocol and stewardship in antibiotic consumption and resistance. The outcome of this study may help facilitate effective and appropriate antibiotic treatment against community-acquired infections.

Presenter(s): Morgan Michael
Student Status: Undergraduate
Major: Nursing
Title: Helping Ease the Burden on Healthcare Workers Through Proper Utilization of Healthcare Resources

Abstract:
In the current, unprecedented healthcare climate, patients are seeing increased wait times in urgent cares, emergency rooms, and even primary care offices. If a patient does make it through the sometimes four plus hour wait to see a physician in an ER, and they are then admitted to the hospital, they may be stuck waiting for a hospital bed to open up for several more hours in the ER. This vicious cycle of waiting is frustrating for the patients and the healthcare workers. It creates lower quality care, increased adverse outcomes, and improper utilization of resources. In this presentation, I have outlined how, through proper use of the healthcare system, patients can not only improve the quality of their own care, but the care of their community. With resources gathered from Southeast Kansas and Southwest Missouri communities, from free clinics to private practices, members of our community will have the knowledge to choose the healthcare option best suited for their needs. Peer reviewed literature is utilized to evidentiate which healthcare option, primary, urgent, or emergent, would provide the best quality care in any health scenario. When communities are given the proper resources to succeed, it creates better outcomes for all people involved, from patients and their families to the professionals providing the care.

Presenter(s): Bobbi Monroe, Haley Price, Alexis Paynter, Andrew George & Anuradha Ghosh
Student Status: Graduate
Major: Biology
Title: Characterization of culturable bacterial isolates obtained from guano of gray bats in southeast Kansas

Abstract:
Humans have historically had an ambivalent relationship with bats. On one hand, bats perform an important service to humans by reducing populations of insect pests. On the other hand, they can act as reservoirs of diseases, as highlighted by the recent Coronavirus pandemic. In the U.S., many bat populations have been threatened by white nose syndrome, caused by the fungus Pseudogymnoascus destructans. This study aims to characterize the bacterial and fungal diversity associated with the Gray Bat (Myotis grisescens) in southeast Kansas. Guano samples were collected from bats roosting in the sewer system and a total of 32 bacterial isolates with different colony morphology were recovered on tryptic soy agar media after enrichment. The majority (21/32, 65%) of isolates was Gram positive. All isolates were tested for their growth on various selective and differential media. Sugar fermentation profiles generated using glucose, maltose, lactose, and sucrose showed that 78% (25 of all isolates) fermented all four sugars, 9% (3/32) fermented three sugars, another 9% (3/32) fermented two sugars, and one isolate (3%) fermented only one sugar. Notably, urea was hydrolyzed by seven (21%) isolates while one isolate (3%) was positive for indole production. Experiments are underway to isolate fungal isolates as well as to determine sensitivity to antibiotics. Identification of both known and novel bacteria/fungi in bats is important for prevention of disease spread and in the long-term preservation of bat populations.

Presenter(s): Vishwa Suthar, Magdalene A. Asare & Ram K. Gupta
Student Status: Graduate
Major: Department of Chemistry
Title: Graphene in Bio-derived Polyurethane for Improved Mechanical Properties.

Abstract:
Polyurethane based polymers have a wide range of application due to their versatility. And to mention a few, they can be manipulated into foams in car seats, medical devices and lubricants. Until recently, polyols, which play a vital role in the properties of polyurethane were petroleum based. However, due to their fast depletion and the earnest need to protect the environment, researchers are more intrigued about using green and cost-efficient alternatives. Scientists have found bio-based polyols from sources like vegetable oils and limonene to produce polyurethanes with high quality properties hence, the gradual expansion in that research area. In this work, sunflower oil is converted into a polyol using an epoxidation reaction followed by ring opening with methanol. The polyol is further used in the synthesis of a polyurethane composite in an easy one step reaction with isocyanate. To improve the mechanical properties of the bio-based polyurethane composite, graphene was introduced in increasing percent concentrations. The dispersion of the graphene as well as the effects of the polyol was studied. In addition, TGA, and elasticity among the many others were used to test the effects of graphene on the properties of the materials. It was observed that the elastic modulus and tensile strength increased to over 450 MPa and 47 MPa respectively. TGA results also showed a high thermal stability of our synthesized materials. This experiment established a fast and facile method for the production of the bio-based polyurethane composites that had improved mechanical properties with the addition of graphene.

Presenter(s): Alexandra King
Student Status: Graduate
Major: Biology
Title: Contemporary extent of the Blackspotted Topminnow invasion and frequency of hybridization with native Blackstripe Topminnow in the Spring River subbasin

Abstract:
The current extent of the Blackspotted Topminnow invasion and the contemporary frequency with which it is hybridizing with the phenotypically similar Blackstripe Topminnow (Fundulus notatus) in the SRS of KS is presently unknown. Furthermore, documenting the Blackspotted Topminnow invasion is complicated by the fact that F. olivaceus and F. notatus phenotypic characteristics vary with environmental gradients, making visual identification unreliable. As such, this project used genetic techniques to 1) investigate the extent of the Blackspotted Topminnow invasion in the SRS of KS, 2) address how the frequency of hybridization between Blackspotted and Blackstripe Topminnow varies spatially, and 3) evaluate how invasion and hybridization are influenced by water clarity and stream fragmentation (i.e., Empire Lake). Blackspotted Topminnow were collected from numerous sites distributed along the Spring River and Shoal Creek using dipnetting and seining. We used restriction fragment length polymorphism (RFLS) assays to identify pure Blackspotted and Blackstripe Topminnow and their hybrids. This research will help inform the management of nonnative species and native species conservation in the SRS, while also contributing to the field of fish ecology by examining how a dispersal barrier (i.e., Empire Lake) impacts the outcome of an invasion.

Presenter(s): Alexandra King
Student Status: Graduate
Major: Biology
Title: Cleansing our waters: How riffle fish communities in the Spring River of Kansas responded to pollution legislation and remediation

Abstract:
Metal pollution from mining is a threat to lotic fishes, although legislation has been enacted to combat this stressor. The Spring River in southeastern Kansas historically received tributary inputs of cadmium, lead, and zinc from the Tri-State Mining District, but long-term reductions in these toxic metals have occurred since the 1990's. It is presently unknown how riffle fish communities have responded to improved water quality, so the objective of our research was to quantify changes in community structure across 1993-1995 and 2019-2021. Responses were quantified using univariate analyses to examine the interactive effects of time period, tolerance classification as intolerant, moderately-intolerant, moderately-tolerant, and tolerant of pollution, and site position above versus below historical metal inputs from tributaries. We also used multivariate analyses to examine contemporary and historic community structure above and below pollution inputs. Our findings indicate that intolerant fish species abundance and occupancy increased between the 1990's to 2020's, while tolerant species declined. There were similar patterns in species richness as intolerant species increased above and below pollution and tolerant species decreased, though these results were more pronounced below pollution where water quality had improved the most. The riffle fish community structure was significantly different across time periods as more intolerant fish species dominated riffle communities in the 2020's compared to the 1990's, which was predominantly composed of tolerant fish species ($P = <0.0001$). Furthermore, pollution intolerant riffle fishes have responded positively to water quality improvements and are recolonizing the Spring River of Kansas despite other pollutants of emerging concern.

Presenter(s): Samantha Wiltz
Student Status: Graduate
Major: Psychology
Title: State-Level Increases in Suicide and School Psychologist Support

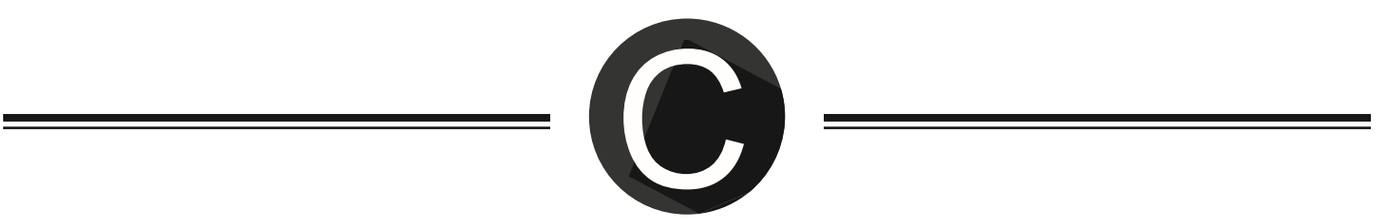
Abstract:
Suicide is the eighth leading cause of death for Kansans. This study consists of two parts. Results will be presented showing a significant increase in suicide for individuals 24 years and younger, followed by results from a statewide survey evaluating school psychologists' involvement in suicide support within the schools. We will discuss how these results can be used to encourage the increased presence of school psychologists in school suicide prevention and what best practices in suicide risk assessments are in the schools.

Presenter(s): Daniel Tustin
Student Status: Undergraduate
Major: Graphics and Imaging Technology
Title: Astrophotography Portraiture

Abstract:
Advanced portrait lighting techniques with a focus on the addition of astrophotography.

Presenter(s): Kamryn Kelley
Student Status: Undergraduate
Major: Chemistry
Title: Graphics and Imaging Technology

Abstract:
For this series of images, I plan to use a Leica Q2 monochromatic camera. I plan to capture multiple images of different locations throughout the surrounding geographical area to show the beauty and people of the Midwest—specifically Pittsburg, Kansas area.



Presenter(s): Samuel Eddington & Dr. Julie Allison
Student Status: Undergraduate
Major: Psychology
Title: A Review of the Impact of Age and Sex on the Diagnosis of ADHD

Abstract:
The purpose of this project is to review the literature on the diagnosis of ADHD. Although attention deficit hyperactivity disorder (ADHD) has been around for over 100 years, there are often difficulties in diagnosing children who have this disorder. Even though ADHD can affect all types of people, research into ADHD has largely been focused on symptoms seen primarily in young boys. This, it will be argued, has created a "stereotype" of those who have ADHD which precludes many with this disorder from being diagnosed. This inequality in the attention given to boys rather than girls or adults is because, in most cases, it is only the boys that are hyperactive. The hyperactive and combined types of ADHD are easily noticeable compared to the inattentive type. Girls suffering from the inattentive type of ADHD typically carry these symptoms undiagnosed into adulthood, potentially resulting in negative consequences. Similarly, adults that have missed diagnosis as a child can have lingering effects. In the last decade, more has been done to adequately diagnose and treat all children and adults. Accurate diagnosis of ADHD is critical to treating those who have it.

Presenter(s): Sophia Porembski
Student Status: Undergraduate
Major: Nursing
Title: Intentional Stimuli in the Preterm Infant

Abstract:
This research project explores the effectiveness of intentional stimuli, specifically Kangaroo care and massage therapy, on infants in the NICU. Kangaroo care focuses on skin-to-skin contact between the caregiver and newborn, while infant massage therapy involves therapeutic touch and increasing circulation within the newborn. Peer-reviewed articles from the Journal of Pediatrics, Journal of Perinatology, Neonatal Network, and World Health Organization were used to provide evidence either supporting or refuting the use of intentional stimuli in the NICU. Overall, this project finds both methods of stimulation to be beneficial when applied under the appropriate circumstances. It is found that Kangaroo care, provided during the infant's rest and wake periods for the first 2-3 days of life, promotes the release of oxytocin in the brains of the infant and the caregiver. Benefits of Kangaroo care can include maturation of neural pathways, increased attachment, better temperature regulation, and shorter recovery times. Although it has these benefits, it should only be applied when ongoing evaluation of the infant's oxygen saturation is possible, as hypoxia can result in more premature infants. Massage therapy is another great way to stimulate the newborn to promote infant growth and weight gain. However, unlike Kangaroo care, massage therapy needs to coincide with care, with infants already weighing >1,000 g, and be balanced with rest periods to avoid overstimulation of the infant. Both intentional stimulation methods are found to be beneficial to the infant's overall outcome when applied to the right patient situations at the right time.

Presenter(s): Aubri Ashbacher
Student Status: Graduate
Major: Nursing
Title: Transitional Psychiatric Care in Pittsburg, Kansas

Abstract:
Psychiatric patients are a known vulnerable population. This population often ends up in a cycle of decline post-hospitalization that leads to rehospitalization. The purpose of this study is to establish the feasibility for bringing psychiatric transitional care services to the local community. The methods for the study include a qualitative analysis of common themes discussed from the presentation of the idea of transitional care services for this area to area mental healthcare providers. Using a qualitative approach, the project will involve conducting interviews with mental healthcare providers in the Pittsburg community via Zoom about the feasibility of transitional psychiatric care services for the area. The moderator will introduce the prompts throughout the Zoom to ensure that all participants were given the opportunity to comment on the same topics. Free discussion will be allowed until discussion for each prompt has ceased. Member checking will be done at the end of the meeting with the moderator summarizing the main ideas that were discussed in the group. Each group meeting will be audio recorded and transcribed verbatim. The author and a professional colleague will then review the transcripts separately to ensure reliability. The author and two professional colleagues will be reviewing the data to find commonalities and themes presented in the discussions. The focus groups will be conducted using a snowball effect until data saturation is obtained. Analysis will begin after the first interviews are completed and will continue until no new themes emerge from the analysis and the material is considered saturated.

Presenter(s): Yixuan Ma & Dr. Ram Gupta
Student Status: Graduate
Major: Chemistry
Title: Trimetallic NiFeMo for Overall Electrochemical Water Splitting with a Low Cell Voltage

Abstract:
We report the development of an efficient and earth-abundant catalyst for electrochemical overall water splitting. Trimetallic NiFeMo alloy is synthesized by hydrothermal deposition from inorganic precursors and subsequent low-temperature thermal annealing. A complete cell made of NiFeMo electrodes on nickel foam exhibits a low voltage of 1.45 V at 10 mA/cm2 as a result of low overpotentials for both hydrogen evolution reaction (HER) and oxygen evolution reaction (OER). High-resolution transmission electron microscopy reveals that nanometer-sized single-crystal domains of Ni, Fe, and Mo are intimately integrated at the atomic level, which enables a synergistic effect of metallic Ni, Fe, and Mo for efficient HER, while self-formed Ni−Fe−Mo (oxy)hydroxides on the surface of the NiFeMo anode become active sites for OER. Such a multimetallic alloy and its (oxy)hydroxides represent a typical HER/OER catalyst couple, and our method provides a new route to develop efficient low-cost metallic alloys for overall water splitting.

Presenter(s): Vishwa Suthar & Ram K. Gupta
Student Status: Graduate
Major: Department of Chemistry
Title: Toward Utilization of Agricultural Wastes: Development of a Novel Keratin Reinforced Soybean Meal-based Adhesive

Abstract:
The development of low-cost bio-based formaldehyde-free adhesives has aroused widespread interest in the wood adhesive industry. In this study, a series of aldehyde-free adhesives were prepared from soybean meal (SM) and chicken feather (CF), which were both largely produced from agricultural wastes. Incorporation of 10 wt % of keratin and calcium phosphate oligomer (CPO) significantly reinforced the performance of the fabricated adhesive material (namely, SMK10-CPO10). The dry and wet bonding strength of SMK10-CPO10 improved to 3.01 and 1.46 MPa, which was 1.75 and 2.15 times that of the adhesive made with SM alone (1.72 and 0.68 MPa), respectively. Meanwhile, the viscosity of the adhesive decreased from 40.77 (SM alone) to 22.32 Pa·s (SMK10-CPO10), which apparently improved the fluidity and wettability of the protein-based adhesive. This work not only put forward a novel method to prepare the green high-performance bio-based adhesive but also opened up a new way for the utilization of waste resources and a new strategy for the design and synthesis of advanced structural and functional materials.
KEYWORDS: soybean adhesive, chicken feather, keratin, calcium phosphate oligomer, bonding strength

High School Presentations

Presenter(s): Dakota Agee
Grade Level: 12
Title: The Effect of Cannabidiol Oil on Cortisol Levels in Lab Mice

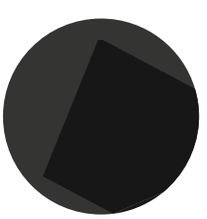
Abstract:
Cannabidiol (CBD) oil is said to reduce stress, yet little research exists regarding use with pets (Kogan et al., 2019). This study examined if CBD reduced stress (cortisol) in mice. It was hypothesized that if mice were given varying amounts of CBD, those given higher amounts would have lower levels of cortisol. Fecal samples were collected from each mouse after CBD treatments and analyzed with a cortisol assay kit. Data showed mice receiving the highest amount of CBD oil had the lowest levels of cortisol (p-value 0.003). There were no significant differences between the groups' mass (p-value 0.7961).

Presenter(s): Brooklyn Hiller
Grade Level: 11
Title: The Effects of Different Memory Techniques on Eyewitness Accounts

Abstract:
Eyewitness accounts are often unreliable but can take part in identifying a perpetrator. The issue with eyewitness accounts is that memory can be easily manipulated and compromised. Factors such as traumatic or high-stress events can affect memory as well as time passed after an event (Wixted, et al, 2018; Deffenbacher, et al 2004). Fortunately, memory is never completely lost, but can be altered with time (Bria 13 3 c How Reliable Are Eyewitnesses, 2021). This experiment tested how different memory techniques were able to help witnesses accurately remember events. Participants were given a photo to study for 15 seconds and then were asked to perform 1 of 2 different memory techniques based on the assigned group. Afterward, they were asked to take a brief survey, answering questions about the photo shown earlier. The results of the study showed that using different memory techniques did not significantly increase the accuracy of eyewitness memory.

Presenter(s): Vivian Farber
Grade Level: 11
Title: The Effects on Population from Lead and Zinc in Water using Daphnia magna as a Model Organism

Abstract:
Old lead and zinc mines leak heavy metals into water. How do heavy metals in water affect the human population? To test this, clear crustaceans called Daphnia magna (D. magna) were used as model organisms. This study investigated the hypothesis: If there are high levels of lead and zinc present in water, then D. magna survival rate and reproduction rate will decrease. The organisms were housed in different concentrations of lead and zinc to collect data on survival rate and reproduction rate. Lead stunted the growth more, but zinc was more toxic and slowed reproduction rate.

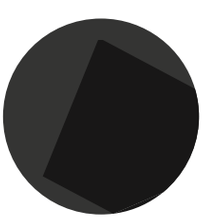


Presenter(s): Kim Nguyen
Grade Level: 12
Title: The Effect of Medicinal Mushrooms on Saccharomyces cerevisiae: Using Saccharomyces cerevisiae as a Model Organism for Cancer Research

Abstract:
Cancer is the number two leading cause of death worldwide (Cancer statistics, 2020). For the last 30 years, medicinal mushrooms have been used in Chinese medicine along with chemotherapy and radiation therapy to help treat and even lower the risk of getting cancer (Medicinal Mushroom, 2021). This experiment investigated the effect of Ganoderma lingzhi (Reishi), Trametes versicolor (Turkey Tail), Lentinula edodes (Shiitake), and Grifola fondosa (Maitake) on the cell division process of Saccharomyces cerevisiae (yeast). It was hypothesized that if yeast was given mushroom treatments, then there would be a decrease in the quantity of yeast. This experiment was divided into three phases. Phase 1 used respirometers to calculate the ideal proportion of mushrooms to yeast. Phase 2 used methylene blue stain to dye cells for survival rate of cells count for each mushroom treatment. Finally, Phase 3 was measuring cell absorbance by using an optical density cell plate reader to see if mushroom treatments affected cell quantity. For Phase 1, the result showed there was not a statistically significant difference between the different mushroom ratios for all four mushroom powders. For the result for Phase 2, the low concentration was the only data with a significant p-value. Lastly, for Phase 3, the mushroom powder did affect the turbidity level and slowed down the growth rate for all the low, medium, and high concentrations.

Presenter(s): Hunter Merkley
Grade Level: 11
Title: The Effect of Ultraviolet B Radiation on Streptococcus sobrinus

Abstract:
Ultraviolet C (UVC) radiation has recently been used as a germicide in oral health practices (Strazzi-Sahyon, 2020). However, there are other kinds of ultraviolet radiation such as ultraviolet A (UVA) and ultraviolet B radiation (UVB). UVB is the radiation that comes from the sun, and is also found in tanning beds and welding torches (Wyant, ACS, 2019). This project investigated how UVB light affected Streptococcus sobrinus, which is a type of bacterium that is shown to cause tooth decay. It was hypothesized that if Streptococcus sobrinus was placed under UVB radiation for 30 minutes and then grown for 24 hours, then there would be a decrease in live colony count. A serial dilution was performed to try to reduce the amount of colonies for counting purposes. Agar plates containing the bacteria were placed into an incubator under UVB light for 30 minutes.The UVB radiation did not affect the bacteria; all of the plates had the same amount of growth. There was no statistically significant difference between the plates placed under UVB and the control group (that was not placed under UVB light).



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Colloquium