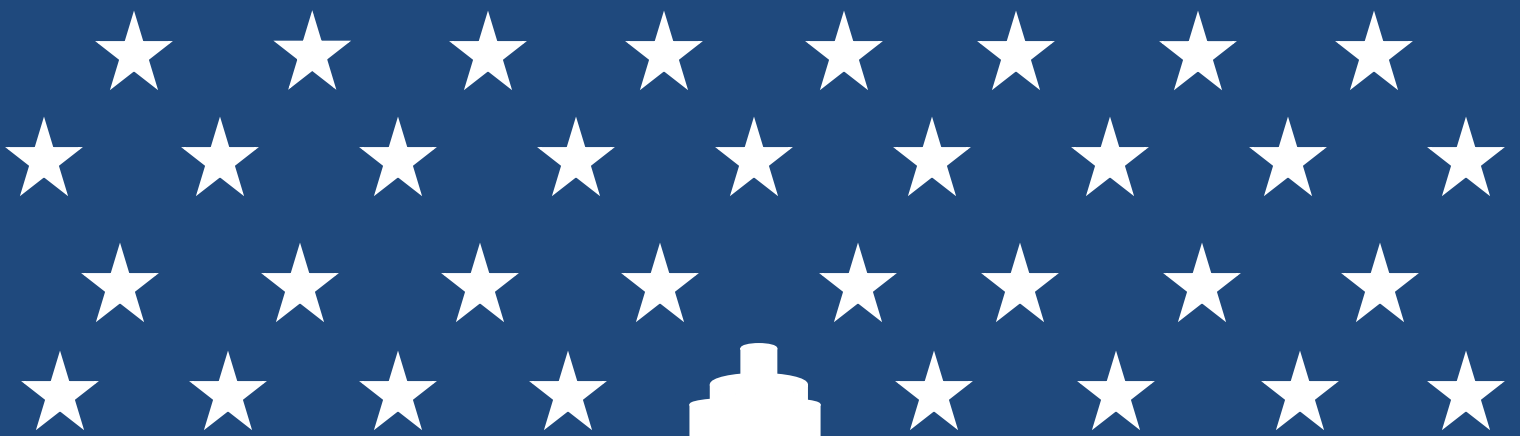


Kansas Undergraduate Research
Day at the Capitol
2018





KANSAS BOARD OF REGENTS

Kansas Undergraduate Research Day at the Capitol

The Kansas Board of Regents is pleased to support the outstanding students selected to present at the 2018 Kansas Undergraduate Research Day. University research has propelled the United States into a world leader in the development of new technologies as well as advancements in existing technologies. Students selected for this event are conducting research that matters to the citizens of our great state.

The role of undergraduate students in research is vital in developing products that will shape our future.

These students learn skills that prepare them for the workforce while promoting engaged learning both inside and outside the classroom. Undergraduate student researchers complete projects that benefit their personal growth, expand knowledge in a variety of fields, and contribute to the growth of the state's economy. The talent of these students and their mentors is remarkable.

The Kansas Board of Regents invites you to explore the research selected for presentation today from Emporia State University, Fort Hays State University, Kansas State University, Pittsburg State University, The University of Kansas, Wichita State University, and Washburn University.

We are confident you will leave the event committed to continue supporting research that benefits our students and our state and in awe of the outstanding work of these students.

Blake Flanders
President and CEO, Kansas Board of Regents

Kansas Undergraduate Research Day at the Capitol

February 14, 2018



Participating Kansas Board of Regents Institutions:

Emporia State University

Fort Hays State University

Kansas State University

Pittsburg State University

University of Kansas, Lawrence Campus

University of Kansas, Medical Center

Washburn University

Wichita State University

Emporia State University

Poster # 1

Student: Brooke Bailey

Year: Senior

Department: Communication & Theatre

Mentor: Dr. Heidi Hamilton

Title: Rhetorical Strategies Utilized by Female Leaders Around the World

In the United States, hegemonic masculinity is often equated with power. This idea impacts many areas of our lives, including the political sphere, where leaders' rhetoric adapts or is judged by these values. The United States is not the only country that values this characteristic; therefore, research is necessary to determine if a masculine society affects the rhetoric of female leaders. For my research, I focused on a nation from each civilized continent, excluding North America, which has had a female head of state (president, chancellor, or prime minister) in the 21st century. The places selected were: Germany, India, Liberia, Brazil, and Australia. Once the nations were selected, I conducted a textual analysis on masculine and feminine rhetorical styles of each female leader by reviewing a major address given to their respective nation. Research from Karlyn Kohrs Campbell was used to define masculine and feminine rhetorical styles. The masculine style focuses on power dynamics. The feminine rhetorical style encourages audience participation and creates identification with the audience. The results revealed that four out of the five female leaders used feminine rhetorical strategies throughout their speech and the fifth was more androgynous, utilizing both feminine and masculine rhetorical styles. Overall, the research suggests a narrower scope of strategies employed by female political leaders, but with less effect on their credibility than for U.S. female politicians. Future research could focus on more contextual and cultural differences, which affect the choice of rhetorical strategies and their receptions.

Poster # 2

Student: Colin Dallimore, Ying Zhang

Year: Senior

Department: Biological Sciences, Physical Sciences

Mentor: Dr. Qiyang Zhang

Title: Determination of Nicotine in Soil

Nicotine from discarded cigarette buds can leach into the soil with the aid of rain water. This nicotine will degrade very slowly and can eventually contaminate underground water. As public properties, such as Emporia State University, begin implementing tobacco free policies, it is expected that analyzing soil samples will help determine the nicotine level in these public environments.

To determine nicotine levels, four undergraduate students collected soil samples in the Spring and Summer semesters of 2017 before the tobacco free policy was enforced. Results from Spring and Summer were presented at Emporia State's Research and Creativity Day and the Honors College's annual meeting. This nicotine research was continued on through the 2017-2018 school year by one of the undergraduate students and an additional graduate student, both under the guidance of Physical Science Department faculty member, Dr. Qiyang Zhang.

To prepare soil samples, standard extraction was performed for soil on campus. Then samples were separated by using high performance liquid chromatography (HPLC) and then analyzed with ultraviolet (UV) detection. The recorded data was compared to a calibration curve with an R² value of 0.997, providing quality data to calculate nicotine levels in soil. The conditions of this experiment were thoroughly optimized to obtain the best possible results. In this research, students not only developed a fast and accurate method for monitoring nicotine in soil, but also revealed the potential exposure of nicotine to the public.

Poster # 3

Student: Grayce McAllister

Year: Junior

Department: School of Business

Mentor: Dr. Steven Lovett

Title: Current Higher Education Funding Models and Possible Enhanced Solution

Currently used within the United States are four general types of funding employed to support higher education. These general types are 1.) Endowment, 2.) For Profit, 3.) Private funding, and 4.) Public funding. Each of these funding models are studied and then compared by looking at the advantages and disadvantages of the respective form. Through this research project the following questions arose and were then answered. Are these four higher education funding models sustainable? There are colleges that allow students to work for their tuition, is that sustainable on a large scale? Can other models be used to create alternative modes of funding? What do other countries use to fund higher education? If the United States does not change the way that higher education is funded, will there be potential problems or repercussions? Is there a need for college graduates? How does higher education affect the workforce, community, and economy? The research began, to find the explanation to: the current rise in tuition for students, slight or no increase in salary for higher education faculty and staff, the unstable amount of funding from the state and federal United States government, and then find a solution to these issues. A solution has theoretically been found and is currently being tested and pursued at Emporia State University. The countries' higher education funding models that were investigated during this research project include: Australia, Brazil, Canada, China, England, Finland, Germany, Greece, India, Ireland, Mexico, Netherlands, Norway, Russia, Saudi Arabia, Scotland, South Korea, and Spain.

Poster # 4

Student: Josué Mejia, Andy Renteria, Kelly Schwinghamer, Charissa Forsythe, Robin McGonigal, Sean Claridge, Xiaoyin Zhang

Year: Senior

Department: Biological Sciences, Physical Sciences

Mentor: Dr. Diane Nutbrown

Title: A New Tool for Understanding Bipolar Disorder: Toward the Formation of a Fluorescent Probe to Detect Intracellular Lithium

Lithium is considered the gold-standard treatment for bipolar disorder, but not all patients respond to this drug and there are potentially severe side effects with its use. The mechanism of action for lithium salts is still speculative, which makes the design of alternative pharmaceuticals a challenge. Many biologically relevant cations, such as Ca²⁺ and Zn²⁺, have fluorescent probes that can track those ions in cells. The synthesis of a lithium-specific fluorescent probe is of great interest as it would aid researchers in understanding the role of lithium in the treatment of bipolar disorder. Hence, we are synthesizing a 1-aza-9-crown-3-functionalized coumarin as a potential lithium-specific sensor. Following published procedures, a Knoevenagel condensation reaction between 8-hydroxyjulolidine-9-carboxaldehyde and diethylmalonate in the presence of piperidine yielded the coumarin ring system. The resulting ester was hydrolyzed from the 3-position by strong acid. An aldehyde functional group was added at the 3-position via a Vilsmeier-Haack reaction with phosphorus oxychloride in N,N-dimethylformamide. Additional steps are being adapted from literature to finish synthesizing the desired fluorescent sensor. A one-pot reductive amination reaction using the resulting aldehyde, hydroxylammonium chloride, zinc dust, and hydrochloric acid with ethanol as the solvent is being tested as an attempt to yield a primary amine. Once the primary amine is isolated, subsequent reaction with 1,2-bis(2-iodoethoxy) ethane generates the 1-aza-9-crown-3 ring to complete the synthesis. The final product will be titrated with biologically relevant cations to determine binding constants and assess the sensor's specificity for Li⁺.

Poster # 5

Student: Franziska Willenbuecher

Year: Senior

Department: School of Business

Mentor: Dr. Marc Fusaro

Title: Could Financial Trouble be Avoided by Cooking at Home? – An Examination of the Relationship Between Fast Food Spending and Payday Loans

Research has shown that payday loans often lead to a spiral of short-term debts for which lenders typically charge an annual percentage rate of 350% to 1,000% (Lim et al., 2014). While the social implications of the payday loan industry and fast food pricing have been investigated individually, this paper is the first to explore the relationship between both areas of research, based on data derived from people's personal bank statements and hence providing a comprehensive overview over spending and borrowing habits. This paper answers the question whether the volume of fast food purchases is related to a higher incidence of payday loans, and hence whether a cycle of debt could be avoided by cooking at home. To achieve this, the average cost per meal per person was calculated based on three spending categories - fast food, restaurant and grocery store - and correlated with the frequency and amounts received at payday loan locations, including the amount of interest paid. The findings of this research have a social impact on people who have difficulties managing their monthly income, primarily affecting people in the lower-income working class. In addition, this analysis can also be used to adjust public policy, as well as financial counseling and financial literacy curricula.

Fort Hays State University

Poster # 6

Student: Annie Hinds, Runfan Yang, & Dana Kang

Year: Sophomore

Department: English

Mentor: Dr. Linda E. Smith

Title: Kansas Gifted Education Database

The Kansas Gifted Education Database, KGED, draws from scientific methodology and incorporates protocols appropriate to educational and social science research. The catalyst for the project was the identification of a problem: limited access to gifted education, especially for students in smaller, rural Kansas schools. From that observation, the research team asked the question, "How can access to gifted education be improved?"

The tentative answer became the team's hypothesis: to change the status quo for gifted education in Kansas, without requiring greater finances for school districts, a repository of free and open, educational resources should be developed that could be accessed by classroom teachers, gifted facilitators, students, and parents—essentially by anyone seeking access to resources appropriate to advance academic interest, as well as activities for higher-level learners.

KGED, a database of educational resources, was developed in response to the hypothesis and became the socio-educational experiment to determine whether or not the envisioned repository would have a positive impact on the deficit of educational resources for gifted students and their teachers. Using the Weebly PRO website development system, the KGED team has continuously edited the website to make sure each link is working, removing the website links that do not work, as well as adding new resources to the KGED website. According to Weebly's monitoring embedded analytics, the KGED project has proven successful, with a 76% visitor increase from January to September 2017, with nearly 6,000 page views this year, and several comments confirming the benefit and merit of the website.

Poster # 7

Student: Russell Krug

Year: Junior

Department: Geosciences

Mentor: Dr. Hendratta Ali

Title: Petrophysical and Sedimentological Analysis of Reservoir Units in Ellis Central Kansas Uplift

The Central Kansas Uplift is the largest positive relief in the state of KS covering roughly 5,700 square miles. The uplift slices to the south through Kansas in a wedge shape, bounded to the west by the Hugoton embayment and the Anadarko basin and to the east by the Salina and Sedgwick basins. The basement rock is the stable Precambrian craton, an extension of the Canadian Shield. The composition of the basement rock transitions from rhyolitic in the north, to granitic in the south. Of great economic importance are the stores of oil and gas trapped in the uplift. The target intervals for petroleum exploration are located between 2000 to 3500 feet in depth within the sedimentary deposits. The goal of this research is to characterize the petrophysical and sedimentary properties of the producing intervals. My objectives are to generate a facies map, characterize composition, and estimate hydrocarbon reserves. Three wells were selected for this study. Well logs, cuttings, and geochemical data were used. Well log trends across wells indicate the same environment of deposition. Porosity averages 10-20%. The highest porosities occur in shale units due to the shale effect on the neutron log. Geochemistry data agrees with log responses; high amounts of clays are consistent with shale layers. Gamma ray log responses indicate zones consisting of shale layers interbedded with carbonate, dolomite, and siltstones. By combining geochemical and geophysical data to more thoroughly understand the nature of the reservoir, new wells can be placed with more certainty.

Poster # 8

Student: Ashley Lockwood

Year: Senior

Department: Psychology

Mentor: Mrs. Brooke Mann

Title: Studying Stigma: Assessing Stigma of Mental Illness Toward Juveniles

Research has shown as many as two-thirds of detained juveniles have a psychological disorder, making it vital to assess both public perceptions of juvenile mental health along with perceptions of correctional professionals (Alcorn, 2014). However, previous literature has primarily focused on perceptions of adults with mental illness, leaving the understanding of juvenile mental health under conceptualized (Heflinger, Wallston, Mukolo, & Brannan, 2015).

The current study assessed juvenile mental health stigmas among college-aged students compared to a sample of juvenile correctional security staff.

Perceptions of juvenile mental health were assessed among 204 college-aged students (M=19.53, SD=2.02) enrolled in general education courses at Fort Hays State University and 44 juvenile correctional security staff (M=37.76, SD=11.55).

Results indicated only 63.2% of students felt knowledgeable about juvenile mental illness compared to 77.1% of the security staff. However, 80.4% of college students agree mental illness has an influence on juvenile delinquency, agreeing with 85.7% of security staff. No significant differences in general stereotypes were found among security staff (M=4.47, SD=1.14) and college students (M=4.49, SD=0.48), $t(46.34)=0.11$, $p>.05$. However, significantly less security staff (M=2.80, SD=1.21) believe there is an increased need for mental health treatment for youth in the juvenile justice system, compared to college students (M=2.00, SD=0.93), $t(62.28)=-4.29$, $p<.005$. Implications for these findings have important and far reaching implication. For example, this research will close the existing literature gap, and may help inform facilities and mental health professionals of specific stigmas in the justice system. Further implications will be discussed.

Poster # 9

Student: Sara Nansel

Year: Senior

Department: Biological Sciences

Mentor: Ms. Claudia da Silva Carvalho

Title: Isolation of Soil Microbes to Test Against ESKAPE Relatives for Antimicrobial Properties

Using the scientific method and crowd sourcing, bacteria is being isolated from soil samples to potentially find new antibiotics as part of the Small World Initiative. The ESKAPE pathogens (Enterococcus faecium, Staphylococcus aureus, Klebsiella pneumoniae, Acinetobacter baumannii, Pseudomonas aeruginosa, and Enterobacter species) (Boucher et al.) are a group of bacteria that have developed multi-drug resistance to antibiotics. This presents a worldwide health concern as the commonly used antibiotics to treat these pathogens no longer work. By testing bacteria obtained from soil samples against relatives of the ESKAPE pathogens, the goal is to find new drugs to treat these pathogens. The microbes were isolated from soil collected near an oil well outside of Hays, KS via dilution. Thirty were selected to test against the ESKAPE relatives to observe any inhibitory affects shown through zones of inhibition on lawns of the relatives. After selecting 2 pure isolates showing this property, staining and biochemical testing was done on both confirming the identities of the isolates. Genetic analysis was performed on these organisms to isolate and amplify the 16s ribosome (the bacterial identifying gene). The products were cleaned to send a pure sample of the DNA to Yale University for sequencing. After sequencing it was found that both isolates were of the Bacillus genus. Further biochemical analysis is being performed to isolate the compound exhibiting the antimicrobial properties.

Poster # 10

Student: Jarred Penton & Derek Bartlett-Steede

Year: Junior

Department: Physics

Mentor: Dr. C.D. Clark III

Title: Comparison of Laser Damage Threshold Model to Experiment

The retina is a very sensitive part of the eye, and when working with lasers it's important to understand how the laser interacts with the retinal tissue to cause damage. Recently, a probability-based model was developed to describe the damage threshold trends for multiple pulse laser exposures. We extended this model to create trend lines that vary according to retinal spot size instead of number of pulses. According to this new model, the damage threshold should decrease according to the following relationship,

$$f(x) = 10^{(\text{inverf}(2(0.5 - 0.5 \frac{d^2}{x^2})) * \sqrt{2}\sigma) + U}$$

This equation includes a baseline diameter (d) that is used as the basis of the increasing spot size (x). In addition, σ is the standard deviation of the laser's distribution, and U is the mean of the distribution. The trend lines constructed to show these damage thresholds are in units of irradiance ($\mu\text{J}/\text{cm}^2$) vs. diameter (cm). Using the ANSI database, we collected historical single pulsed spot size varying laser damage threshold data. Plotting this historical data on top of the trend lines show that our predictions are correct and only vary in terms of the slope of the laser used. Most reported slope values were found to be in the range 1.04 to 2.5. This research has shown that methods used for producing multiple-pulsed laser damage threshold trends can be used in the same way to predict varying retinal spot size laser damage threshold trends. This means doubling retinal spot size has the same increase in damage thresholds as firing the same laser twice concurrently.

Poster # 11

Student: Anna Dykeman

Year: Senior

Department: Biochemistry and Molecular Biophysics

Mentor: Dr. Lawrence Davis

Title: Fatty Acid, Phospholipid and Sterol Composition of Salt Cedar (Tamarix spp.) Roots

The salt cedar, Tamarix spp., is found mostly in the southwestern U.S., originally coming from Eurasia. A lot of beneficial properties are not widely known. As one example, Tamarix absorbs a large amount of boron without being damaged. Tamarix can help clear up boron contamination, that was created by burning fossil fuels, running power plants and landfills. Tamarix could be used to keep boron localized; preventing it from going into the ground water. Tamarix can live up to 100 years.

Our initial hypothesis was, that boron resistance may depend on altered root membranes. Tamarix proved to be resistant to boron up to 200 mg/L (ppm) in hydroponic growth experiments with the duration of up to three months. The aim of this study was to explore routes of boron transport in Tamarix. First, we looked at root lipids including fatty acids (FA), sterols and phospholipids, analyzed by different methods. The root FAs were analyzed by gas chromatography. Lipid types were determined via thin layer chromatography (TLC). In another experiment lipid composition of phospholipids was determined by mass spectrometry (MS). There were no major differences in the root lipids between treatments, caused by boron. Composition of phospholipids was not altered in levels up to 200 ppm of boron in the nutrient solution. It appears that boron tolerance does not depend on changes of root lipids in Tamarix. The next step is to examine root membrane proteins.

Poster # 12

Student: Maria Fernanda De La Torre

Year: Senior

Department: Computer Science

Mentor: Dr. William Hsu

Title: Faster Annotation Interfaces for Learning to Filter in Information Extraction and Search

This work explores the design of an annotation interface for a document filtering system based on supervised and semi-supervised machine learning, focusing on usability improvements to the user interface to improve the efficiency of annotation without loss of precision, recall, and accuracy. Our objective is to create an automated pipeline for information extraction (IE) and exploratory search for which the learning filter serves as an intake mechanism. The purpose of this IE and search system is ultimately to help users create structured recipes for nanomaterial synthesis from scientific documents crawled from the web. A key part of each text corpus used to train our learning classifiers is a set of thousands of documents that are hand-labeled for relevance to nanomaterials search criteria of interest. This annotation process becomes expensive as the text corpus is expanded through focused web crawling over open-access documents and the addition of new publisher collections. To speed up annotation, we present a user interface that facilitates and optimizes the interactive steps of document presentation, inspection, and labeling. We aim towards transfer of these improvements to usability and response time for this annotator to other classification learning domains for text documents and beyond.

Poster # 13

Student: Jakob Hanschu

Year: Junior

Department: Sociology, Anthropology, and Social Work

Mentor: Dr. Lauren W. Ritterbush

Title: Quantifying the Qualitative: Locating Burial Mounds in North-Central Kansas

Scattered through parts of northeastern and north-central Kansas are prehistoric burial sites in the form of low rock and earthen mounds located atop bluffs overlooking stream valleys. In Kansas, the Unmarked Burial Sites Preservation Act (UBS) exists to protect these sites, but this law is only effective if the location of these features is known. Most prehistoric mounds in this region are subtle in appearance, making them difficult to recognize. If sites are not recorded and protected, they may be unintentionally or intentionally destroyed, erasing some of Kansas's prehistoric heritage. Using Geographic Information Systems (GIS) software and the Kanas State Historical Society Archaeological Site Inventory, a map was created pinpointing the locations of recorded burial mounds in Clay, Geary, Pottawatomie, Riley, and Wabaunsee counties. Geographic associations of known mounds relative to topographic and hydrologic features were highlighted in order to recognize spatial patterns and simple statistical procedures were used to predict areas with high potential for past use as prehistoric burial sites. Samples of these areas were targeted for pedestrian survey to identify and record additional burial mound features with the overall goal of helping protect prehistoric burial sites in northeastern Kansas. Four burial mound sites were recorded because of these surveys, raising the effectiveness of Kansas's UBS law and increasing the preservation of cultural resources in the state.

Poster # 14

Student: Jazmine Snow

Year: Junior

Department: Biology

Mentor: Dr. Nicholas A. Wallace

Title: Targeted Therapeutics to Treat Cancers Derived from Human Papillomavirus

Human Papillomavirus (HPV) causes nearly every cervical cancer, with approximately 14 million infections annually in the United States. Kansas is ranked 46th out of the 50 states and Puerto Rico on HPV vaccination percentages, with less than 50% of our citizens being up to date on their HPV vaccinations in 2016. HPV causes 6 different types of cancer by manipulating the host cells. These changes were categorized by comparing data from 144 patients and found increased expression of genes needed for replication and for a DNA damage tolerance pathway, the translesion synthesis (TLS) pathway. This led to the hypothesis that increased cell growth will result in an induction of proteins in this tolerance pathway.

To test this hypothesis, an assay was created to test if cell growth could be modulated by restricting access to growth factors. Human foreskin fibroblasts (HFFs) were grown in a gradient of growth factor concentrations. When the cells with the highest concentration of growth factors neared confluence, all cells were harvested and counted. Consistent with access to growth factors modulating cell growth, this data showed an increase in cell growth with increasing growth factor concentration. Proteins from parallel treated cells were also harvested and showed that TLS protein levels mirrored growth rates.

Despite higher TLS protein levels, HPV-caused cancers cannot utilize the DNA damage tolerance pathway. This inhibition sensitizes cells infected with HPV to an existing class of cancer drugs, DNA crosslinkers, indicating a potential targeted drug against HPV-derived cancers.

Poster # 15

Student: Katelyn Thomson

Year: Senior

Department: Animal Sciences and Industry, Swine Nutrition

Mentor: Dr. Cassandra Jones

Title: Evaluation of Medium Chain Fatty Acids as a Dietary Additive in Nursery Pig Diets

A total of 360 nursery pigs were used in a 35-d study to evaluate the effects of dietary inclusion of medium chain fatty acids (MCFA; C6, C8, and C10) on growth performance. Medium chain fatty acids have previously been studied as antibacterial and antiviral compounds. This experiment sought to determine which level of blended MCFA or individual MCFA could improve growth performance. For the study, pens of pigs were assigned to 1 of 8 dietary treatments in a randomized block design by BW with 9 pens/treatment. Treatments were fed for 35 d and consisted of: 1) control diet without MCFA; 2-5) control diet containing a 1:1:1 blend of C6:C8:C10 at 0.25, 0.50, 1.0 or 1.50%; 6-8) control diet containing 0.50% C6, C8 or C10. Pig weights and feed disappearance were recorded weekly. From d 0 to 35, pigs fed increasing MCFA blend had improved ($P < 0.05$) ADG, ADFI and G:F compared with the control. Specifically, ADG and G:F were improved by 11.6% and 5.8%, respectively, when comparing the 1.5% MCFA blend with the control. Pigs fed C6 or C8 had increased ($P < 0.05$) ADG and G:F compared with the control. In conclusion, increasing levels of MCFA blend and feeding either C6 or C8 improved pig performance. Thus, the use of MCFA in nursery pig diets offers significant potential to improve growth performance, thus increasing economic return for producers and making pork production more sustainable. Additional research should be done to determine the effects of MCFA as a potential antibiotic alternative.

Pittsburg State University**Poster # 16**

Student: Wesley Brantley

Year: Senior

Department: Chemistry

Mentor: Dr. Santimukul Santra and Dr. Tuhina Banerjee

Title: Functional Magnetic Nanosensors for the Fast and Accurate Detection of Bacterial Contaminants in Platelet Concentrates

In transfusion medicine, contamination of blood products continues to pose a serious challenge. Importantly, blood platelet concentrates are known to be frequently contaminated with bacteria due to the storage conditions and often leads to a fatal condition sepsis. According to CDC estimates 250,000 Americans die every year from sepsis. Current diagnostic assays for the detection of bacteria in transfused platelets mostly rely on culture based techniques and are often laborious and time consuming.

In recent years nanotechnology has been extensively used for the detection of bacterial targets while offering greater sensitivity and faster detection kinetics. This presentation will primarily focus on magnetic relaxation techniques for the fast and sensitive detection of bacteria in platelet concentrates and whole blood using magneto-fluorescent nanosensors. The magnetic relaxation property of our nanosensors enabled low CFU counts detection in whole blood and platelet concentrates. Unique pairing of magnetic relaxation with fluorescence will allow us to discriminate between two potentially contaminating bacteria in platelet concentrates: *Staphylococcus epidermis* and *E. coli*. Additionally our results demonstrate the potential application of magneto-fluorescent nanosensors for the quantitative assessment of fast and slow growth kinetics of bacteria.

Poster # 17

Student: Mallory Gibson

Year: Senior

Department: Biology

Mentor: Dr. Virginia Rider

Title: The Role of Wingless 4 (WNT4) in Uterine Decidualization

The processes of stromal cell proliferation and differentiation in the mammalian uterus requires a specific series of signals regulated by the female sex steroids estradiol and progesterone. Proliferation and differentiation of stromal cells, called decidualization, is required for successful embryo implantation in many species including humans. Previous research in our laboratory showed that in the rat uterus, WNT4, WNT5a, WNT7a, and WNT7b are expressed in the stroma in response to progesterone and estradiol. Wnt5 was the only WNT family member expressed in the uterine stroma in response to progesterone alone. Knockdown of Wnt5 expression in uterine stromal cell lines suppressed stromal cell proliferation. To clarify the role of Wnt4 in decidualization, quiescent rat uterine stromal cell lines (UIII) were stimulated to proliferate with progesterone (1 μ M) and fibroblast growth factor (FGF, 50 ng/ml). Some cells were transfected with scrambled siRNA while other cells received Wnt4 specific siRNA. The proliferative response was assessed using the MTT assay. Progesterone plus FGF increased stromal cell number in the presence of scrambled and Wnt4-specific siRNA ($p < 0.05$, Mann Whitney test). Real-time PCR revealed Wnt4 mRNA only in stimulated stromal cells transfected with scrambled siRNA. These results indicated Wnt4 signaling is not required for stromal cell proliferation. Studies in progress are investigating the role of Wnt4 in stromal cell differentiation.

Poster # 18

Student: John Hey and Sanket Bhoyate

Year: Senior

Department: Biology and Polymer Chemistry

Mentor: Dr. Ram K. Gupta and Dr. Anuradha Ghosh

Title: Screening of polyacrylonitrile nanofibers infused with silver and other allied nanoparticles for antimicrobial applications

The applications of nanoparticles are virtually unlimited and the solutions offered by modern nanotechnology are becoming more widespread. Electrospinning is a well-established technique that can be used to tailor nanofibers with specific diameter to obtain desired properties. In this study, silver was used as an effective antimicrobial agent against different biological pathogens, while polyacrylonitrile (PAN) was used as a bioactive polymer that is compatible with and easily degradable by the human body. The main objectives of this study were: a) to design PAN nanofibers infused with silver and other (hydroxyapatite, copper oxide, selected antibiotics, or detergent) allied nanoparticles; b) to determine the effect of prepared infused nanofibers on the viability of antibiotic-resistant bacterial strains and pathogenic fungal strains. The PAN nanofibers were prepared in 10% PAN solution by electrospinning process. In order to embed the silver particles in nanofibers, silver precursor was added to make different solutions with 2%, 6%, and 10% concentration. The fibers were then subjected to UV irradiation for 2 hours to obtain active silver nanoparticle embedded PAN nanofibers. Selected microbial strains were spread plated on Mueller-Hinton agar. Sterile discs impregnated with infused PAN nanofibers were placed and incubated at various temperatures and for different time periods. The zones of inhibition were recorded and charted for comparison. Further, the effect of infused nanofibers with potential antimicrobial activity on biofilm formation as well as on mammalian cell lines will be evaluated. The outcome of this study should have implementation in biomedical sciences and technology.

Poster # 19

Student: Kelly Mallatt

Year: Senior

Department: Biology

Mentor: Dr. Christine Brodsky

Title: Remediation of Tar Creek: Ecological Diversity and Potential Human Health Impacts

A variety of human health and biodiversity risks are often the result of habitat alterations in human-dominated ecosystems, particularly due to greenspace removal and increased pollutant concentrations. In this study, we asked how habitat remediation of a heavy-metal contaminated area impacts biological diversity and nearby residents. We surveyed 22 locations at the Tar Creek Superfund site in various stages of remediation. We sampled each location's vegetation and bird communities in May – July 2017 and analyzed community data through Bray-Curtis ordination plots, and a series of regression and ANOVA analyses. We observed 59 bird species and 21 tree species across the mined area. The remediated locations were composed of grasses and forbs, in contrast to the un-remediated locations which were dominated by mining waste and trees. Bird species richness varied significantly across the remediation gradient with the greatest species richness the 4-year post-remediation sites. A similar trend was observed with species abundance, with the most birds found in the remediated locations. Species communities differed across remediation site, often following life history traits and habitat associations. Regarding human health, the effects of mining-caused elevated lead exposure to humans and wildlife are well documented. There is substantial data correlating psychological and physical health with exposure to greenspaces emphasizing the value of remediation. Future portions of this study will analyze the human dimensions and health impacts of remediation efforts in the Tar Creek community, particularly for Quapaw Tribe residents.

Poster # 20

Student: Tucker Morey

Year: Senior

Department: Chemistry

Mentor: Dr. Pawan K. Kahol and Dr. Ram K Gupta

Title: Hydrogen Generation Using MoS₂ Decorated Polymeric Nanofibers

Hydrogen is one of the most efficient and renewable energy resources which can be generated efficiently via water splitting. However hydrogen evolution occurs at high overpotential, and efficient hydrogen evolution catalysts are desired to replace state-of-the-art catalysts such as platinum. Here, we report an efficient and stable electrocatalyst that has low overpotential, efficient charge transfers kinetics and low Tafel slope. Polymeric nanofibers were synthesized by electrospinning polyacrylonitrile followed by carbonization. The carbonized polymeric fibers were decorated with MoS₂ using a facile hydrothermal process. Microstructural analysis of MoS₂ decorated fibers showed flower-like morphology with vertical pedals. Hydrogen evolution reaction of MoS₂ decorated over polymeric fibers was compared with MoS₂ without any fibers and with commercial MoS₂. MoS₂ grown over fibers and MoS₂-synthesized produced about 374 and 98 times higher current density at -0.30 V compared with the MoS₂-commercial sample, respectively. The enhanced catalytic activities of polymeric nanofibers decorated with MoS₂ is due to large electroactive surface area, more exposure of edge sulfur to the electrolyte, and easy charge transfer from MoS₂ to the electrode through conducting fibers. Our study suggests that earth-abundant materials and the cost-effective process can be combined to produce efficient electrocatalysts for hydrogen production via water spitting. Other Team Members: C. Zhang, Z. Wang, S. Bhoyate, Brooks L. Neria, Venkata Vasiraju, Gautam Gupta, Soubantika Palchoudhury, S. R. Mishra, Felio Perez.

Poster # 21

Student: Connor Armstrong

Year: Senior

Department: Geology

Mentor: Dr. Chi Zhang

Title: Near Surface Geophysical Monitoring of Organic Contaminants

The ability to monitor near-surface sediment and ground water for contaminants is vital. This task can be challenging, however with the use of various geophysical techniques it can be done. In this study, we examined how well organic contaminants can be detected using the geophysical method, SIP (Spectral Induced Polarization). Column containers were packed in the lab with 30 milliliters worth of varying ratios of deionized water, toluene (organic contaminant), pure quartz silica sand, and sodium-montmorillonite clay until fully saturated. SIP tests were conducted on the sediments in order to compare their corresponding impedance phase and magnitude values. Though data processing is still underway, we expect to calculate conductivity values from the impedance data in the hopes of forming a measurement of how contaminated the sediment is. This study could benefit the environment greatly when applied to the cleanup of harmful chemical spills. In addition, it may be highly useful to environmental and oil companies facing the problem of evaluating a contaminated area of the subsurface. This method could help quantify the volume of porous media contaminated, and the degree of contamination in order to keep their project area clean and cost-efficient.

Poster # 22

Student: Emily Casteen

Year: Junior

Department: Psychology

Mentor: Dr. Bruce Liese

Title: Addressing the Opioid Epidemic in Kansas: It begins with professional continuing education for health care professionals

Ninety-one Americans die from opioid overdoses each day (Center for Disease Control and Prevention). The opioid epidemic impacts Kansas, just as it does every other state in the US; forty-five percent of the 1,500 Kansas drug related deaths between 2012 and 2016 were caused by an opioid overdose (Kansas Health Institute). The healthcare professionals who provide addiction services need specialized training, which varies in availability from state to state. Increasing access and participation in addictions-related education is crucial to reduce this loss of life. This training is usually acquired through continuing education. Addictions-related continuing education programs fill an important void, as addictions psychology is often not extensively covered in providers' training programs. The purpose of this study was to assess the availability of substance use and addiction training for health care professionals who work in Kansas. The American Psychological Association (APA) is among the professional organizations that certify educational programs in the United States, and the APA lists the programs that have been approved to provide continuing education in psychology (including addictions). In this study we fully searched the APA directory online to determine the availability of education in Kansas, compared to 14 other states in the US. We found that only one addiction-related continuing education course is based in Kansas. This number is small, especially when compared to the other states we studied. In our poster we speculate about the reasons for this dearth of continuing education in addictions, and we make specific recommendations to remedy this situation.

Poster # 23

Student: Matthew Dunn

Year: Senior

Department: History

Mentor: Dr. Andrew Denning

Title: Re-Imagining the Community: Fostering a Belgian Identity Through the Clandestine Press During World War I

This paper investigates how issues of Flemish, Walloon, and pan-Belgian identity played out in the clandestine press during the First World War as well as how the occupying German administration sought to exploit these conflicts to facilitate their governing of the country. Through studying these events, historians will be better able to understand how differing national identities can be reconciled and subsequently re-constructed. By analyzing articles found in the clandestine press and considering them within their historical context, scholars can observe how authors of prohibited newspapers hoped to construct a pan-Belgian upon the pillars of Belgian identity: Catholicism, anti-Germanism, and loyalty to the Belgian Crown.

Poster # 24

Student: Alix Fisk

Year: Sophomore

Department: Applied Behavioral Science

Mentor: Dr. Vincent Francisco

Title: Adverse Childhood Experiences (ACEs) and Adult Health Outcomes

One of the primary ways to assess childhood trauma is through a survey called the Adverse Childhood Experiences (ACE) test. Researchers have found that as the number of ACEs (also known as ACE scores) increases, the risk for negative health outcomes also increases, including adoption of risk-taking behaviors, chronic illness, disability, and early death. However, the traditional ACE test only takes into account family-related experience, not neighborhood or structural exposures. Additionally, it has mainly been carried out among less diverse and more affluent populations. This study examined household and community-level ACEs in a population of primarily poor, minority adult residents in the Hi-Crest neighborhood in Topeka. Hi-Crest has some of the highest rates of poverty and crime in the city, and among the lowest rates of homeownership and property values. This research was conducted in collaboration with NET Reach, a branch of the Topeka Rescue Mission and the community's primary outreach organization. This research will benefit the members of the Hi-Crest community by providing the data and analysis the organization needs to better address the adverse effects of the childhood trauma on the adult residents, through future programs and practices. More broadly, it will advance scholarly research on the intersection of community-level exposures and ACE scores.

Poster # 25

Student: Shea O’Sullivan

Year: Senior

Department: History

Mentor: Dr. Jonathan Hagel

Title: “Associated Women Sycophants”: Sorority Women and Changing Gender Roles at the University of Kansas, 1950s-1970s

My research topic is sororities at the University of Kansas from the 1950-1970, and how the institution of sororities perpetuated a more conservative gender role for women than were had of other women of the University. By focusing on the areas of sorority life, such as rules and regulations, and studying the records of women’s group on campus, such as the Associated Women Students, a narrative of the different values women had during that time period can be formed by contrasting sororities with women of the ‘New Left’. I am hypothesizing that during the tumultuous time at KU during the Women’s Liberation movement and second wave feminism, sororities resisted social change by reinforcing conservative roles for females. Furthermore, I believe that this remains true today, and that as social change is accelerating on college campuses, sororities are slower to follow, and aim to extrapolate my research into conclusions on present day dynamics in third wave feminism.

University of Kansas - Medical Center

Poster # 26

Student: Abdulrahman Alsulaiman, Minahal Baig, Mohammed Bin Daeag, and Kikelomo Ojo

Year: Senior

Department: Respiratory Care Education

Mentor: Dr. Karen Schell

Title: Art Speaks

Medical education is a multidimensional learning experience, presenting many challenges to students. Students in fields of medicine, nursing, and health professions are faced with emerging healthcare technologies, interprofessional education (IPE) and patient-centered care models. Students in medical fields are exposed to clinical education within one of the most complicated and fastest paced environments of the healthcare delivery paradigm (Miller, et al, 2013). As a result, healthcare education requires learners to effectively communicate between a varieties of health care providers in order to provide exceptional patient care. Patient assessment skills and ability to communicate meaningful aspects of patient’s needs are vital skills necessary for providing quality patient care. Students may improve their patient assessment and communication skills by “thinking out loud” while viewing and discussing art in instructor-facilitated groups. This teaching and learning lesson helps students carefully observe and form their ideas into words (Reilly, et al, 2005).

Innovative lesson plans integrating Visual Thinking Strategies that focus on art-viewing to enhance students’ clinical observation and reflective capacity are guiding professional practice skills in medical students. Upon a review of the literature, it was determined there was no previous research on effectiveness of visual thinking and communication strategies that may improve patient care in an IPE setting. The purpose of this study was to develop an innovative education approach (Art Speaks) for improving interprofessional student groups’ abilities to observe and assess the “whole patient”; and examine the impact of Art Speaks on student’s ability to effectively communicate a patient’s plan of care.

Poster # 27

Student: Rebecca Cates

Year: Senior

Department: School of Nursing

Mentor: Dr. Martha Baird and Dr. Carol Buller

Title: Assessing the Mental Health of Refugees Relocated to the Kansas City, Kansas, Area Using the Refugee Health Screener-15 (RHS-15)

Introduction: In 2015, 741 refugees from 15 African and Asian countries were resettled throughout Kansas. Refugees struggle with mental health issues, including anxiety, depression, and post-traumatic stress disorder. As part of the resettlement process, all newly arrived refugees receive physical and mental health screenings.

Purpose: This study analyzed the results from the Refugee Health Screener-15 (RHS-15), a survey that measures mental health symptoms to learn: (1) What mental health symptoms do newly arrived refugees report? (2) What are the associations between refugees' demographic data and their mental health symptoms? (3) What are the experiences and opinions of the healthcare providers who screen newly arrived refugees?

Methods: This study is a retrospective analysis of results from completed RHS-15 surveys collected by nurses at Silver City Health Center (SCHC) in Kansas City, Kansas, from February to November, 2017. The opinions and experiences of the providers who administered the RHS-15 to the refugees also was elicited through individual interviews.

Findings: A total of 83 refugees were screened at SCHC with seven native language versions of the RHS-15. A majority of refugees (63%) had no mental health symptoms. Of those refugees who did report symptoms, the most commonly reported were rumination; muscle, bone, and joint pains; feeling down, sad, or blue most of the time; crying easily; and being jumpier, more easily startled. Further data analysis is ongoing.

Relevance to Kansas: It is essential to identify mental health symptoms in refugees early in the resettlement process in order to provide necessary referral and treatment.

Poster # 28

Student: Mary Katherine Kancel

Year: Senior

Department: School of Nursing

Mentor: Dr. Janet Pierce and Dr. Qihua Shen

Title: Optimal Digital Capillary Puncture for Use in Point-of-Care Instrumentation

Introduction: Point-of-care (POC) testing requires venipuncture blood samples and has not been validated for use with digital capillary blood samples (DCBS). Patients with diastolic heart failure (DHF) often need faster results so health care providers can initiate and implement treatment. One advantage of POC includes faster and easier procurement of blood samples from patients using DCBS.

Purpose: To determine the optimal method of DCBS for accurate POC measurements of lactate and brain natriuretic peptide (BNP).

Methods: A descriptive design was used. Blood samples were obtained from 10 adults using the Accu-Chek Softclix lancing device. The capillary blood was used for lactate and BNP measurements using an i-Stat instrument. Data were collected from the participant's first upper extremity phalangeal digit. The lateral surface of the distal phalanx was punctured to obtain 100 μ L of blood.

Findings: We found that the optimal method of DCBS included warm temperature, 200 μ L manual pipette, 150 μ L tip coated in anticoagulant, phalangeal pressure, and positioning. Ten participants were sampled using the optimal method listed above. Of the 10 blood samples obtained, 8 were sufficient volume to adequately fill i-Stat cartridges. Subjects commented that the Accu-Chek Softclix lancing device caused minimal discomfort.

Relevance to Kansas: The results from this study indicated the optimal method of DCBS to be used in DHF patients to obtain adequate blood volume for important clinical laboratory tests. Rapid i-Stat laboratory results allow healthcare professionals to examine critical values necessary to provide optimal treatment and maximize outcomes for patients in Kansas.

Poster # 29

Student: Ashley Sage

Year: Senior

Department: School of Nursing

Mentor: Dr. Heather Nelson-Brantley

Title: Organizational Sources of Joy and Meaning in Work among Nurses Working in Acute Care Hospitals

Introduction: The National Patient Safety Foundation (NPSF) reported that hospital work environments that are devoid of joy and meaning, where patient throughput pressures and toxic sociocultural norms prevail, are places where patients and the workforce suffer. These environments are associated with nurse dissatisfaction and turnover, costing the healthcare industry \$2 billion per year. It is therefore essential to identify organizational sources that contribute to joy and meaningful work.

Purpose: The purpose of this study was to compare organizational sources of joy and meaning in work among nurses working in acute care hospitals. It was hypothesized that joy and meaning in work varies as a consequence of hospital organization characteristics.

Methods: Data were collected from 265,657 nurses working in 693 U.S. hospitals using the 2016 National Database of Nursing Quality Indicators® RN survey. Three items endorsed by the NPSF were used to measure joy and meaning in work. A one-way analysis of variance was conducted to compare organizational sources (hospital size, teaching status, ownership, and Magnet® status) of joy and meaning in work.

Findings: Nurses working in hospitals that were smaller in size (< 200 beds), were non-teaching, and not for profit reported significantly higher joy and meaning in work.

Relevance to Kansas: Kansas hospitals may provide an important source of information for understanding how to build joy and meaning in work, as most hospitals in Kansas are smaller in size; this includes the highest number of critical access hospitals (which have 25 or fewer inpatient beds) in the nation.

Poster # 30

Student: Megan Wagner

Year: Senior

Department: School of Nursing

Mentor: Dr. Jill Peltzer

Title: Acceptability and Use of Apps for Psychological Wellbeing among HIV-Infected African American Women

Introduction: HIV/AIDS remains a significant health concern for African American (AA) females. Psychological distress is a pervasive symptom post-diagnosis that can negatively influence the HIV trajectory among this group of women. Interventions integrating cognitive-spiritual methods have not been reported, but hold promise for reducing psychological distress among this population.

Purpose: The primary purpose of this study is to evaluate the efficacy and feasibility of a cognitive-spiritual intervention on reducing psychological distress among 15 HIV-infected AA women. A secondary purpose is to examine the acceptability of the technology-based delivery, including the use of Smart Phone Applications (Apps).

Methods: This pre-post intervention pilot study will evaluate a six-session intervention delivered via Zoom technology and iPad. The participants can use evidence-based Apps focused on breathing exercises and meditative practices. They record the frequency, duration, and mood state. Post intervention, data will be collected from the participants about the use of the Apps and will be analyzed using descriptive statistics and content analysis.

Findings: We will present the findings about the participants' reports regarding the acceptability and use of the Apps, including if the apps effected mood state.

Relevance to Kansas: HIV disproportionately affects AA in Kansas. Although they only make up ~6% of the Kansas population, 25% of HIV-infected individuals are AA. AA women are 15 times more likely to be infected than their European American counterparts. Technology, including Apps, that promotes confidential, person-centered care to reduce psychological distress is imperative for achieving positive HIV-related health outcomes among this vulnerable population of women.

Poster # 31

Student: Charlie Blomstrom

Year: Senior

Department: Psychology

Mentor: Dr. Cindy Turk

Title: The Relationship Between Sales Call Anxiety and Burnout Among Commission Salespeople

Problem: Sales jobs requires sustained mental effort and continuous interpersonal interaction. This intense work-environment can strain attentional and emotional resources. Social anxiety can exacerbate this problem, especially social anxiety related to sales interactions (Verbeke & Bagozzi, 2000). Sales call anxiety (SCA) is a type of social anxiety that involves fear of receiving negative evaluation or rejection from customers, causing urges to avoid contact with them and reluctance to ask for commitment (Verbeke & Bagozzi, 2000). These feelings of anxiety are likely to make afflicted salespersons less effective in their role and lead to burnout. Burnout is described as a syndrome characterized by emotional exhaustion, depersonalization, and diminished personal accomplishment (Cravens, Grant, & Moncrief, 2001). Though burnout has been primarily associated with human service industries such as medical care, research has shown that salespeople may be more likely to suffer burnout than those in other occupations. It is possible that the increased stress associated with SCA may have an effect on burnout among commission salespeople. The purpose of this research is to determine the relationship between SCA and employee burnout among commissioned salespeople in the automotive industry. It is hypothesized that higher levels of SCA will be associated with greater burnout.

Method: The sample consisted of 28 salespersons (26 male, 1 female, 1 non-identifying) from car dealerships in a large Midwestern city. Participants completed a SCA inventory describing anxiety felt during closing situations in sales and the Maslach Burnout Inventory General Survey (MBI-GS). Questionnaires were administered individually on a laptop using SurveyMonkey.

Results: Significant positive correlations between all subscales of the SCA measure (Anxiety Cognitions, Physiological Symptoms, and Protective Actions) and the exhaustion and cynicism subscales of the MBI-GS were observed. SCA was not related to one's sense of professional efficacy or feelings of achievement in one's work.

Conclusions: Consistent with hypotheses, salespersons with greater SCA appear to be at greater risk for burnout. The implications of these findings for commissioned sales people and their employers will be discussed. Direction for future research will also be proposed.

Poster # 32

Student: Sarah Dweik

Year: Senior

Department: Communications

Mentor: Dr. Tracy Routsong

Title: Pine Ridge Perceptions: Approaching Community Understanding Framed Through the Double ABCX Model

Poverty impacts health (Conway, 2016). One organization that works with those in poverty within the city of Topeka is Pine Ridge Manor a community within Topeka Housing Authority (THA, Inc.) through the Department of Housing and Urban Development. This research is a part of a multi-tiered project based on a grant Classroom to Community which is an interdisciplinary team through the Schools of Business and Nursing and the department of Communication Studies, along with THA, Inc. and residents of Pine Ridge. The research question was: What are individual's health perceptions in the Pine Ridge Manor community? Data collection occurred twice, once in December and once in June with a 30% participation rate. Using the Double ABCX Model (McCubbin & Patterson, 1983), stressors, resources, and perceptions of health were identified through disaggregating the surveys. Some key stressors included concerns about crime, access to healthy foods and safe exercise environments, ability to pay bills or for medicine. Surprise findings involved information dissemination of current services and use of emergency room as primary care. It is suggested that there needs to be better information dissemination of current services, as well as the continued development of new services at Pine Ridge.

Poster # 33

Student: Diana Hall

Year: Senior

Department: Psychology

Mentor: Dr. Jericho Hockett

Title: Employees' Perceptual Influence on Organizational Change

To survive the dynamic environments of corporate industries today, organizations must be adaptive and resilient to stay relevant against competitors. Successful implementation of organizational change (OC) is widely based on employees' perceptions of the changes (Cullen, Edwards, Casper, & Gue 2013). The purpose of this study was to illuminate the role of employees as an integral element in successful application of OC initiatives (Choi, 2011). We analyzed qualitative data's consistency with theoretical dimensions suggested in previous literature to underlie employees' OC perceptions, including employees' levels of organizational trust (e.g., Liu & Wang, 2013), perceptions of the relationship quality with leaders (e.g., Furst & Cable, 2008), and expectations of OC outcomes (e.g., Allen, Jimmieson, Bordia, & Irmer, 2007). These themes did emerge from participant responses, as did theoretical dimensions less well represented in the literature (e.g., the source of employee motivation, organizational hierarchies). We address limitations and offer future research suggestions.

Poster # 34

Student: Holly Johnston

Year: Junior

Department: Psychology

Mentor: Dr. Mike Russell

Title: Perception of Approaching and Retreating Sounds: Influence of Individual and Acoustic Factors

Generally speaking, individuals are highly capable of using sound to judge whether an object is in motion. Research involving auditory motion has also focused on the ability of individuals to determine whether a sound is approaching or retreating. That research has revealed individuals are significantly better at recognizing approaching (looming) sounds than withdrawing ones. The current theory explaining such findings is that it is more important to our safety to be able to recognize approaching sounds than retreating sounds. Previous research has revealed that auditory motion perception is affected by both individual factors (e.g., women showed significantly greater underestimation of time of arrival) and acoustical factors (e.g., perception of motion direction is tied intimately to signal intensity). While previous research has examined perception of motion across a single dimension, sound-producing objects often move across multiple dimensions simultaneously. The present study examined the ability of individuals to judge the direction of motion across two dimensions (distance and elevation). The sounds were footsteps of an individual walking up or down a set of stairs, toward or away from the recording device. In addition to assessing whether a sound was approaching or retreating, participants were also required to determine if the pedestrian was walking up or down the stairs. Overall, participants were significantly more accurate at judging approach/withdrawal than up/down. Results further revealed, contrary to previous research, that males and females were equally accurate at judging approach/withdrawal. While judgments of motion direction were seemingly unaffected by the speed of motion or the overall intensity of the pedestrian's steps, judgments were notably affected by whether participants were exposed to the peak change in signal intensity. Discussion will be given to the extent to which judgments of motion in the anterior-posterior plane as well as the vertical plane are affected by individual and acoustic factors. The results of the present study have far-ranging implications (e.g., eyewitness testimony, combat, driving safety).

Poster # 35

Student: Reegan Miller

Year: Senior

Department: Biology

Mentor: Dr. Matt Arterburn

Title: Karyotype Variation in Early Generation Polygeneric Wide Hybrids of Perennial Wheat

Perennial wheat breeding lines are produced by crossing annual hexaploid bread wheat (*Triticum aestivum*, $2n = 6x = 42$, AABBDD) with perennial wheatgrass species such as tall wheatgrass (*Thinopyrum elongatum*, $2n = 14$, EE) and intermediate wheatgrass (*Thinopyrum intermedium*, $2n = 6x = 42$, EEJSS). The hybridization process is usually followed by doubling chromosome content with colchicine so that each chromosome has a pairing partner. These hybrids exhibit a perennial life cycle and are useful in sustainable agriculture systems. When these perennial wheat lines are used in crosses to other wheat varieties, subsequent generations experience considerable chromosome number variation. We performed cytological examination of a unique set of perennial wheat crosses, involving various *Thinopyrum* parents, that were performed without the use of colchicine. We examined F1, F2 and F3 specimens of these crosses. Expectedly, chromosome number varied considerably in the specimens examined. Fertility rates were very low and multiple specimens were completely sterile. We used genomic in situ hybridization (GISH) to identify the genome origins of the chromosomes present, and detected considerable variation among the alien chromosomes.

Wichita State University

Poster # 36

Student: Faye Alruwaili

Year: Senior

Department: Biomedical Engineering

Mentor: Dr. Kim Cluff

Title: Heart-Ventricular Blood Volume Assessment Using Non-Invasive Skin Patch Sensor

The importance of ventricular stroke volume (SV) for the assessments of cardiac function has been clearly investigated. Thus, the focus of this study was to develop a simple to use, point-of-care sensor that could be applied like an adhesive bandage that could potentially measure SV. A patch sensor was designed from a single baseline component, comprised of a trace of copper, configured into a square planar spiral. The sensor self resonates when impinged upon by a specific range of radio frequency (RF) waves. Human participant (Supine and HDT) and Biological Model were utilized to measure stroke volume. Shifts in the sensor's resonant frequency were registered as blood volume changes throughout the cardiac cycle. A statistical correlation analysis and ultrasounds measurements were performed to determine the sensor performance in measuring SV. Changes in the dielectric properties in the left ventricle (LV) due to changes in fluid volume were directly correlated to the measurements of SV. Stroke volume was registered as shifts of 80.16 kHz, and 618.3 kHz (Supine) & 634.92 kHz (HDT) in bovine and human participant, respectively. Shifts in the principal resonance frequency and volume changes in the LV had a statistical correlation of $R^2=0.9849$. Ultrasound shows an increase in volume of 5 mL. This work presents a foundation for the development of a skin patch sensor that may be used as a non-invasive, point of care diagnostic to identify abnormal heart function by assessing the fluid dynamic of the LV chamber.

Poster # 37

Student: David Elzinga and Shelby Stowe (Sterling College)

Year: Senior

Department: Biological Sciences

Mentor: Dr. Leland Russell

Title: Modeling Control Method Combinations to Manage the Sylvatic Plague in Black-Tailed Prairie Dog Towns

The bacterium *Yersinia pestis* is the foundation of the sylvatic plague, an infectious disease that causes epizootics in Black-tailed Prairie Dogs (*Cynomys ludovicianus*). These epizootics prove dangerous for Black-tailed Prairie Dogs as well as for the survival of species that depend upon them, particularly the Black-footed Ferret (*Mustela nigripes*). Previous research has sought to understand and compare transmission routes of the plague, in particular the common vector, the Prairie Dog Flea (*Oropsylla hirsuta*). We present a model to determine optimal control methods to sustain a Black-tailed Prairie Dog town against the plague, including the implementation of a recently developed and tested vaccine. For our host submodel we create a Susceptible, Exposed, Infectious, Vaccinated model, and for our vector submodel we create a Susceptible, Exposed, Early-Stage Transmission, and Late-Stage Transmission model with questing and on-host vectors. Both submodels operate using a hybrid ordinary differential equation and difference equation model with respect to the phenology of Black-tailed Prairie Dogs. We conclude with a discussion about optimal combinations of control methods and their implementation to sustain a town's population.

Poster # 38

Student: Louis Gomez

Year: Senior

Department: Biomedical Engineering

Mentor: Dr. Jaydip Desai

Title: Implementation of Artificial Neural Network on EEG Signals for Classification

Brain-Machine Interface (BMI) technology has the potential to restore physical movement but requires an accurate classification of human brain patterns in real time to generate commands for digital devices. Researchers have shown the use of BMI technology to control a computer cursor, a robotic wheelchair, an artificial limb, and even a quadcopter but due to nonlinearity in EEG signals and movement artifacts, EEG controlled devices don't offer stability in a real-world scenario. Artificial Neural Networks (ANN) play an integral step in this larger process as they can be applied to classify the given data in order to provide a means of sending commands to digital devices. This work details the accuracy of ANN's in classifying motor imagery signals recorded from Electroencephalography (EEG) signals at a 256 sampling rate. The recorded data was processed through signal processing techniques and features were extracted for use as feature vectors in the network. Simulink and MATLAB's Neural Network support package were used extensively to perform the needed operations. Scaled Conjugate Gradient and Resilient Backpropagation were used as the training algorithm. To provide varying accuracies, the training algorithm and the number of hidden neurons in the hidden layer are varied for this study. The network was trained several times and the optimum accuracy of both training algorithm and number of hidden neurons was 97.2%. The results of this study show that ANN's given the right training algorithm and number of hidden neurons in the hidden layers, can adequately classify EEG patterns associated with imagination.

Poster # 39

Student: Abdul-Mannaan Giles

Year: Senior

Department: Medical Laboratory Sciences

Mentor: Dr. Diana Cochran-Black

Title: Aerobic Exercise Sustains Performance of Instrumental Activities of Daily Living in Early-stage Alzheimer's

Alzheimer's disease (AD) is a debilitating neurodegenerative ailment that causes brain atrophy and memory loss. Individuals with AD experience progressive loss of independence performing instrumental activities of daily living (IADL). IADLs are those actions that allow an individual to function independently, such as maintaining hygiene, managing money and preparing meals. Thus, it is imperative to identify interventions that support independence, and reduce the economic and psycho-social burden of care giving for individuals with AD. The purpose of this investigation was to examine functional disability and caregiver time in individuals with early-stage AD, and explore if specific exercise regimens could improve these areas. We completed a 26-week trial of aerobic exercise (AEx) vs strength and toning (ST) for patients with early-stage AD. Each AD exercise group was assessed for functional dependence, required caregiver time, and cognition using standard battery assessments before and after their respective exercise regimens. Results showed a stable function in the AEx group compared to significant decline in ST group. This was especially evident in more complex instrumental activities of daily living (such as financial planning). Individuals in the AEx group increased 1% compared to an 8% loss in the ST group over 26 weeks. Negative changes in memory correlated with declining performance of instrumental activities of daily living for both groups. This analysis extends recent work by revealing specific benefits for instrumental activities of daily living for individuals in the early stages of AD and supports the value of aerobic exercise for individuals with cognitive impairment.

Poster # 40

Student: Henry Postoak

Year: Senior

Department: English and Linguistics

Mentor: Dr. Mythili Menon

Title: Local Identity and the Language of Craft Beer

As consumer tastes have increasingly valued variety and local authenticity over the convenience of mass-market uniformity, craft brewing has grown into a means through which consumers construct a sense of local identity and community (Schnell and Reese 2003, Rojack and Cole 2015, Moore, Reid & McLaughlin 2016). The alignment that brewpubs and microbreweries create with their local community and in relation to the beer industry at large, which is dominated by what are contrastively called 'macro-breweries,' are represented in the types of appeal found in their beer bottle labels. The text of 5 micro- and 4 macro-brewery labels were linguistically analyzed through aspects such as word count and references to location, and coded as descriptive, concerning production, ingredients, or flavor; autobiographical, telling the brewery's story; or worldbuilding, evoking imagery instead of providing information. Micros repeatedly named their location, telling its, and their, histories while macros cited history in emphasizing the tradition of mass-production.

