President’s Excellence in Research Scholars Research Symposium

February 9, 2022

Thompson Student Center

Sponsored by the Division of Research, Innovation and Economic Development
**Program Overview**

Welcome to Tarleton State University’s inaugural President’s Excellence in Research Scholars Symposium, celebrating the life-changing breakthroughs of our exceptional professors and student researchers.

They’re meeting regional challenges head-on and creating a regional powerhouse for improved quality of life and economic vitality. I’m proud of their scholarship and ingenuity — the core of our elevation to R2 (high research) by the Carnegie Classification of Institutions of Higher Education.

Among other topics, university researchers are probing chemotherapy delivery systems, gender-based violence, dairy cow nutrition, rural communication and healthcare, bioenergy recovery, social media, chronic stress in law enforcement, brain cell death after a heart attack, biodiversity, child development, mental health, pollinators and food production, and disaster epidemiology.

Today you will learn about their discoveries and leave with a new appreciation for the energy it takes to move ideas from mere vision to proof of concept — from the lab to your living room.

My sincerest appreciation to Dr. Rupa Iyer and the Division of Research, Innovation and Economic Development for providing this valuable academic forum.

Sincerely,

Dr. James Hurley
President

Tarleton President James Hurley in 2021 announced $1 million in special funding for faculty-led student research. Today we get an up-close look at some of the 51 projects made possible by the President’s Excellence in Research Scholars (PERS) initiative.

Student posters and professors’ oral presentations showcase Tarleton’s commitment to robust discovery and entrepreneurship. Learn how skilled student researchers and distinguished faculty members are reshaping what we know about everything from novel drug delivery systems to mapping broadband access. The quality of their research is exceptional, its impact far-reaching.

Thank you for taking time to explore Tarleton’s scholarly and creative activities. We’re doing more and achieving more to enrich our world. The work is more vital than ever.

Sincerely,

Dr. Rupa Iyer
Vice President, Division of Research, Innovation and Economic Development
# Program Schedule

**Wednesday, February 9, 2022**

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>7:30am – 8:30am</td>
<td>Presenter Registration and Poster Setup</td>
<td>TSC Ballrooms A, B, C</td>
</tr>
<tr>
<td>8:30am – 9:00am</td>
<td><strong>Welcome and Opening Address</strong></td>
<td>TSC Ballroom B</td>
</tr>
<tr>
<td></td>
<td>Dr. Rupa Iyer</td>
<td></td>
</tr>
<tr>
<td></td>
<td>President James Hurley</td>
<td></td>
</tr>
<tr>
<td>9:00am – 1:00pm</td>
<td><strong>Poster Sessions</strong></td>
<td>TSC Ballrooms A, B, C</td>
</tr>
<tr>
<td>9:00am – 9:20am</td>
<td><strong>Oral Presentations</strong></td>
<td>TSC Room 27</td>
</tr>
<tr>
<td>9:00am – 9:20am</td>
<td>Dr. Fei Wang</td>
<td></td>
</tr>
<tr>
<td>9:30am – 9:50am</td>
<td>Dr. Bryant Wyatt</td>
<td></td>
</tr>
<tr>
<td>10:00am – 10:20am</td>
<td>Dr. Subi Gandhi &amp; Dr. Jennifer Edwards</td>
<td></td>
</tr>
<tr>
<td>10:30am – 10:50am</td>
<td>Dr. Hoe-Gil Lee</td>
<td></td>
</tr>
<tr>
<td>11:00am – 11:20am</td>
<td>Break</td>
<td></td>
</tr>
<tr>
<td>11:30am – 11:50am</td>
<td>Dr. Scott Cook</td>
<td></td>
</tr>
<tr>
<td>12:00pm – 12:20pm</td>
<td>Dr. Tom Faulkenberry</td>
<td></td>
</tr>
<tr>
<td>12:30pm - 12:50pm</td>
<td>Dr. Jonali Baruah</td>
<td></td>
</tr>
</tbody>
</table>


**Oral Presentations**

9:00–9:20am, TSC 27

Large-Scale Experimental Study on the Use of Biochar to Treat Oil Contaminated Soils

PERS Recipient

Research Area: Civil and Biological Engineering

Faculty Presenter: Dr. Fei Wang

Authors: Dr. Fei Wang and Daniel Martinez

Department: Mechanical, Environmental, and Civil Engineering

Associated Student: Daniel Martinez

Abstract: Oil spills can result in a significant negative impact on the environment, economy and society. A number of oil spill incidents caused by oil pipeline leaks have been reported all over the world. Several types of remediation technologies have been developed including biological, chemical, thermal, and physicochemical methods. Bio-remediation is recognized as the most sustainable and environmentally friendly method. However, two problems limit its application: (1) oxygen is required for the growth of oil degrading bacteria; and (2) treatment is a slow process. Biochar has the ability to solve these problems perfectly by two mechanisms: (1) biochar could absorb oil from soil for immediate oil removal; (2) biochar includes nutrients for the growth of oil degrading microorganisms without oxygen. In addition, biochar is cost-effective and sustainable since it can be produced by wood chips, branches, and sewer sledge. Large scale tests were conducted to consider the several possible influencing factors for the proposed treatment technology. The large-scale tests were conducted in a plastic test box with a dimension of 5 ft x 5 ft x 3 ft. Five large scale tests were conducted to investigate the effects of depth of the biochar barrier (i.e., 2, 4, and 6 inch) and test duration (i.e., 14, 28, and 56 days) on the oil removal efficiency. In addition, after each test, the bacteria number was counted to understand the bacteria growth with and without biochar in soil samples from top, mid-depth, and bottom of the test box. The soil mixture of 80% concrete sand and 20% bentonite by weight was used in the large-scale tests and compacted at optimum moisture content with an initial oil content of 8%. We have the following major findings from the tests in this project: (1) the weight of absorbed oil are approximately 9 times the self-weight of biochar; (2) the absorption stopped after 5 days when we can consider the biochar is saturated with oil; (3) the oil removal rate is time-dependent which decreases with the elapsed time; and (4) the existence of biochar could stimulate the growth of oil degrading bacteria in oil contaminated soils.

9:30–9:50pm, TSC 27

Supraventricular Tachycardia Study Using a Dynamic Computer Generated Atrium

PERS Recipient

Research Area: Biomedical

Faculty Presenter: Dr. Bryant Wyatt

Authors: Dr. Bryant Wyatt

Department: Mathematics

Associated Student: Avery Campbell and Gavin McIntosh

Associated Student Classification/Affiliation: Junior/Engineering and Sophomore/Mathematics and Computer Science

Abstract: The leading cause of death globally is heart disease, followed by strokes. Supraventricular Tachycardia (SVT), though not in itself deadly, is a leading cause of strokes, heart attacks, and heart failure. Therefore, one could argue that SVT is indirectly a leading global killer. SVT is a term used to describe all events where the atria beat too rapidly or out of sync with the ventricles. This out-of-sync beating between the atria and the ventricles can cause blood to pool in the atria creating clots that can then travel to the brain or coronary arteries resulting in a stroke or heart attack. SVT events also greatly reduce the stroke volume of the heart, and if they persist for extended periods of time they can cause a permanent reduction in ejection fraction, possibly resulting in congestive heart failure.

In a normally functioning heart, the sinus node acts as an orchestra conductor and methodically sends out a periodic electrical impulse. This electrical pulse starts a chain reaction throughout the heart causing the heart muscles to rhythmically contract and produce an orchestrated beat. Rogue electrical impulses can cause chain reactions to occur at the wrong place and at the wrong time, disrupting the sinus rhythm. The beating heart is a multi-dimensional nonlinear dynamical system that is sensitive to initial conditions. Hence, SVT events can produce chaotic outcomes that are impossible to predict with great accuracy. Doctors and researchers need a computer-generated dynamical model of the atria that they can perform experiments on. This research creates such a model. The model beats in real-time and can be adjustable down to the individual muscle level. This will allow researchers to create initial conditions that will produce SVT events that they can attempt to eliminate with simulated ablations. This work will greatly increase our understanding of what causes SVT events and how to eliminate them.
COVID-19 Vaccine Initiatives in Rural East Texas

**PERS Recipient**
Research Area: Public Health and Communications
Faculty Presenter: Dr. Subi Gandhi and Dr. Jennifer Edwards
Authors: Dr. Subi Gandhi; Dr. Jennifer Edwards
Department: Medical Lab Science, Public Health, Nutrition Sciences, Communications

**Abstract:** Knowing the needs of rural populations during the pandemic, the investigators applied and secured two external grant funding to address disparities associated with COVID-19 vaccination rates in rural East Texas. We specifically targeted counties with low vaccination rates (< 30%) at the time of grant submission. Through the North East Texas Counts - Vaccine Project, individuals (especially from communities of color) in the six North East Texas regions will be trained to become Vaccine Champions and will be the local trusted voices focused on boosting vaccination efforts. We will also hold community forums to understand the gaps in vaccine access and partner with other community-based organizations in the underserved areas. The project directors have worked with some of these individuals in some capacity on prior projects. We will provide direct outreach through roadside booths, church meetings, and community meetings that will engage the community as well as provide unvaccinated individuals with information about the vaccine which will empower them to make informed decisions. Clients will also receive assistance in registration and access to vaccines with limited barriers.

Optimal Design Process for a Wind Turbine Blade Through Numerical Analysis and Experimental Results in North Texas

**PERS Recipient**
Research Area: Renewable Energy
Presenter: Dr. Hoe-Gil Lee
Authors: Dr. Hoe-Gil Lee
Associated Student: William Flores and Silverio Vazquez

**Abstract:** Wind energy is utilized using a wind turbine and the wind blows the blades of the turbine, which rotates an electric generator to produce electricity. For producing the maximum wind energy, the wind turbine blades are the most important parts of a wind turbine in terms of performance of the power system. Thus, the design and shape of the turbine blade has a major impact on the performance, which indicates the energy conversion process of kinetic energy associated with the wind speed.

This research involves two parts. There are design and simulations, and measurements, validations, and testing using 3D printed prototypes based on experimental acquisition data from wind tunnel and a strain-gage measurement system. A wind turbine blade length determines how much wind power can be captured as they rotate around a central hub and the aerodynamic performance of wind turbine blades is very different between a flat blade and a curved blade. In order to improve the wind turbine power and the aerodynamic effects by using the curved profile, twisted and propeller-type blade design for producing more power, the wind blades need to have an aerodynamic profile to create lift and rotate the wind turbines, but curved airfoil type blades are more difficult to make but offer better performance and higher rotational speed making them ideal for electrical energy generation. This research finds the following results of studies: First, the airfoil designs with a smaller airfoil thickness (below 12%) experience stall at earlier angles of attack than thicker (above 12%) designed airfoils. Second, the initial decrease in percent thickness from 24% to 12% in the airfoil results in roughly 38% more energy production. Third, thinner blades with an airfoil thickness ranging between 10% and 8% started trending towards inefficiency likely due to the airfoils’ early entrance into the stall region. Fourth, the maximum stresses and deflections decrease from 97.09 MPa to 12.26 MPa and from 186 mm to 2.48 mm, respectively, as airfoil thickness increases in both simulated analysis with similar results in experimental analysis. Lastly, smaller blade thickness greater than 12% poses failure risks as well as increasing deflection and vibrational effects ultimately reducing the blades’ AEP by around 3% for each blade thickness decrease from NACA 2424 to NACA 2408. In order to optimize and improve the performance of the wind turbine blade system, the design process is iterated to find the best performance using engineering optimization methods.
11:30–11:50am, TSC 27

**Fighting Gerrymandering with Improved Recombination MCMC**

**PERS Recipient**

Research Area: Mathematics  
Faculty Presenter: Dr. Scott Cook  
Authors: Dr. Scott Cook  
Department: Mathematics  
Associated Student: Vianey Rangel & Cody Drolet

Abstract: Political gerrymandering is a complex and pressing threat to our system of government. Release of 2020 Census results triggered the once-per-decade process of redrawing the boundaries of election districts. This highly-charged political process profoundly affects elections for the following decade and invariably brings accusations of gerrymandering, where a party gains disproportionate political advantage by manipulating district boundaries. How can the degree of gerrymandering in a proposed districting plan be quantified? One option is to statistically compare it against a large ensemble of alternative districting plans. Generating such an ensemble is a difficult task for which mathematicians have developed powerful Markov Chain Monte Carlo (MCMC) based algorithms. Recombination MCMC (Recom) developed by Tufts/MIT Metric Geometry and Gerrymandering Group improves convergence and coverage properties of earlier Single-Flip MCMC. However, the GerryChain implementation of Recomb was not able to accommodate extreme population imbalances created by 2020 Census results, the need to create 2 new US Congressional districts in Texas, nor the Texas House’s “county-line” rule. We present improvements to Recomb that solved these problems and allowed real-time mathematical analysis of newly-proposed Texas redistricting plans.

12:00–12:20pm, TSC 27

**Developing an interdisciplinary research experience for undergraduates in computational mathematics**

**PERS Recipient**

Research Area: Mathematical psychology  
Faculty Presenter: Dr. Tom Faulkenberry  
Authors: Dr. Tom Faulkenberry  
Department: Psychological Sciences

Abstract: Over the past few years, my colleagues and I have been working to develop a comprehensive research experience for undergraduates (REU) project called *Computational Mathematics at Tarleton* (CMAT). With this collaborative, cross-disciplinary project, we have aimed to stimulate intellectual curiosity and develop transferrable research skills in a talented group of undergraduate students from a diverse set of STEM programs, particularly in the mathematical and psychological/behavioral sciences. For 2021, this program was funded by a Mathematical Association of America NREUP (National Research Experiences for Undergraduates Program) grant as well as a PERS grant. With this additional funding from PERS, we were able to support more students and faculty mentors, thus expanding our REU program to a sufficient scale necessary to prepare for (and be competitive for) a pending full scale REU site proposal to the National Science Foundation. In CMAT, our research mentors engage undergraduate students from underrepresented groups in an 8-week research experience, where students complete collaborative research projects in the field of computational mathematics. In Summer 2021, these projects involved diverse fields of inquiry such as mathematical psychology, gerrymandering, and modeling of infectious disease spread. The results of these research projects have not only contributed to the body of scientific knowledge in these fields, but more importantly they have contributed to the development of these students’ knowledge and research skills related to mathematics, statistics, and computational data science. We further predict that the experience will inspire these students to persist to graduation, pursue further STEM-related educational opportunities, and ultimately seek careers in the mathematical and computational sciences. In this talk, I will give an overview of the development of our REU program in computational mathematics, paying particular attention to the framework under which we are able to work together as research mentors, even though the topics we study are quite diverse. I will also share some lessons learned and potential pitfalls to be aware of when planning a comprehensive REU experience.
The Future of Virtual Team Meetings: Enhancing Equity and Innovation in Video-based Team Interactions

PERS Recipient
Research Area: Social Psychology and Industrial Organizational Psychology
Faculty Presenter Name: Dr. Jonali Baruah
Authors: Dr. Jonali Baruah, Dr. Lauren Coursey (University of North Texas) & Dr. Jugal Kalita (University of Colorado, Colorado Springs)
Department: Psychological Sciences
Associated Student Name: Arianna Gomez

Abstract: Organizations and educational institutions are becoming increasingly digital in terms of communication and task completion. This migration to digital platforms is further spurred by the COVID-19 pandemic, has increased barriers in interactions, diversity and inclusion. It’s not only the emotional exhaustion (Brawner, 2020) that is caused by increased exposure to digital media (video meeting), but the shift to virtual team meetings also worsened other issues of social equity (Pikoos et al., 2021), with women and people of color receiving lesser talking time during team meetings (Leskinen, et al., 2015). Many studies have also found that group polarization (decision shift to an extreme position) is greater via technology than face-to-face meetings (see Postmes, et al., 2001; Sai, Tan, & Wei, 2002). Such decision-making biases are prominent in tasks where the main objective is to reach a consensus (Axtel, Fleck & Turner, 2004). Due to the strong likelihood that remote work (and thus virtual meetings) will continue to thrive ((Reeves, 2021) there is a need to develop more inclusive and equitable spaces that support diverse work groups’ productivity and creativity in a virtual team context. This project aims to contribute to the improvement of virtual team creativity, focusing specifically on improving equity in the process of meetings (e.g., equal participation between team members, reducing team polarization, promotion of multicultural mindset), finding the best team interaction paradigm and reducing prejudice in teams. Drawing on the findings, a virtual team creativity facilitation intervention will be developed as the final objective of this study.

Objectives:
1. Develop a broad understanding of how people express their ideas and perceive diversity in group interaction in virtual meeting; 2. Conduct an exploratory analysis of how fundamental virtual meeting paradigm and socio-cognitive variables (multiculturalism mindset, team polarization) statistically relate to collaborative creativity and prejudice in diverse groups; 3. Test hypotheses using a series of experimental studies to manipulate different mindset in a. Which specific multicultural mindset associated in the context of video-based virtual meetings can be used by diverse teams to best enhance collaborative creativity and decision making. b. Which specific paradigms of video-based virtual meetings (e.g. virtual brainwriting, virtual verbal brainstorming) can be used by teams to best enhance multicultural mindset and reduce polarization and prejudices in collaborative creativity context; 4. Develop a virtual intervention program to confirm that specific virtual meeting paradigm and multiculturalism mindset promote collaborative creativity and reduction of prejudice in diverse groups.
**Poster Presentations**

1. **Moving Up while Upbringing: Supplementing Morton’s Strivers to include Students who are Parents**
   
   **PERS Recipient**
   
   Research Area: Philosophy  
   Student Presenter: Nicole Sulak  
   Faculty Mentor: Dr. Karl Aho  
   Authors: Nicole Sulak, Dr. Karl Aho  
   Department: Government, Legal Studies, and Philosophy  
   Student Classification/Affiliation: Senior Psychology Major  
   
   Abstract: This research project uses contemporary work in moral philosophy as well as recent higher education to develop a richer account of barriers to access that students who are parents face. Jennifer Morton’s recent discussion of strivers (first-gen or low-income students) has informed higher education’s understanding of the moral costs that students pay while pursuing a college education. She writes that: The financial costs of college for strivers and even for many middle-class families these days are staggering. Yet strivers face other costs along the path of upward mobility that are equally important, though rarely discussed. These costs are ethical; that is, they concern those aspects of life that give it value and meaning—relationships with family and friends, connection to one’s community, and one’s sense of identity (Morton 2019, 8). Morton illuminates gaps in support for strivers. While Federal aid programs and University assistance programs show promise, the financial burden is only a portion of the cost. The commutation of education for one’s roots, heritage, and family is one of many examples Morton uses to describe the moral cost. We contend that students who are parents—who may or may not be strivers—face similar material and moral costs. We defend this claim by first briefly discussing Morton’s account of strivers. We then demonstrate how students who are parents face challenges that are not contained in this account. We conclude by considering how institutions can better support strivers and other students who are parents. Morton’s responses to strivers can be fruitfully expanded, and thus our project and hers can mutually inform each other.

2. **Exploring the link between crisis communication and outrage during COVID-19**
   
   **PERS Recipient**
   
   Research Area: Risk Management  
   Presenter Name: Izaria Ferguson, Leigh Lambert, Dr. Lynal Albert  
   Corresponding Author: Dr. Lynal Albert  
   Department: Mechanical, Environmental and Civil Engineering  
   Student Classification/Affiliation: Junior/Senior  
   
   Abstract: Crisis communication is a critical component of risk management when aiming to curb, minimize or mitigate the adverse effects associated with a hazard to a specific population. The COVID-19 pandemic has emphasized the importance of effective crisis communication. The worldwide response to these drastic life changes has varied from one region to another. While the various contingency measures have been recognized as effective in curbing the spread of disease globally, enforcement of these measures among various populations differs due to varied crisis management strategies in those regions. The objective of this study was to analyze the responses to crisis communication in different regions by analyzing several key pandemic specific societal norms. The trends seen in these pandemic specific norms affected each population uniquely due to varying strategies and messages adopted during the crisis. Differences in crisis communication methods can lead to distinctive responses in outrage caused by the pandemic. Outrage is pertinent to risk management especially in situations where public participation is critical. Outrage can be a combined reaction of many actions and emotions such as need for control, responsiveness, anger, trust, dread, or disappointment. Our study investigates the influence that crisis communication has on the overall perception of the pandemic thus resulting in varied responses among different population groups. These responses are a direct manifestation of population outrage. Analyzing these trends in population outrage during a crisis can help improve future pandemic crisis communication to eventually help bridge the gap between public outrage and the true risk at hand.
3. Developing a Rover via Additive Manufacturing Technology to Improve Performance and Enhance Space Exploration Missions

Research Area: Mechanical Engineering
Student Presenter: Zackery Watson, Jackson Black, Matthew Gass, Vicente Ochoa
Faculty Mentor: Dr. Ruaa Al Mezrakchi
Authors: Ruaa Al Mezrakchi, Zackery Watson, Jackson Black, Matthew Gass, and Vicente Ochoa
Department: Mechanical, Environmental, and Civil Engineering
Student Classification/Affiliation: Watson (Junior/MECE), Black (Sophomore/MECE), Gass (Junior/MECE), Ochoa (Sophomore/MECE)
Abstract: As space travel gets more popular and exploration of solar systems becomes more demanding, developing a cheap and effective data collection and planetary surface exploration device turns into a higher priority. This can be accomplished through the additive manufacturing advancing technology. This evolving technology is a cheap and fast way to produce complex parts and designs compared with traditional manufacturing methods. Thus, additive manufacturing is the best candidate for developing small rovers with complex designs. Those miniature vehicles can be used to explore places where larger rovers cannot approach. Besides, one large scale rover can carry several medium size rovers to increase the area of exploration. In this research, a medium size rover is designed and developed with good directional movements and ability to travel over very difficult terrain. Additive manufacturing technique is investigated to fabricate the rover structure including legs, chassis, wheels, and main body. Moreover, a special electrical system along with various electronic components is developed and embedded into the structure. Multiple tests were performed on the developed rover to ensure its functionality. This research is the key to explore the practical use of additive manufacturing in developing future rover to be used in space explorations.

4. Lightweight 3D Printed Robotic Arm for Industry Automation and Enhancing Production Lines

Research Area: Mechanical Engineering
Student Presenter: Austen McKee, Mackenzie Phillips, Andrew Curtis, and Jake Schumaker
Faculty Mentor: Dr. Ruaa Al Mezrakchi
Authors: Dr. Ruaa Al Mezrakchi, Austen McKee, Mackenzie Phillips, Andrew Curtis, Jake Schumaker
Department: Mechanical, Environmental, and Civil Engineering
Student Classification/Affiliation: McKee (Junior), Phillips (Sophomore), Curtis (Sophomore), and Schumaker (Sophomore)
Abstract: Automation and robotic devices are becoming an ever-increasing part of manufacturing and various other industries. Weight is one of the critical aspects that has a huge influence on the automated robotic arms. It is crucial to reduce the weight of those devices to enhance their performance. Unlike traditional manufacturing methods, Rapid Prototyping is a new manufacturing technology that can be utilized to produce complicated designed parts and yet control their weight by manipulating their internal infrastructure. This technique can be implemented in developing a new light weight robotic arm by altering its infrastructure design. A control system was developed and embedded into the fabricated structure in order to fully automated the arm such that it is capable of autonomously completing tasks. The developed automated arm has multiple degrees of freedom which provides the ability of movement in all three dimensions using three axes of rotation. From a technical perspective, this research focused on developing a new learning experience by designing, fabricating, programing, and testing a new light weight automated arm. The arm itself was a success, it proved to be a fully functional and well-designed product.
**5. Application of Positive and Negative Emotions in Collaborative Innovation**

Research Area: Social Psychology  
Student Presenter: Alison Beason  
Faculty Mentor: Dr. Jonali Baruah  
Authors: Alison Beason, Dr. Jonali Baruah  
Department: Psychological Sciences  
Student Classification/Affiliation: Graduate student, MS Applied Psychology Program  

Abstract: Creativity doesn’t happen in a vacuum. As a team is assembled to address a problem or come up with an original product, each team member comes to the table bringing with them their own emotional state, and therefore, cognitive state. These collective cognitive states can help or hinder divergent and convergent thinking through influencing cognitive flexibility and cognitive persistence (Nijstad et al., 2010). These are beneficial for success in any creative task that includes idea generation, selection and evaluation (Rietzschel et al., 2009). In this study, we examine the effects of three emotional conditions (positive emotion, stress, and positive emotions and stress) with two stages of brainstorming (idea generation and idea selection-evaluation) in a computer-mediated setting where participants must generate ideas on a given problem, select the best ideas and refine them to make them more creative (original and feasible). This research tests the following three hypotheses:  

H1: Positive emotion induction groups will generate a higher quantity of ideas and more original ideas than moderate stress induction groups and the groups induced with a combination of positive emotions and moderate stress.  
H2: Moderate stress induction groups will generate ideas with a higher category fluency than positive induction groups and the groups induced with a combination of positive emotions and moderate stress.  
H3: The combination of positive emotion and moderate stress induction groups will select higher quality ideas than the stress induction groups and positive induction groups.  

Discussion: The findings of the present study have a theoretical contribution toward the research of positive psychology and its role in virtual team innovation. It will also demonstrate savoring as an induction method of group positive emotion.
6. Enhancing Virtual Team Creativity in the Context of Multiculturalism and Competition

Research Area: Social Psychology
Student Presenter: Christin Mylius
Faculty Mentor: Dr. Jonali Baruah
Authors: Christin Mylius, Dr. Jonali Baruah
Department: Psychological Sciences
Student Classification/Affiliation: Graduate students, MS Applied Psychology Program

Abstract: In the last few decades, academic institutions and work teams are becoming increasingly more virtual and culturally diverse, especially (Lloye & Hartel, 2010). Enhancing creativity within multicultural groups to produce innovative solutions to problems could help many industries and institutions (Baruah & Paulus, 2019). Exposure to multiculturalism has been shown to increase creativity in both individuals and groups (Li & Khamaksorn, 2020). However, few studies have tested the effects of promoting multiculturalism through a paradoxical mindset to enhance virtual team creativity. The theory of paradoxical frames suggests that the ability to simultaneously think of contradicting ideas to find possible solutions can allow for enhanced creativity (Miron-Spektor & Erez 2017). Additionally, by setting up a task-based competition, the performance of such groups can be increased as the groups will compete with an “outgroup”, a notion supported by the theory of social categorization (Turner et al., 1987). The purpose of this study is to examine the effects of multiculturalism and competition in enhancing virtual team creativity. H1: Groups with multicultural exposure will generate more original ideas, more elaboration, more combination of ideas than groups exposed to either the single culture prime or control groups. H2: Groups in the competition condition will generate more ideas and ideas of higher originality compared to those in no-competition groups. H3: Groups with multicultural exposure and primed with competition will generate the ideas of highest originality, fluency, elaboration, and combination. H4: Groups with multicultural exposure and primed with competition will yield lower scores of prejudice.

Design and Procedure: This is a 2 (condition, no-competition) X 3 (multicultural exposure, single culture exposure, and control) between-subjects factorial design. The dependent variables are the originality of ideas, fluency, elaboration, and idea combination. Small virtual groups of three participants are primed with one of three slideshows: multicultural exposure, single culture exposure, and a control condition. The multicultural slideshow consists of culturally representative images (i.e., fashion, architecture, or art) of Chinese and American cultures in juxtaposition. The single culture condition contains only the American culturally representative images (the same images used in the multicultural condition). The control group condition contains neutral images. Half of the groups are told that they are competing against other groups and the other half is not given any competition prompt. The groups are then asked to collaboratively come up with a creative poster. Posters will be evaluated by two trained raters for creativity in terms of originality, fluency, group elaboration, and idea combination. Proposed Analyses: Once the data collection is completed the proposed analysis for this study will be a factorial Multivariate Analysis of Variance (MANOVA) using all four dependent variables combined. Then a subsequent Analysis of Variance (ANOVA) for each dependent variable (originality, fluency, group elaboration, and idea combination) will be computed. The significance of this study is to aid in the future development of multicultural competency intervention programs, validated by empirical evidence which will be a helpful contribution towards facilitating virtual team innovation.
7. Application of the Paradox Perspective in Collaborative Creativity: A Longitudinal Quasi-Experimental Study

**PERS Recipient**

Research Area: Social Psychology

Student Presenter: Arianna C. Gomez

Faculty Mentor: Dr. Jonali Baruah

Authors: Arianna C. Gomez, Dr. Jonali Baruah

Department: Psychological Sciences

Student Classification/Affiliation: Graduate student, MS Applied Psychology Program

**Abstract:** Traditionally, schools have focused curriculum around a commonality perspective, or the emphasis of superordinate groups, to reduce potential prejudice between cultural groups and increase creativity in an educational setting. Unfortunately, this approach has become insufficient as it becomes apparent that the marginalization of diversity is only largely beneficial for majority White groups. In contrast to the commonality approach, we propose the use of a paradoxical approach to effectively address and respond to the opposing needs in culturally diverse groups. Paradoxical approach promotes simultaneous use of contradictory viewpoints as opposed to an either/or approach. Present study investigates the effectiveness of paradoxical perspective in virtual team setting in enhancing team creativity and ethnocentric empathy. H1: Groups exposed to the paradoxical framing will exhibit higher creativity (more ideas/more original ideas) than groups primed with commonality framing. H2: Groups exposed to the paradoxical framing condition will demonstrate the highest openness to diversity compared to the commonality and the neutral groups. H3: Groups exposed to the paradoxical framing condition will demonstrate the highest ethnocultural empathy compared to the commonality and the neutral groups.

**Procedure:** Undergraduate students were randomly placed into a small group of 3-5 after completing questionnaires measuring their natural openness to diversity and normative multiculturalism. Then, participants were exposed to one of the three conditions (paradoxical perspective, commonality perspective, or neither in the control group). Finally, students completed an exit survey measuring their new openness to diversity and their resulting ethnocultural empathy. Results: A 2x2 mixed factorial ANOVA was performed. The preliminary results reveal that, there were no significant main effects of the type of test or the type of group, there also is not a significant interaction of the test and the group conditions. There was a marginally significant main effect of the type of test F (1, 10) = 3.63, p = 0.08, eta squared = 0.06 for the quantity of ideas generated. The post test revealed a higher quantity of ideas (M = 23.83, SD = 12.98) compared to the pre-test (M =22, SD =8.2). The data for the current study is still being coded and analyzed. The prejudice score has not been measured yet, however; these will be provided in detail during the conference. This study will contribute towards a better understanding of the dynamics of culturally diverse groups where the members are facilitated to utilize their conflicting perspectives to come up with innovative ideas.
8. Academic Clustering Phenomenon and the NCAA Reclassification Transition to Division I Athletics

PERS Recipient

Research Area: NCAA Athletics, Student-Athlete Experience, Higher Education Leadership
Student Presenter: Dr. Jesse Brock
Faculty Mentor: Dr. Don Beach
Author: Dr. Jesse Brock
Department: Educational Leadership & Technology
Student Classification/Affiliation: Doctoral student alumni
Abstract: Division II institutions decide to make the transition to Division I athletics for various beneficial reasons, such as a projected upsurge in revenue, a broader public relations exposure, an increase in student applications, and a growth in alumni donations (Frieder, 2007; Tomasini, 2005; William et al., 2018). Despite the scholarship on these institutional benefits yielded by the Division I reclassification process, scholars have yet fully examined how the student-athlete experience is impacted by the transition itself (Chandler, 2014). This is the especially the case with the academic clustering, a widespread phenomenon among NCAA athletics both at the Division I and Division II levels (Brock, 2021; Paule-Koba 2015; Steeg et al., 2008). Clustering occurs when at least 25%, or one-fourth, of a team roster declare the same academic major (Case et al., 1987). There are a total of four levels of the clustering phenomenon – benchmark (25-39%), extreme (40-49%), super (50-74%), and mega (75% or more). Research indicates that there are negative implications of clustering, as some student-athletes are externally and internally steered into degree paths that do not align with personal interests or occupational goals. While there is a growing body of literature on the clustering phenomenon, how the transition from Division II to Division I impacts the clustering phenomenon has yet to be examined. This study, therefore, is the first longitudinally examination on the academic clustering within the lens of the NCAA transition process. To examine the phenomenon within the athletic transition process, the researchers gathered data from four universities that recently completed the NCAA reclassification transition from Division II to Division I athletic. This study was guided by two research questions: (a) What is the prevalence of academic clustering at reclassification transition institutions? and (b) Does longitudinal data indicate that the reclassification transition affects the occurrence and trends of the clustering phenomenon? The data source for this study included non-password protected publicly attainable websites for each of the NCAA reclassification transitioning institutions. Team rosters provided on institutional athletic websites provided the gender, sport, and academic major choice for each student-athlete. Whereas descriptive statistics were utilized to answer research question one, SPSS run statistical tests address research question two. At the current stage of research, the authors have preliminary results regarding research question one and are still in the progress of data analysis for research question two. When viewed within Astin’s (1991) Input-Environment-Output (I-E-O) model, academic clustering’s association with student-athletes’ choice of major justifies the phenomenon’s categorization as both a product of the academic advising service and as a student learning factor. By utilizing Astin’s I-E-O model, this study sheds light on how the transition across NCAA athletic division levels impacts the overall student athlete experience, an important topic given Tarleton State University’s current transition to Division I athletics.
9. Addressing Environmental Justice Concerns through Cumulative Impact Strategies

PERS Recipient
Research Area: Environmental Justice, Environmental Soil Science
Faculty Mentor: Dr. Barbara Bellows
Authors: Dr. Barbara Bellows
Department: TIAER

Abstract: In the environmental justice community of South Garland, TX, community members talk about how factories that produced lead-based paint, batteries containing lead, and hats formed by using mercury, dumped waste materials directly into creeks and streams or stored their wastes in unlined earthen storage ponds. For over 25 years, South Garland community members have struggled to get assistance for their health concerns from local, state, and federal government agencies. Between 2018-2020, community members conducted door-to-door health surveys of residents, recording numerous cases of bowel, brain, and other cancers, as well as ALS and muscular dystrophy. Finally, in 2019, the EPA conducted an environmental assessment that revealed high levels of lead and arsenic in various locations. Of particular concern were the high levels of lead and arsenic found on the grounds of the local primary school, whose student population was 72% Hispanic, and 80% below the poverty level. The South Dallas community of Southwest Oak Hill is historically a “red-lined community.” A chromium plating company, Lane Plating operated in this community for more than 90 years until its closure in 2015 due to violations, investigations, and bankruptcy filing. The US Department of Labor issued citations against Lane Plating for storage of barrels of sodium hydroxide next to barrels of sulfuric acid, lack of safety and personal protective equipment for employees, and presence of high levels of toxic hexavalent chromium on break room tables, bathroom sinks, and the secretary’s desk. Working with community members, we investigated attempts by community members to obtain assistance in addressing their environmental and health concerns. The EPA has excellent guidance publications for “Assessing Environmental Justice in Regulatory Analysis”. It has also published documents and developed tools to assess cumulative impacts including the sensitivity of individual community members to contaminants, the additive impact of pollutants, multiple pathways of exposure (oral, dermal, respiratory), multiple sources of pollution in the community, and community vulnerability, including economic insecurity and access to health care. Unfortunately, we found that protocols developed by the EPA and other agencies, often did not follow their own guidelines and stymied efforts by community members to have their concerns addressed. Deterring factors include focusing on chemicals emitted by a single industry without considering potentially synergistic impacts on the environment or human health of chemicals from multiple industries. Agency assessments of community environmental impacts also do not account for interactions between existing community health problems and environmental contaminants. An initial attempt was made to develop an EPA proposal in collaboration with local community member. This project would have assisted community members in conducting citizen science environmental assessments and creating processes to enhance community access to environmental protection resources. These processes, which we will revisit once appropriate collaborators are identified, would also assist community members in conducting cumulative impacts assessments that would consider these impacts from the perspective of community members.
10. Burnout and internship: A teacher and student perspective

Research Area: Stress and Industrial and Organizational Psychology
Student Presenter's: Bea Yousey and Simone Dickson
Faculty Mentors: Dr. Jamie Borchardt and Dr. Deborah Banker
Authors: Dr. Jamie Borchardt and Bea Yousey
Department: Psychological Sciences
Student Classification/Affiliation: Senior Psychology majors

Abstract: This study will evaluate burnout among pre-school teachers and the use of student interns to help mitigate this issue. We used Maslach’s Burnout Inventory (MBI) to calculate a pre-test burnout score with all teachers during the fall semester, and then we will place student interns in the spring to conduct a post-test MBI after the internship has concluded. We will use a paired samples T-test to assess this perspective. Burnout happens when employees are overwhelmed and stressed on the job. During the pandemic, pre-school teachers were placed under an extreme amount of stress. Burnout is already high among pre-school teachers; therefore, this is a pertinent research problem to investigate. Burnout among pre-school facilities in general, is a common occurrence. According to Storey (2020), childcare directors experience a high level of stress due to job working conditions related to parents, state standards and funding resources. Burnout has been studied in depth in a variety of positions such as police officers and medical professionals. However, many other career paths such as lawyers, teachers and human service workers need to be assessed, and strategies need to be developed. According to Poghosyan et al., (2009) there is a “lack of consensus about measurement of burnout in the U.S” (para. 4). It has been stated that future research needs to address ways to deal with burnout in our population. Wang et al., (2020) studied high turnover and retaining in primary care providers and discussed a need to develop strategies to address these issues, in order to improve job satisfaction. In addition, we would like to assess the student internship experience to assess career readiness changes within the scope of the internship. Employers have stated that students have the textbook knowledge, but not the skills to deal with difficult situations in the workforce, and doing so will allow us to examine both perspectives in a pre and post-test survey.

11. Visualizing Canvas LMS Metadata for Student Success

PERS Recipient
Research Area: Learning Analytics, Data Visualization, Student Success, Institutional Effectiveness
Presenter: Ms. Ashley Hall
Authors: Mr. Morgan Carter
Department: Institutional Analytics, Effectiveness, and Accreditation
Student Classification/Affiliation: Graduate Assistant

Abstract: Student Information Systems (SIS) collect a myriad of data elements to help contextualize relationships between students and Tarleton State University. Institutional analytics traditionally involves the examination of SIS data (demographic data, admissions, enrollment, grades, financial data, etc) to determine information about the student body. These data may provide administration with insight into retention and attrition trends among those variables available in the SIS. However, the common SIS data used for this analysis does not provide many other variables necessary to develop targeted student success strategies. The Canvas Learning Management System (LMS) gathers data about how students interact within the online learning environment. The Canvas LMS amasses thousands of data elements on each student from broad features like course enrollment, to fine details like the amount of time spent viewing a specific assignment. LMS data could provide valuable guidance to administrators, advisors, and professors about the development of strategies aimed at improving student engagement and success. However, these data are largely unstructured and difficult to understand. Visualizations can give context to complex data. Our aim for this research was to find the best strategy for harnessing Canvas LMS metadata to improve student success, particularly with our student-athlete pilot group. Using an iterative prototyping approach, our team worked with the Athletics departments to design visualizations relevant for their particular student success tracking requirements. Information Technology Services and Academic Technology departments also assisted with the project. The overall goal was to deliver a set of visualizations that may help identify patterns indicating potential decline in student engagement and success. Preliminary results of the three-month project include an initial set of drill-down visuals for assignment submission tracking and student-athlete enrollment in various subjects. With additional time and support, future iterations of the dashboard could include real-time data fetching, allowing the department to generate insightful visualizations on demand. Additionally, the understanding and accuracy of the metadata used for visualizations will increase as the LMS is more widely adopted into campus learning environments.
12. Evaluating Diatom Entry into Bone Marrow Post-Mortem as Forensic Evidence

PERS Recipient
Research Area: Biology, Forensic Science
Student Presenter: Michelle Marshall
Faculty Mentor: Dr. Victoria Chraibi
Authors: Michelle Marshall, Dr. Victoria Chraibi
Department: Biological Sciences
Student Classification/Affiliation: Graduate Student / Biological Sciences

Abstract: Aquatic environments are home to many specialized plants and algae. These environments are also common sites for criminal activities such as drownings and body disposals. Based on unique characteristics and wide diversity, diatoms (Bacillariophyceae) can be used to determine the site of crime or evidence disposal, providing evidence for forensic cases (Pollanen 1998). However, not much is known of the pathways or timeframes by which diatoms enter bone marrow, presenting limitations on the use of diatoms as trace evidence of drowning versus body disposal in water (Lunetta et al. 2013). This study uses experimental bone submersion in exposure to diatoms in order to determine the potential for diatoms to enter bones post-mortem. The results of this study will help refine the interpretation of diatom presence in bone marrow as evidence of drowning and provide additional sources of trace evidence for crimes in aquatic locations. The first phase of the study conducted a controlled experiment in field conditions using cow femurs. Two container bins were filled with oxygenated river water and rocks with visible diatom colonies; one bin was then treated with algaecide. Bones were submerged and then removed for sampling at 1 week, 3 weeks, and 2 months. The second phase of the study conducted a field experiment in which porcine long bones received treatments to mimic common injuries, specifically acid pitting and cuts. The bones were submerged in river water in field conditions and then removed for sampling at 1-3 months. Marrow was extracted and treated to isolate any diatoms that may be present. Diatoms were observed biofilm on the exterior of both bone types, especially in cartilage and joint areas. Diatoms were found in the porcine bone marrow after as early as one month of submersion. Observations of diatom presence, morphology, and abundance related to timeframe will constrain accuracy of use of diatoms as positive indicator of drowning and may increase their use as trace evidence of length of submersion in cases with skeletal remains.

13. Making Unbiased Voting Districts to Pass the "Eyeball Test" Via MCMC Redistricting

PERS Recipient
Research Area: Mathematics
Student Presenter: Vianey Rangel and Cody Drolet
Faculty Mentor: Dr. Scott Cook
Authors: Vianey Rangel, Cody Drolet, and Dr. Scott Cook
Department: Mathematics
Student Classification/Affiliation: Undergraduate

Abstract: Political gerrymandering is a complex and pressing threat to our system of government. Release of 2020 Census results triggered the once-per-decade process of redrawing the boundaries of election districts. This highly-charged political process profoundly affects elections for the following decade and invariably brings accusations of gerrymandering, where a party gains disproportionate political advantage by manipulating district boundaries. How can the degree of gerrymandering in a proposed districting plan be quantified? One option is to statistically compare it against a large ensemble of alternative districting plans. Generating such an ensemble is a difficult task for which mathematicians have developed powerful Markov Chain Monte Carlo (MCMC) based algorithms. However, without guidance, the resulting maps typically fail the “eye-ball” test by producing districts with highly irregular boundaries that wantonly ignore political borders like county lines. We present techniques that encourage Recombination MCMC to respect these borders and pass the “eye-ball” test while still producing unbiased ensembles of legally-viable districting plans that provide context for evaluating fairness of a proposed districting plan.
14. Finding Tarleton’s Peers & Aspirants

PERS Recipient
Research Area: Data Science
Student Presenter: Aurod Ounsinegad
Faculty Mentor: Dr. Scott Cook and Dr. Credence Baker
Authors: Aurod Ounsinegad, Dr. Scott Cook, and Dr. Credence Baker
Department: Mathematics
Student Classification/Affiliation: Undergraduate
Abstract: Tarleton Forward 2030 is our strategic plan for the next decade. Many of our objectives are data-driven and linked to progress relative to other "Peer & Aspirant Institutions." Who is that? The Integrated Postsecondary Education Data System (IPEDS) collects hundreds of statistics on thousands of schools. Which ones matter and how can we balance many competing factors to find the right set of Peers & Aspirants to guide our efforts? This project presents data science research that explores the full range of IPEDS data across the last 15 years to find the right set of Peers & Aspirants that are similar to us and are trending in the direction we want to go.

15. Increase in Exposure Rates of the Eastern Equine Encephalitis Virus from the Black-Tailed Mosquito to Avian Species: A Mathematical Approach

Research Area: Mathematical Epidemiology
Student Presenter: Aurod Ounsinegad
Faculty Mentor: Dr. Christopher Mitchell
Authors: Dr. Christopher Mitchell, Aurod Ounsinegad, Nicholas Komar
Department: Mathematics
Student Classification/Affiliation: Junior
Abstract: The Eastern Equine Encephalitis Virus (EEEV) is an erratic and deadly neurological disease that spans across the northeastern coast of the United States. To determine the rate at which the virus is spread between the Black-Tailed Mosquito (Culiseta melanura) and select avian species we began by analyzing the migration patterns of both the mosquito and the avian species. It was found that certain species of avians shared similar, or even identical, flight patterns with the Black-Tailed Mosquito. Through this research, we develop and analyze a system of Ordinary Differential Equations (ODEs) to gain insight into how and when transmission of the virus to avians is at its highest. We incorporate a host stage-structured model where the avian host group is split into two categories, adults and young-of-the-year birds (YOY). Using this we explored the extent to which fluctuations occurred in transmission rates according to host/vector abundances, mosquito biting rate, and type of host. We evaluate the hypothesis that YOY avians are more readily exposed to the mosquito vector as they lack a defense mechanism, unlike their adult counterpart using the compartmental model.

16. A mathematical model for Onchocerciasis and Resistance in Treatment

Research Area: Mathematical Epidemiology
Student Presenter: Dashon Mitchell and Kaylee Terrell
Faculty Mentor: Dr. Christopher Mitchell
Authors: Dr. Christopher Mitchell, Dashon Mitchell, Kaylee Terrell
Department: Mathematics
Student Classification/Affiliation: Dashon (Junior), Kaylee (Senior)
Abstract: Neglected tropical diseases are diseases that affect mainly developing countries and in turn are poorly funded and under researched. Onchocerciasis is a neglected tropical disease that exists primarily in Sub-Saharan Africa and South America. This is because the black flies that spread this disease are common to these regions and since these flies bite humans they can infect humans at a noticeable rate. When the black fly bites you it can pass a parasite called filarial nematode, or Onchocerca volvulus, which is transmitted solely by black flies during blood feeding. Some people do not experience symptoms while infected with Onchocerciasis, however as the larvae can migrate through the human body without provoking a response from the immune system. But many people do have symptoms, which include itchy skin rashes, nodules under the skin, and vision changes. Onchocerciasis is currently being treated with ivermectin through mass drug administration. The goal of our research project is to find out the optimal way to distribute the treatment to eradicate the disease and to find if the current approach will eventually lead to drug resistance. Our focus was to model this situation and data fit our model to the country of Cameroon. Our research showed that the current treatment plan of Onchocerciasis may never completely eradicate the disease from the population due to resistance. We also found evidence that there may already be resistance in the population.
17. Law enforcement evasion & techniques learned from Empire

Research Area: Dark Web Marketplace, Empire
Student Presenter: Harpreet Dheer-Dixon
Faculty Mentor: Dr. Christopher Copeland, Dr. Tara O’Connor Shelley and Dr. Olga Semukhina
Authors: Harpreet Dheer-Dixon
Department: Criminal Justice
Student Classification/Affiliation: Graduate Student
Abstract: When online Dark Web marketplace users engage in sales of illegal drugs, hacking techniques, or child pornography, there is an abundance of information available and left behind by them in the form of forums, product descriptions, feedback, etc. Valuable information left behind can then be utilized by law enforcement and researchers for the study of illegal markets, but to do so requires new methods of investigation. The popularity and use of the Dark Web has increased in recent years due to its inherent nature of anonymity which can provide a safe haven for cyber criminals. Data was collected manually from October 2019 to August 2020 from the Dark Web marketplace Empire, resulting in 393 vendor listings and images, this data was then coded using NVivo and then further content analysis was done to discover common themes. This presentation hopes to bring about some understanding of the dark web marketplace Empire and common themes associated with the sale of Cannabis within the United States, such as stealth packing and shipping methods, encryption tools, law enforcement evasion, communications methods, guidance on receiving packages, other techniques, and how it continues to provide invaluable information to law enforcement and researchers for further research on Dark Web marketplaces. This study is derived from a National Institute of Justice (NIJ) U.S. Department of Justice sponsored grant on Illegal Marijuana and Drug Related Violent Crime in North Texas.

18. Development of a Health Equity Index through Applications of Machine Learning to Social Determinants of Health

PERS Recipient
Research Area: Mathematics and Data Science
Student Presenter: Brandon Amerine, Ray Casas, Aurod Ounsinegad, and Nicholas Petela.
Faculty Mentor: Dr. Jesse Crawford, Dr. Myoung-Gwi Ryou, Dr. Scott Cook, and Dr. Christopher Mitchell.
Authors: Dr. Jesse Crawford, Brandon Amerine, and Nicholas Petela
Department: Mathematics
Student Classification/Affiliation: Amerine, Casas, Petela (graduate students), Ounsinegad (undergraduate student)
Abstract: Health disparities are differences in access to medical services and variation in rates of disease and disability between population groups defined by socioeconomic characteristics such as age, race, sex, economic resources, and geographic region. More broadly, health outcomes are influenced by social determinants of health (SDoH), which are environmental and social factors generally divided into five domains: economic stability; educational access and quality; health care access and quality; neighborhood and built environment; and social and community context. The high dimensionality of SDoH presents a challenge for assessing the overall health risk posed to any individual, who may experience health disadvantages from multiple social determinants. A health equity index solves this problem by aggregating risk from multiple sources into a single predictive analytic, resulting in more precise estimates of health care disparities and improved effectiveness of intervention strategies aimed at alleviating those disparities. In this presentation, we discuss the development of a health equity index, obtained by applying machine learning algorithms to SDoH and health outcomes data for a variety of diseases, including ischemic stroke. Ischemic stroke is the leading cause of adult disability and the fifth leading cause of death in the US. The only FDA-approved treatment is recombinant tissue plasminogen activator (rtPA), which has a therapeutic window of 4.5 hours after onset, after which the risk of serious complications like intracranial hemorrhage increases sharply. We conjecture that geography (urban vs rural), income, and transportation network differences significantly impact the proportion of stroke victims that receive rtPA within this window, inducing significant disparities in health care outcomes. Models are built using data from the Healthcare Cost and Utilization Project (HCUP) and Axiom for Florida, Maryland, and Wisconsin. The study design is to predict a dependent variable Y representing health outcomes in terms of social determinants X1,...,Xp, using supervised machine learning algorithms, including artificial neural networks (deep learning) and random forests. Both types of models are optimized with k-fold cross-validation and validated on a sequestered test set. Deep learning has the advantage of generally higher performance, while random forests provide better model explainability in the form of variable importance plots. To further improve explainability and to avoid multi-collinearity, dimension reduction techniques will be applied to the SDoH, including nonlinear principal components analysis with optimal scaling, and hierarchical clustering.

Research Area: Computer Vision and Autonomous Vehicles

Presenter: Kaleb Blankenship

Faculty Mentor: Dr. Sotirios Diamantas

Authors: Kaleb Blankenship and Dr. Sotirios Diamantas

Department: Computer Science and Electrical Engineering

Student Classification/Affiliation: Undergraduate, Computer Science and Electrical Engineering

Abstract: In this research we present a parsimonious yet effective method to detect, track, and estimate the speed of multiple vehicles using a single camera. At first, we make use of a neural network trained to detect vehicles. The output of the neural network serves as an input to a multi-object tracking algorithm which tracks the detected vehicles while at the same time their speed is estimated. In our algorithm, we make no assumptions about the camera, the distance to the objects, or the direction of motion of vehicles with respect to the camera. Our method proves to be accurate and efficient with minimal assumptions. In particular, we only assume the mean dimensions of a passenger vehicle to be known and, using the homography matrix, we are able to estimate the speed of any vehicle irrespective of its motion direction and regardless of its size. In addition, we need a single point from each tracked vehicle to infer its speed avoiding the use of computing the homography matrix in each and every vehicle, thus reducing the time and computational complexity of our algorithm. We have tested our algorithm on a series of known datasets, the results from which validate our approach.

20. Survey of Coronaviruses in Texas Bats

PERS Recipient

Research Area: Virology

Student Presenter: Selina Alvarado

Faculty Mentor: Dr. Dustin Edwards

Authors: Selina Alvarado, Dr. Phil Sudman, and Dr. Dustin Edwards

Department: Biological Sciences

Student Classification/Affiliation: Undergraduate Student

Abstract: Coronaviruses (CoV) are positive-sense single-stranded RNA viruses known to cause disease in avian and mammalian species. Seven coronaviruses, two alpha- and five betacoronaviruses, are known to cause disease in humans. Bats are likely a main and original natural reservoir for CoVs worldwide, including severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), the etiological agent of the current Coronavirus Disease 2019 (COVID-19) pandemic. CoV genomes from bats have been sequenced but mostly from captured animals, which involves inherent risks to the bats and researchers. Due to the size and genetic diversity of CoVs, full-length genome sequencing is expensive, and time and labor-intensive. We proposed to develop and demonstrate a protocol that reduces biohazards, uses rapid and non-invasive sample collection, and can be used to search for and characterize known and novel coronaviruses by inexpensive and simplified genome sequencing. The proposed protocol uses easily acquired guano samples for complete genome sequencing, removing the need to capture or handle bats, which is safer for both the bats and the researchers and could lead to more full-length genomes sequenced from wildlife by increasing available samples. Further, we added a step to inactivate biological agents present in guano while still in the field, which will permit the use of this sample type in BSL-1 and BSL-2 laboratories. Guano samples were collected on July 22, 2021, from a colony of migratory Brazilian Free-tailed bats (Tadarida brasiliensis) located at Fort Hood, a military post in Killeen, Texas. Plastic sheeting was placed beneath elevated roosts to collect bat droppings. With guidance from a U.S. Army Natural Resources Management bat biologist, 32 guano samples were collected and placed in a 2% phenol solution. The samples were disrupted with sterile swabs and incubated for 30 minutes to inactivate biological agents. The samples were centrifuged and supernatants passed through 0.22μm filters. Genetic material was extracted from the supernatants using QIAamp Viral RNA Mini kits. The species source of guano was verified by cytchrome c oxidase I (COI) DNA mini-barcode assays using PCR to amplify extracted DNA with Chiroptera order-wide COI primers and thermocycler program, followed by Sanger sequencing at Texas A&M University-Corpus Christi Genomics Core. We successfully amplified COI PCR products for all 32 samples and BLASTn query of the sequences had 100% nucleotide identity to Tadarida brasiliensis, indicating that the proposed protocol was successful for molecular identification of bat species. To detect CoVs, we attempted to amplify viral RNA by reverse transcription-PCR using conserved pan-coronavirus primers that target a 440-bp region of the RNA-dependent RNA polymerase (RdRp). We were unable to detect CoV RdRp cDNA products in any of the samples. We were able to successfully isolate, amplify, and sequence synthetically-produced control RNA that spans a portion of CoV RdRp using QIAamp Viral RNA Mini kits, however, amplification failed to produce PCR products when 2% phenol was added prior to isolation of nucleic acids on the QIAamp column. Future directions include evaluating an alternative new nucleic acid extraction kit that includes phenol reagents for biological agent inactivation.
21. How the Federal Government and State of Texas are Communicating About Health

Research Area: Social Media
Student Presenter: Jessica Thomas, Kristi Cortez, Julia Nolen, Kennedy Onuam
Faculty Mentor: Dr. Jennifer T. Edwards
Authors - Jessica Thomas, Kristi Cortez, Julia Nolen, Kennedy Onuam
Department: Thomas, Nolen, Onuam(Communications), Cortez(Business)
Student Classification/Affiliation: graduate students

Abstract: The Covid-19 pandemic allowed the public to view how our governments handle the communication between federal and state and then on to the public about the health of our country. It seems that communication efforts include discrepancies between the two governments including the recommendations of masking students by the CDC and the Texas Governor fiercely protecting the individual rights of the Texas citizens (Svitek, 2021). The communication problem creates confusion in these uncharted waters our country is desperately trying to navigate (Kim & Kreps, 2020). To solve the communication problem, research was conducted to see just where the failure to communicate effectively was originating. The purpose of this study was to provide research on the communication efforts of the United States Federal Government and the State of Texas Government and how they communicate with the public about the health situation plaguing the country. This facilitated a better understanding of where to locate the information about the health concerns in our state and country. With the state and Federal government providing direction to credible information, they have assisted individuals in making better decisions concerning health. To understand the communication, research focused on how the United States Federal Government and the State of Texas Government communicate effectively about Covid-19, and based on the hashtags the public associates with health, can we determine the influence each entity has on the public’s health stance.

22. Supports for and Barriers to Rural Entrepreneurship as Perceived by 50 Women Entrepreneurs in Texas

PERS Recipient
Research Area: Economic Development
Student Presenter: Anna Laurent, Lauren Harris
Faculty Mentor: Dr. Jennifer T. Edwards
Authors: Anna Laurent, Lauryn Harris, Magnolia Dunlap
Department: Communication Studies
Student Classification/Affiliation: Graduate Student/Communication Studies/Rural Communication Institute Fellow

Abstract: The purpose of the Rural Women Entrepreneurship Study was to discover the barriers and supports as experienced by rural women entrepreneurs in Texas. This study discovered the barriers and supports to entrepreneurship as experienced by rural women entrepreneurs and developed best practices for rural economic development corporations and city governments focused on supporting women entrepreneurs. A paucity of research conducted in the United States is focused on rural entrepreneurship. Rural entrepreneurship serves as a way to revitalize rural America (de Guzman et al, 2020). Most rural entrepreneurship and small business studies are focused on Asia, Central America, South America, and the United Kingdom. Also, few studies focus on the experiences of women entrepreneurs, especially those in rural areas of the United States. This study focuses on the experiences of both under researched populations. Various state, federal, and international organizations are interested in rural women entrepreneurship. State organizations include the Texas Comptroller’s Office and the Texas Workforce Commission. Federal organizations include the Small Business Development Center, Small Business Administration, and the Kaufman Foundation. International organizations include the World Bank and the United Nations. All aforementioned organizations publish reports, and fund studies, and create programs focused on their interest areas.
How the Louisiana Department of Education and the Texas Education Agency are Communicating about Health During COVID19

Research Area: Social Media
Student Presenter: Morgan Maley, Christina Byrd, Jorge Irizarry, Katherine Mitchell, and Audrey Morton
Faculty Mentor: Dr. Jennifer T. Edwards
Authors - Morgan Maley, Christina Byrd, Jorge Irizarry, Katherine Mitchell, and Audrey Morton
Department: Byrd, Irizarry, Mitchell, Morton(Communications), Maley(Management)
Student Classification/Affiliation: Graduate Students

Abstract: In our research, we sought to compare and contrast public health communication messages employed by two state education agencies during the COVID-19 pandemic. Located in the southwest region of the United States, Texas and Louisiana, these two agencies represent the members of two ethnically diverse communities. In 2020, education departments across the United States had to make fast decisions. In a matter of weeks, the status quo was flipped upside down, and the need for computer-mediated communication increased (Wang, Ho, Olusanya, Antonini, & Lyness, 2021, p. 255). Now, individuals of the United States face novel challenges as they begin a second school year under the stresses caused by the COVID-19 pandemic. After more than a year of being exposed to revelations about the nature, dangers, and socio-economic impact of the COVID-19 virus, state education agencies are focused on collecting and updating information and distributing resources to their communities. A critical tool that these agencies use to help employ messages about COVID-19 prevention protocols is social media. Many of the messages on these agencies' respective social media accounts are similar, if not identical, while others are unique to their jurisdiction (Rehm, Moukarzel, Daly, & Fresno, 2021, p. 1423). Some agencies receive high levels of engagement that can range from primarily supportive to mostly opposed. These messages are important because they reveal the attitudes that members of the community share about the concerns associated with the health risks of contracting and spreading COVID-19 in classroom environments, as well as how certain safety protocols (i.e., mask mandates, social distancing, vaccination disclosures, and virtual learning) can potentially infringe upon individual constitutional freedoms and impact a student's academic performance. Therefore, it is imperative that education agencies analyze the effectiveness of these messages. This research could potentially aid all state education agencies around the country in producing more engaging messages on their social media accounts going forward. In order to assess the COVID-19 communication messages employed by two state education agencies, the following research questions will be applied: Research Question 1: Which social media messages, concerning COVID-19, posted by two state education agencies, received the most reactions on Twitter? Research Question 2: What similarities are shared between two state-level education agencies' social media messages on Twitter concerning mask mandates, social distancing, vaccinations, and other COVID-19 prevention protocols? Research Question 3: What are the differences between two state-level education agencies' social media messages on Twitter concerning mask mandates, social distancing, vaccinations, and other COVID-19 prevention protocols?
24. Identifying Sustainability Benchmarks for Rural Research Stations
Research Area: Sustainability and Environmental Quality
Student Presenter: Cameron McKenzie
Faculty Mentor: Dr. Anne Egelston
Authors: Cameron McKenzie
Department: College of Graduate Studies, Department of Chemistry, Geosciences, and Physics
Student Classification/Affiliation: Graduate Student, Thesis Tract
Abstract: Much of the research conducted regarding sustainability has been focused on either the national level or locally in highly populated, urban areas. Instead of either of the two, it is proposed that research is to be conducted in rural settings that is focused directly with environmental, geological, and ecological research. The proposed research hopes to conduct a qualitative assessment of sustainability benchmarks at the Timberlake Biological Field Station (TBFS). TBFS is the home for environmental and biological research projects for Tarleton State University in Mills County, Texas. Using standards set by the Transforming our world: the 2030 Agenda for Sustainable Development for sustainability, benchmarks will be created. These benchmarks will reflect the nature of rural environment, both environmentally, economically, educationally, and sociologically. The proposed research will hope to prove a null hypothesis that there is sustainable actions occurring at the field station, but the actions are not organized in a structured, measurable manner. The first alternative hypothesis is that sustainable actions are occurring at the field station, but the actions taking place are not possible to be measured and/or structured to a benchmark system. This would require a new set of sustainable actions to take place at the field station. Methodology will focus on evaluating prior studies that have occurred at the field station regarding how involved they were to the field of sustainability, as well as any and all land records involving the field station. This will include sample datasets like the Tarleton State University BioBlitz studies that have been performed in years prior. Additional methodologies will include evaluating the field station itself using geospatial remote sensing techniques, watershed evaluation, and overall land use in years prior. This will be performed to indicate 1) what is the current management of the land and 2) what benchmarks can be set to improve the sustainability of the field station further. A simple database will be created to perform simple data analytics and data visualizations on the data collected across all the various methodologies. It is the hope of the proposed research that one of the first sustainability research studies can be conducted involving a rural environment as well as a rural, academic facility. Many studies are conducted on individual, sustainable initiatives, especially in urban areas. This paper differs in that an entire research station is to be evaluated in a very rural area.

25. Sustainability Implementation Within Rural Texas Counties
Research Area: Environmental Science, Policy
Student Presenter: A’dayr Shewmaker
Faculty Mentor: Dr. Anne Egelston
Authors: A’dayr Shewmaker
Department: Environmental Science
Student Classification/Affiliation: Graduate Student
Abstract: Sustainable development is a pertinent topic in today’s world, especially with impending climate change, a global pandemic, and social strife within the United States. Sustainable development is commonly seen in urban counties that contain metropolitan hotspots, and likewise, most of the research surrounding sustainable development and implementation surrounds urbanized areas. This proposal seeks to investigate sustainable development and implementation within rural Texas counties and answer to what extent sustainability occurs in rural Texas counties. Furthermore, the counties intended for research within this project are Brewster, Sabine, Andrews, Llano, and Blanco counties. These counties were chosen with Brewster County as the basis, and all other counties were chosen due to similarity in population size, income, and infrastructure. To test the hypothesis that rural Texas counties are participating in sustainable development to some extent, a set of indicators characterizing rural sustainability within Texas must be created. These indicators must then be tested on multiple rural Texas counties to ensure accuracy. Using the Opp-Saunders Sustainability Practices Index (OSSPI) as a basis, and the CEDEUS indicator set to avoid comparing the incomparable, a sustainability index can be formed to judge sustainable development within rural Texas counties. The OSSPI would allow for all three pillars of sustainability (environmental protection, social equity, and sustainable economic development) to be thoroughly checked within the five rural Texas counties whereas the CEDEUS indicator set would allow for a thorough look into the impact of corporations, institutes of higher education, and other factors of sustainable development.
Abstract: Teacher noticing is an important aspect of effective mathematics teaching. While preservice and novice teachers have difficulty with the skill, research has shown that teacher noticing can be improved with targeted practice. Additionally, there is evidence that improvements in noticing during teacher preparation programs transfer to future practice. Studies of preservice teachers’ noticing have focused on improving the skill through various types of experiences, including adaptations of lesson study. Much of the research on preservice teachers’ noticing takes place in the context of mathematics methods courses in teacher preparation programs or during field experiences. There is limited research on the potential of experiences, such as adapted lesson study separate from a course, to influence the teacher noticing skills of preservice teachers. This research is an exploration of shifts in preservice teachers’ noticing while they engage in adapted lesson study to prepare and implement a summer mathematics camp for middle school students. This research reveals how a process such as lesson study can provide a context for preservice teachers to develop their noticing skills outside of a course. Summer programs that allow preservice teachers to engage in a community of learning has the potential to improve noticing. In this poster, attendees will learn about the summer program for preservice teachers providing the context of the study, examine some of the data from the research, and discuss the findings and implications. Findings will emphasize the preservice teachers’ self-directed learning to notice through adapted lesson study.

27. Using ex-Gaussian and diffusion modeling to reveal mechanisms of the flanker effect

Abstract: Mechanisms of visual attention have been studied rigorously over the past half century. Many studies have replicated the flanker effect originally discovered by Eriksen and Eriksen (1974). In a flanker task, participants are asked to quickly identify a central character that is surrounded (or “flanked”) by distractor characters. The flanker effect refers to the relative slowdown that occurs when the flanking characters are different from the central character. Though a flanker task produces many individual trials, most of the studies analyze only the central tendency estimates of reaction times collected from the task. In this study we want our analysis to extend beyond the mean. To do this, we will describe the entire distribution of response times from a flanker task using two mathematical models that are well suited to fit the typical positive skew exhibited in response times. The ex-Gaussian model describes a skewed distribution as the sum of a normal component (with mean µ and standard deviation σ) and an exponential tail with mean τ. Another mathematical model we will use is the EZ diffusion model (Wagenmakers et al., 2007), which describes the distribution of RTs as a collection of stopping times for a noisy stochastic accumulator with drift. Like the ex-Gaussian model, the EZ diffusion model also includes three parameters: drift rate, boundary threshold, and nondecision time. Our flanker task design is a replication of Heitz and Engle (2007). Participants will each complete three blocks of 80 trials with increasingly fast response deadlines (1500 ms, 600 ms, and 300 ms). The stimuli presented to the participants are randomly selected from one of four five letter strings, which comprise two trial types: congruent trials, where the central target and flankers are identical (SSSSS or HHHHH), and incongruent trials, where the central target and flankers are different (SSHSS or HHSHH). Data is still being collected for this project. When complete, the ex-Gaussian and EZ diffusion parameter estimates for the resulting RT distributions will help us determine the locus of the flanker effect. Specifically, it will show us which parameters are impacted by the experimental manipulations. Effects that are centered on the normal mean µ are typically thought to reflect stimulus-driven (i.e., nonanalytic) processes, whereas effects on the tail τ may reflect central attention demanding (i.e., analytic) processes (Balota & Spieler, 1999). In the context of diffusion modeling, effects on drift rate and threshold reflect decision-related processes, whereas effects on nondecision time reflect encoding and motor-preparation processes. In all, these results will help to uncover the cognitive mechanisms related to the flanker effect, and more broadly, processes of visual attention.
28. Cognitive processes in mental arithmetic: A confirmatory Bayesian analysis

PERS Recipient
Research Area: Mathematical Psychology
Student Presenter: Bryanna Scheuler
Faculty Mentor: Dr. Tom Faulkenberry
Authors: Bryanna Schueler and Dr. Tom Faulkenberry
Department: Psychological Sciences
Student Classification/Affiliation: Graduate

Abstract: The process of mental arithmetic comprises three stages: encoding, calculation, and production. The encoding stage is usually reflected by the format effect, where problems in digit format (e.g., 2 + 4) are solved faster than problems in word format (e.g., two + four). Similarly, the calculation stage is reflected by the problem size effect, where small problems (e.g., 2 + 3) are solved faster than large problems (e.g., 6 + 8). Given the prevalence of these effects, evaluating the change in response times caused by manipulations of format and size provides information about the processes involved in mental arithmetic. A current debate concerns whether there are any overlaps between the three stages of mental arithmetic. Namely, does problem format impact both encoding and calculation? Evidence for this overlap would appear as an interaction between size and format. Some researchers (e.g., Campbell, 1992; Campbell & Fugelsang, 2001) have proposed that such an interaction does occur. In contrast, others (e.g., Dehaene, 1992; Frampton and Faulkenberry, 2018) have argued in support of an additive model where format and problem-size do not interact. The purpose of this study is to perform a confirmatory Bayesian analysis to compare these competing models for the underlying cognitive processes of mental arithmetic. Fifty-four participants were presented with a series of solved addition problems. After being presented with each problem, the participants selected whether that problem had the correct solution. Half of these problems were presented in digit format while the other half were presented in word format. Response times were submitted to a Bayesian analysis of variance, which we used to compare the likelihood of our observed data under both an additive model (with main effects of size and format) and an interactive model (which also includes the interaction between size and format). As expected from past research, response times were faster for problems in digit format. Similarly, response times were faster for small problems. While these results replicate the well-known problem size and format effects, our Bayesian modeling confirmed the absence of an interaction between the two. For trials where the presented addition problem was true, we found that the observed data was 1.65 times more likely under than additive model than the interactive model. Similarly, for trials where the presented addition problem was false, the observed data was 5.07 times more likely under than additive model than the interactive model. Across both problem types, the additive model had the best predictive adequacy. Thus, we found positive evidence for the absence of an interaction between problem size and format. Given the absence of an interaction between encoding and calculation, these results are indicative of an additive model for the cognitive processes underlying mental arithmetic. This agrees with the conclusions of Frampton and Faulkenberry (2018) and Dehaene (1992). Furthermore, as past studies were performed within a frequentist context, the present study is the first to explicitly find evidence for the absence of an interaction between size and format; such a result is only possible within a Bayesian context.
29. Response time modeling reveals the latent cognitive processes in two-digit number comparison

**PERS Recipient**
Research Area: Mathematical Psychology
Student Presenter: Bella Zapata
Faculty Mentor: Dr. Tom Faulkenberry
Authors: Bella Zapata, Claire Jean Baptiste, Kristen Bowman, and Dr. Tom Faulkenberry
Department: Psychological Sciences
Student Classification/Affiliation: Undergraduate

**Abstract:** The past two decades have revealed increased interest in how people construct mental representations of numbers. For two-digit numbers, the unit-decade compatibility effect (UDCE) has revealed how people process numbers with multiple components. The typical signature of the UDCE shows a difference in mean response times (RTs) between two trial types in number comparison. Compatible trials, where both unit and decade digits obey the same order relation (e.g., 23 versus 78, where both 2 < 7 and 3 < 8), are faster than incompatible trials, where order relations are opposite (e.g., 28 versus 73, where 2 < 7 but 8 > 3). Classically, UDCE studies have demonstrated the effect by collapsing the distribution of RTs to condition means. In the present study, we used mathematical modeling to analyze the effect of unit-decade compatibility on the entire distribution of RTs, thus shedding light on the exact nature of the UDCE. Fifty-three adult observers each completed 300 trials of a two-digit number comparison task. Each observer’s distribution of RTs in each compatibility condition was then fit to an ex-Gaussian model, which decomposes the positively skewed distribution into the sum of a normal distribution and an exponential tail. We used maximum likelihood estimation to recover estimates of the mean and standard deviation of the normal component as well as the mean of the exponential tail. Finally, each distribution was fit to a diffusion model (Ratcliff, 1978), which considers each observer’s RT distribution as a collection of stopping times for a noisy stochastic accumulator with drift. Estimates of drift rate, response threshold, and nondecision time were obtained via the EZ-diffusion method (Wagenmakers et al., 2007). Overall, observers were faster on compatible trials (M = 665 ms) than on incompatible trials (M = 708 ms). This 43 millisecond effect was further decomposed via the ex-Gaussian model, revealing an effect of 13 milliseconds from the means of the normal components and 30 milliseconds from the exponential tails. A Bayesian paired-samples t-test confirmed that these differences, though small, were reliably positive, with median values of Cohen’s d equal to 0.38 for the effect on the normal means (95% CrI = [0.12, 0.66]) and 0.92 for the effect on the tails (95% CrI = [0.59, 1.24]). Diffusion modeling further revealed that the UDCE manifested reliably in all three parameters: incompatible trials yielded a smaller drift rate, larger response threshold, and larger nondecision time. By employing two different mathematical models for the observed response times in our two-digit number comparison task, we saw that the unit-decade compatibility effect manifests in multiple ways. First, ex-Gaussian modeling revealed that much of the effect resides in the tail of the distribution, implying a role for central attention demanding processes (e.g., Balota & Spieler, 1999). Further diffusion modeling revealed that the UDCE may be due both to decision related processes (stimulus uptake and response caution) as well as nondecision processes (encoding and/or motor preparation).

30. The Impacts of COVID-19 Among Students Attending a Rural University

**PERS Recipient**
Research Area: Epidemiology, Public Health
Presenter: Jade Smith
Authors: Dr. Subi Gandhi and Jade Smith
Department: Medical Lab Sciences, Public Health and Nutrition Science
Student Classification/Affiliation: Public Health (Senior)

**Abstract:** The ongoing COVID-19 pandemic has put a strain on college students’ health, endangered their academic success, and jeopardized their overall well-being. Since the pandemic started, students have faced many unique vulnerabilities they had never encountered before in college. This study assessed the prevalence of COVID-19 among students and their vaccination status, as well as other barriers they faced during the pandemic. Methods: College students (n=828) attending a rural university in Texas were anonymously surveyed in summer 2021. A cross-sectional design was employed to collect data on basic demographics, COVID-19 status, and other barriers students faced during the pandemic. Results: Forty-six percent of the participants were first-generation students and were primarily between the ages of 18-45 years (87%), female (73%), Caucasian (64%), and undergraduate students (74%). Twenty-four percent reported having COVID-19 during the pandemic, and 51% reported taking the COVID-19 vaccine. Among both the vaccinated and non-vaccinated students, 30% of participants reported their unwillingness to take the vaccine in the future. Regarding learning difficulties, 49% reported problems with Online Learning, followed by Hybrid Learning (16%). Loss of job (26%) was the most common livelihood issue, followed by food (10%) and housing (4%) insecurities. Conclusion: The COVID-19 pandemic is yet to be over. The virus evolves quickly and can create new variants. Rural university students can be hit hard with the next wave of infection if the new variants’ infectivity and case-fatality rates are higher. Vaccination and educational efforts could be elevated through many channels at the university to lessen physical health impacts and alleviate barriers to increase student academic success.
31. Implementing a reflective paper assignment to enhance student self-efficacy in marketable skills

Research Area: Applied Psychology
Student Presenter: Kirsten Denney
Faculty Mentor: Dr. Trina Geye
Authors: Kirsten Denney, Dr. Trina Geye, and Alana Hefner
Department: Psychological Sciences
Student Classification/Affiliation: Junior

Abstract: One of the main purposes of higher education is to aid students in acquiring marketable skills that will help them develop their career, even after college (McClure-Brenchley, 2020). These skills, such as critical thinking and communication competence, are important in the current competitive job climate (Indrašienė et al., 2021). Thus, it is essential to ensure that classes designed to help students acquire these skills are functioning properly. The purpose of this project is to evaluate the implementation of a reflective paper assignment based on selected American Association of Colleges and Universities’ (AACU) rubrics as an intervention to improve perceived efficacy in written and oral communication, critical thinking, and career exploration. Psychology students enrolled in Senior Capstone and management students enrolled in Introduction to Management also separated into a treatment and control group based on course enrollment. The treatment group completed a personal reflection paper, citing examples from their own coursework in the assignment. The Critical Thinking Disposition Scale (CTDS; McCroskey et al., 1988), Self-Perceived Communication Competence Scale (SPCC; Schmidt et al., 2012), Post-Secondary Writerly Self-Efficacy Scale (PSWSES; Sosu, 2013), and the Career Exploration and Decision Self-Efficacy Scale (CEDSE; Lent et al., 2016), were administered as a pre-test at the beginning of the semester and, at the time of this submission, a post-test is scheduled for administration at the end of the semester. In total, 142 students participated in the pretest survey, with 15 in the management control group, 65 in the management treatment group, 25 in the psychology control group, and 37 in the psychology treatment group. Ages of participants ranged from 18 to 54, and most participants were white (65%) and female (64%). Analysis of pretest data showed no statistically significant differences in any of the measures based on major or treatment group. Upon completion of post-test data collection, scale scores will be submitted to a repeated-measures analysis of variance.
32. Implementation of Electrocardiograms During Pre-Participation Exams in a Rural Texas School District

PERS Recipient
Research Area: Sports Medicine
Student Presenter: David Taylor and Elexis Rockwell
Faculty Mentor: Dr. Andi Johnston Green, DAT, LAT, ATC
Authors: Dr. Andi Johnston Green, DAT, LAT, ATC, David Taylor, Elexis Rockwell
Department: Health and Human Performance
Student Classification/Affiliation: Graduate/MSAT
Abstract: Sudden cardiac death (SCD) has been noted to be preventable with appropriate, early detection. Studies have included the cost-effectiveness and efficacy of implementing electrocardiogram (ECG) testing in pre-participation exams (PPE) at the secondary school level often highlighting their ability to recognize cardiac abnormalities that lead to SCD. PURPOSE: This project was funded by a Presidential Excellence in Research Scholars (PERS) Grant and allowed for Tarleton State University Master of Science in Athletic Training (MSAT) students to gain confidence and consistency in the skills needed to coordinate and execute a station format for PPEs. These students utilized the expertise of those on campus to potentially go beyond the basic PPE and offer ECG testing as recommended by Cody’s Law (House Bill 76). The opportunity for local secondary school students to receive this additional preventative screening allows for the start to creating a comprehensive profile of the regional athletes. Use of the ECG tests allowed for the identification of conditions that may put the athlete at risk for sudden cardiac death. The ability to provide this service allowed student athletes a central location to receive care that they may not otherwise receive locally due to financial and other barriers. Thus, providing them the ability to safely continue involvement in their chosen activities which can lead to retention in their respective educational settings. METHODS: Subjects in this study were students participating in secondary school athletics for which the University Interscholastic League (UIL) requires a PPE. The PPE was administered in a station format at a site at a local rural school district. Subjects received the UIL PPE form and packet to complete prior to their exam. In addition, consent forms were obtained from those participating in the exams. Local health care providers conducted the general medicine and orthopedic portions of the exam. For the ECG, a trained clinician performed the assessment utilizing a Cardea 2020 unit. This involved data entry, proper application of leads, and recording of the information which was further evaluated by a cardiologist via a partnership with the Cody Stephens Foundation. RESULTS: A total of thirty-six secondary students participated in PPEs. This included twenty-six females and ten males with all but one student receiving participation clearance at this event. Of these thirty-six PPE participants, seventeen took part in the optional ECG screenings. One ECG participant initially was not going to have this additional screening but was asked to complete it as part of the clearance for the PPE due to previous medical history. Overall, nine ECG participants reported no personal nor family history of cardiovascular problems. The remaining eight described instances of murmurs, shortness of breath, chest pain, or syncope in addition to previous family medical history of heart disease or sudden death. CONCLUSION: This initial collaboration with various stakeholders in the community will lay the foundation for further, more inclusive events the will allow for a further development of a comprehensive health profile of rural secondary school athletes.
33. The Effect of Cannabidiol on Follicular Growth and Ovulation in Cattle

PERS Recipient
Research Area: Animal Science
Student Presenter: Emily Purnell
Faculty Mentor: Dr. Kimberly Guay
Author: Emily Purnell, Dr. Kimberly Guay, Cheyenne Runyan, and David Roper
Department: Animal Science
Student Classification/Affiliation: Graduate student

Abstract: The role of the endocannabinoids in regulating female reproductive processes such as follicular development has become an area of heightened interest with the prevalence of Cannabidiol (CBD) increasing as a natural mediator to physiological issues as well as the addition of hemp meal as a feedstuff for livestock. Initial studies indicate that cannabis use including Δ9-tetrahydrocannabinol (THC) has negative implications on folliculogenesis and multiple aspects of pregnancy. However, there is limited knowledge on the effect of CBD on follicular growth and ovulation. The objective of this study was to identify the presence of the endocannabinoid system (ECS) in bovine ovarian theca and granulosa cells and its effect on follicular dynamics leading to ovulation. Theca and granulosa cells from medium (<4 mm) and large (>4 mm) follicles from abattoir bovine ovaries (n=61) were collected. Upon completion of pooling theca and granulosa cells, protein was isolated for detection of cannabinoid receptors, type 1 (CB1) and type 2 (CB2) through Western blot. Receptors CB1 and CB2 are G-protein coupled receptors with effect on the adenylyl cyclase pathway, which is key to many reproductive functions in the ovary. A strong visual representation of CB1 receptor detection was found in large granulosa cells and theca cells. Using Stain-Free total protein measurement as the loading control, the densitometric ratio in medium granulosa cells and large granulosa cells had greater abundance of CB2 (P<0.05) compared to theca cells. This data suggests a detectable effect by cannabinoids on granulosa and theca cells. Future studies are needed to investigate the role the ECS has in folliculogenesis and key steroidal production for successful ovulation. The subsequent knowledge is a key first step in understanding the effect CBD has on fertility and pregnancy in livestock.

34. COMB.v2: A hybrid feature selection method for disease prediction

PERS Recipient
Research Area: Machine Learning and Healthcare
Student Presenter: Ms. Audrey Kacur
Faculty Mentor: Dr. Thejas Gubbi Sadashiva
Authors: Dr. Thejas Gubbi Sadashiva and Ms. Audrey Kacur
Department: Computer Science and Electrical Engineering
Student Classification/Affiliation: Junior

Abstract: Supervised machine learning algorithms are now widely used in healthcare systems to intelligently transform all available data into valuable knowledge. Recent studies say that there exists a 12% of error rate in diagnosing diseases by healthcare professionals. It is crucial to pre-process the available data before the model training. Feature selection is one way that enables us to craft the data, using which we boost the performance of our learning model. Feature or Attribute Selection is a data pre-processing technique where only the most informative features are considered and given to the predictor. These informative features reduce the computational overhead and improve the efficiency and correctness of the classifier. To address the above-said issues, we propose a hybrid feature selection method that combines filter and wrapper techniques. The proposed method is called Clustering Optimization with Mini-batch K-means and Cross-validation (COMB.v2). The proposed method is experimented with and evaluated with five medical datasets.

35. Code performance and scaling for cloud computing resource application

PERS Recipient
Research Area: Biological Sciences
Presenter: Audrey Kacur
Authors: Audrey Kacur and Dr. Russell Pfau
Department: Biological Sciences

Abstract: Advancements in genetic techniques have allowed for the generation of millions of DNA sequences quickly and cost-effectively. Due to the size of these genetic datasets, computer analyses are very intensive—beyond that of a typical desktop. A Linux machine with multiple cores and sufficient memory are required. Rather than purchasing a machine, cloud computing and the use of a virtual machine configured to the needs of the project can be more efficient. Jetstream is an NSF-funded, user-friendly cloud environment designed to give researchers access to interactive computing and data analysis resources on demand at no cost to the researcher. Jetstream research allocations are provided upon submission and acceptance of a proposal which includes code performance and scaling documentation. We present here documentation of our code performance and scaling tests for the methods of analysis that will be used for a variety of ongoing and future genetic projects.
36. Integrative Taxonomy of Posthodiplostomum
PERS Recipient
Research Area: Biology
Student Presenter: Kari D. Waddle
Faculty Mentor: Dr. Kristin Herrmann
Authors: K. Waddle, I. Blasco-Costa (Natural History Museum of Geneva), A. Smith-Herron (Sam Houston State University), N. Carpenter (A.E. Woods State Fish Hatchery, San Marcos, Texas), Dr. Kristin Herrmann
Department: Biological Sciences
Student Classification/Affiliation: Graduate Student/Biological Sciences
Abstract: Parasitologists have been operating under the assumption that there is a single representative species of Posthodiplostomum found in North America, and until recently, specimens found within the North American continent were deemed to be Posthodiplostomum minimum. Posthodiplostomum larvae in fish are more easily accessible than adult specimens found in herons, but lack of morphological differentiation at this life stage makes determining species unlikely. More recently, phylogenetic studies conducted on Posthodiplostomum metacercariae in fish hosts have found genetic differences and have shown host and tissue specificity within Posthodiplostomum. Our study incorporates integrative taxonomic methodology to delineate species of Posthodiplostomum based on adult specimens. Specimens belonging to Posthodiplostomum were obtained from nuisance herons at a Texas fish hatchery by their biologist. A subset of specimens was relaxed and fixed in steaming saline, then tissue samples were removed and preserved in 100% ethanol for DNA extraction. The remainder of each specimen was stored in 70% ethanol for staining and morphological measurements. After DNA extraction, gene-specific primers were used for PCR amplification of two genes (CO1 and ITS). For morphological examination, specimens were dehydrated in a graded ethanol series, stained, and cleared with xylene then mounted on microscope slides in Canada Balsam. Various organ measurements are being recorded for morphological comparison of holengophores. Maximum likelihood and Bayesian phylogenetic analysis is being conducted for COI and ITS sequences from our study and those obtained from GenBank. Currently, our results suggest four distinct morphologies that line up with species descriptions for P. centrarchi, P. nanum, P. minimum, and P. macrocotyle. Additionally, we have obtained one specimen that has not matched any morphological species descriptions, which may represent a new undescribed species. Further, preliminary phylogenetic analysis of COI indicates that this specimen of a putative new species matches parasite larvae we obtained from Western mosquitofish, Gambusia affinis. Thus far, preliminary data reveals unrecognized and undocumented diversity within Posthodiplostomum in North America.
37. Helminth communities in migratory bird hosts from Lights Out Cleveland

**PERS Recipient**
Research: Biology
Student Presenter: Jennifer A. Talbert
Faculty Mentor: Dr. Kristin Herrmann
Authors: J. Talbert, A.W. Jones(Cleveland Museum of Natural History), A.J. Smith-Herron(Sam Houston State University), Dr. Kristin Herrmann
Department: Biological Sciences
Student Classification/Affiliation: Graduate Student/Biological Sciences

Abstract: Parasitic species belong to several different taxa and have vastly different morphologies, methods of transmission, life cycles, and host-parasite interactions. Parasite communities that exist within and on an individual host are affected by specific traits of a host, such as the age, sex, diet, and geographical range. Federal protections of migratory songbird species have impacted the ability of researchers to access and assess parasites in these hosts over the past few decades. Fatalities due to building collisions provide a unique opportunity to investigate host specificity, infection intensity, and parasite diversity in migratory songbirds. The purpose of this research is to describe the community of ocular and intestinal helminth parasites in songbirds and to examine the effects of host life history traits, such as age, sex, diet, and geographical range, on parasite abundance and diversity. Songbirds were collected during migration seasons by volunteers of Audubon’s Lights Out Cleveland initiative. Age and sex were recorded for each bird, and diet and geographical range will be determined for each species using online databases. Standard parasitological necropsies were conducted to retrieve parasites from eyes and intestines. Collected parasite specimens were preserved and handled according to their taxon. Nematodes were temporarily mounted to determine species identification while all other specimens were stained and permanently mounted. Prevalence and abundance were calculated for each type of parasite. Thus far, 306 birds have been processed for eye worms and 159 for intestinal helminths. The prevalence of the eyeworm, *Oxyspirura*, is 0.3% and the abundance is 0.02 eyeworms per bird. A total of 136 nematodes have been recovered with a 21.4% overall prevalence and abundance of 0.9 nematodes per bird. To date, we have identified *Capilaria caudinflata*, *Capilaria contorta*, *Contracaecum sp.*, *Odontoterakis valvata*, *Porrocaecum ensicudatum* in the hermit thrush, *Catharus guttatus*. Overall, 92 cestodes have been recovered with a 10.0% prevalence and abundance of 0.6 cestodes per bird. A total of 102 trematodes have been found with an 3.8% overall prevalence and abundance of 0.6 trematodes per bird. Lastly, 156 acanthocephalans were found with a 14.5% overall prevalence and abundance of 0.9 acanthocephalans per bird. To date we have identified *Plagiorhynchus cylindraceus* in the American robin, *Turdus migratius*, and the brown thrasher, *Toxostoma rufum*. Additionally, 48 acanthocephalans have been identified to the *Plagiorhynchus* genus, but not to species due to the lack of an everted proboscis. The two species of nematodes identified have previously been reported only to genus in the hermit thrush and the other three species have never been reported in the hermit thrush. Of which, one of those, the genus has not been reported in North America before, only in South America and Australia. Identification of all parasites will continue, and prevalence and abundance will be calculated for each parasite species in each host species. Further, Shannon’s diversity index, species evenness, and species richness will be calculated and compared among different host species. General linear models will be constructed to examine the effect of host traits on the abundance and diversity of parasites in these songbirds.

38. FPV/Drone Game Educational Simulator

**PERS Recipient**
Research Area: Game Simulation
Faculty Mentor: Dr. Knut LSG Hybinette
Authors: Dr. Knut LSG Hybinette
Department: Fine Arts

Abstract: There are no First Person View educational or training games that teach FAA rules and safety for drone piloting. My game simulator will be the first on the market programmed specifically for major FPV brand products. As an added benefit, my program will allow the player/pilot to incorporate updates for specific new parts and products as they become available. I will show drone build and game stills.

**PERS Recipient**

Research Area: Health Care in Rural Areas

Student Presenter: Ms. Laura Burkhart

Faculty Mentor: Dr. Syed H. Jafri and Dr. Edward Osei

Authors: Dr. Syed H. Jafri

Department: Accounting, Finance and Economics

Student Classification/Affiliation: Graduate – College of Business

Abstract: As the population of Texas continues to age, the need for patient care by orthopedic specialists is increasingly relevant. Furthermore, it has been well documented that healthcare disparities are more pronounced in rural counties. A robust assessment of healthcare access is needed especially in rural areas. Our research uses the state-of-the-art methods to estimate the county-level supply of and demand for orthopedic surgeons. It builds upon our previous research for assessing shortages for cardiologists, endocrinologists, and pulmonologists (funded by TAMU grant) and for General Surgeons and ER Physicians (funded by the State Department of Health Services). Using existing physician licensure data files provided by the Texas Medical Board, we estimate the supply of orthopedic surgeons based on an inverse-distance weighted gravity model. Likewise, we estimate the demand by using the public use data files from Texas Department of State Health Services. Our preliminary analysis reaffirms significant disparities in physician utilization of orthopedic surgeons—higher rates by females, non-Hispanic and white populations as compared to males, Hispanics, and Blacks. Further planned research will determine the extent to which these disparities translate into physician availability. We expect to inform policymakers of critical shortages areas as well as the vulnerable groups. Once we have the complete results, we expect to outline policy recommendations to policymakers in Austin, Texas for bridging the healthcare disparity. The results of the proposed research will also form the basis of subsequent grant submissions for related federal grants.

40. Perceptions of Soft Skills by Computer and Information Technology (C&IT) Students and C&IT Professionals: An Exploratory Proposal

**Research Area:** Computer Information Systems, Soft Skills, Hard Skills, Technology, Employment, Pandemic

**Presenter:** Tara Whitson

**Authors:** Tara L. Whitson, Dr. Dennis G. Jones

**Department:** Marketing and Computer Information Systems

Abstract: Computer and information technology (C&IT) professionals need a combination of soft skills and hard skills to be successful. However, soft skills have been identified with a higher level of importance by numerous authors. The complexity of IT projects and the COVID-19 work from home environment have placed increased focus on soft skills to communicate with team members using online tools. This study will survey C&IT students and C&IT professionals related to their perceptions of soft skills.

41. An Analysis of the Home Creek Limestone Exposure in Stephens, County Texas

**PERS Recipient**

Research Area: Paleontology, Geology

Student Presenter: Kennedy Berry

Faculty Mentor: Dr. Kris Juntunen

Authors: Dr. Kris Juntunen, Kennedy Berry, Austin Delavergne

Department: Chemistry, Geoscience, Physics (ChGP)

Student Classification/Affiliation: Austin Delvergne (Senior) Kennedy Berry (Junior)

Abstract: During the Late Pennsylvanian period, Texas was blanketed by the warm shallow seas of the Absaroka transgression. This inundation of marine waters led to the deposition of widespread carbonate platforms in north Central Texas (Moore and Plummer, 1922). Evidence of this ancient sea can be found in several outcroppings of fossiliferous limestone and shales in Stephens County. These carbonate rocks make up the uppermost exposed member of the Home Creek Limestone (Moore and Plummer, 1922). For this study, the researchers reexamined three small exposures of the Home Creek Limestone in Stephens, County, Texas. The unending geological processes of weathering and erosion are constantly revealing potential new discoveries and evidence of our past. Therefore, it was the goal of these researchers to re-assess these exposures, collect new evidence (and potentially new fossil species), since these sites were last examined over fifty years ago. While the research did not produce any significant new findings, the study has reinforced previous interpretations and provided an up-to-date description of rock and fossil materials at the study site.
42. Changes to Satisfaction in Work, Environment, and Communication Due to COVID-19

Research Area: Applied Psychology
Student Presenter: T. Forest Moore
Faculty Mentor: Dr. Heather A. Labansat
Authors: T. Forest Moore, Dr. Heather A. Labansat, R. Wallace, T. Hough
Department: Psychological Sciences
Student Classification/Affiliation: Graduate Student MS: Applied Psychology

Abstract: The present study examines how employees’ experiences have changed since March 2020 and how they may have been affected by the COVID-19 pandemic. This study is examining employee’s satisfaction with prior work environments and how the changes caused by the pandemic may have impacted their satisfaction with work and negatively impacted their emotional health, psychological well-being and stress on a global scale. Questioning employees about their perceptions of work satisfaction and happiness prior to and after the onset of the COVID-19 pandemic will give researchers a further understanding how changes in work environment may affect employees. All participants in the study completed the online survey through Qualtrics and participation was entirely voluntary with no compensation for participation. Participants read and signed a consent form, fill out demographics and multiple assessments regarding their satisfaction with work, life, communication, and more before, during and after March 2020. After completion, the participants were debriefed and thanked for their participation. The data is currently being analyzed and will included t-tests, ANOVAs, and correlational analyses plus any additional analysis needed. The current study will be helpful to employers, researchers, and the universities as they navigate the next steps and changes that are coming with the global turn to work-from home and split office balance. Understanding how these interactions may affect employee satisfaction will help give universities, businesses, and researchers more insight into the working adult population. Hy1: Employees who experienced changes in working environment (working in office vs remotely) due to the onset of the COVID-19 pandemic will report differences in perceived productivity. Hy2: Employees who experienced changes in the working environment due to the onset of the COVID-19 pandemic will report a difference in perceived satisfaction with their work compared with their prior work environment. Hy3: Employees who have experienced changes in the working environment (working in office vs remotely) and report higher levels of job satisfaction due to the change will be more likely to choose to continue working in their changed environment in the future and not return to their typical method prior to the COVID-19 pandemic. Hy4: Employees who have changed their work environment (working in office vs remotely) since the onset of the COVID-19 pandemic will experience a difference in their perceived levels of communication in their jobs compared to prior the onset of the COVID-19 pandemic.
43. How Individual Differences Relate to Resilience During the COVID-19 Pandemic

Research Area: Applied Psychology

Student Presenter: Tionna Hough

Faculty Mentor: Dr. Heather A. Labansat

Authors: T. Hough, T. Forest Moore, R. Wallace, A. Savkovic, Dr. Heather A. Labansat

Department: Psychological Sciences

Student Classification/Affiliation: Graduate Student MS: Applied Psychology

Abstract: Individuals vary substantially in their ability to cope with change, manage stress, and regulate the emotions brought on by adversity. The COVID-19 pandemic has presented a variety of pervasive stressors with the capacity to negatively influence psychological well-being and stress management on a global scale. These circumstances have forced individuals to learn to cope with and adapt to a new version of daily living. Previous research implicates personality traits as risk factors for increased reactivity to stressors, protective factors against distress, and predictors of coping and resilience (Campbell-Sills et al., 2006). Specifically, high neuroticism is associated with greater levels of self-reported distress and internalizing symptoms, while low extraversion and low conscientiousness are positively correlated with resilience and adaptive coping mechanisms (Penley & Tomaka, 2002). The present study examined how individuals with varying personality traits fared during the COVID-19 pandemic, particularly as it relates to emotional well-being, psychological well-being, and distress.

Hypothesis 1: Neuroticism will be significantly positively correlated with distress and significantly negatively correlated with resilience, hope, and psychological well-being. Hypothesis 2: Extraversion, openness, and conscientiousness will be significantly negatively correlated with distress and significantly positively correlated with resilience, hope, and psychological well-being. Hypothesis 3: There will not be a significant relationship between agreeableness and any of the distress or resilience variables.

Method: Recruitment of participants consisted of convenience and snowball sampling methods using social media, flyers, and courses at a Southwestern university. The participants (n = 234) followed a link to a Qualtrics survey and completed the following questionnaires: Demographics, the Ten Item Personality Inventory, the Adult Hope Scale, the Depression, Anxiety, and Stress Scale, Ryff’s Scales of Psychological Well-being, the Satisfaction With Life Scale, questions about hobbies engaged in prior to and during the COVID-19 pandemic, questions about COVID-19-related work changes/attitudes toward these changes (if employed), and questions about COVID-19-related educational changes/attitudes toward these changes (if a college student).

Results: A Pearson r bivariate correlation indicated that extraversion was significantly negatively related to depression and satisfaction with life and significantly positively related to hope and psychological well-being (p ≤ .001). Next, a Pearson r bivariate correlation indicated that agreeableness was significantly negatively related to depression and stress (p < .05) and significantly positively related to hope and psychological well-being (p < .01). Pearson r bivariate correlations indicated that conscientiousness was significantly negatively related to satisfaction with life, depression, anxiety, and stress (p < .05) and significantly positively related to hope and psychological well-being (p ≤ .001). An additional Pearson r bivariate correlation indicated that emotional stability was significantly negatively related to satisfaction with life, depression, anxiety, and stress and significantly positively related to hope and psychological well-being (p ≤ .001). Lastly, a Pearson r bivariate correlation indicated that openness to experience was significantly negatively related to depression (p < .01) and significantly positively related to hope and psychological well-being (p < .05). Conclusion: The findings of this study highlight the importance of acknowledging personality traits as influential to individuals’ trajectories for risk and resilience during the COVID-19 pandemic.
44. COVID-19 and Online Learning Preferences in American College Students

Research Area: Applied Psychology
Student Presenter: Rene Wallace
Faculty Mentor: Dr. Heather A. Labansat
Authors: R. Wallace, T. Hough, T. Forest Moore, A. Savkovic, and Dr. Heather A. Labansat
Department: Psychological Sciences
Student Classification/Affiliation: Graduate Student MS: Applied Psychology

Abstract: The present study looks at how college students may have been affected by the COVID-19 pandemic. Specifically, it examines prior experience with online college courses and if forced online learning during the nationwide shutdown in March of 2020 had an effect on student preferences moving forward. The research questions this study sought to answer is if student preferences for online learning have changed. The main hypothesis is that students would be more likely to choose an online class after being completely online for most of a semester regardless of their experience level of online college courses in the past. This information can be helpful to universities as they plan class schedules in a post-Covid world. Understanding how students view online learning and if there has been a shift in the academic course delivery can encourage universities to plan courses students prefer to take. This may lead to higher enrollment rates and greater retention rates. All participants in this study were enrolled at least part time during the Spring semester of 2020. There were 119 participants who completed the online survey through Qualtrics. All participation was voluntary, and no individuals were compensated for their participation in anyway. Participants read and signed a consent form and filled out a demographics questionnaire which asked typical demographic questions and a myriad of questions regarding their college life before, during and after March 2020 (the COVID-19 nationwide shutdown). Lastly, participants were thoroughly debriefed. The data is currently in the process of being analyzed. Data will be analyzed using standard t-tests, ANOVAs, Bayesian statistics, and correlational analyses. The current research is both relevant and helpful to Universities and college student organizations as they navigate the post-COVID-19 waters. This research will have implications for many departments in a university setting and give better insight into America’s current college population. Future research should continue to be conducted which examines how COVID-19 affected American college students.
Building College Retention by Teaching Students Self-Compassion: The Impact of Fear of Failure on College Students’ Performance

Research Area: Applied Psychology
Student Presenter: Andrea Savkovic
Faculty Mentor: Dr. Heather A. Labansat
Authors: A. Savkovic, Dr. Heather A. Labansat, R. Wallace, T. Forest Moore, and T. Hough
Department: Psychological Sciences
Student Classification/Affiliation: Graduate Student MS: Applied Psychology

Abstract: Purpose: The belief systems of fear of failure & perfectionism may be harming students when it comes to their test taking abilities, learning strategies, and perseverance in academic endeavors. The ability to have self-compassion is strongly related to psychological well-being, as well as a decrease in depression, anxiety, and self-criticism. The present study thinks that people who report experiencing high test anxiety may lack self-compassion and may score high in perfectionism as well. If this is the case, we hope to later create interventions to teach self-compassion to help decreasing student’s anxiety regarding learning and increase their performance. The present study will explore the following questions: Is there positive correlation between fear of failure & test anxiety?, Is there a negative correlation between Self-Compassion & Fear of Failure? Is there a negative correlation between Self-Compassion & Test Anxiety?, Are there gender differences in regard to Fear of Failure & Self-Compassion?, Problem: Fear of failure is described as the motive of avoiding failure in achievement tasks that involve cognitive, behavioral, and emotional experiences (McGregor & Elliot, 2005; Atkinson, 1957). Sagar et al (2007) demonstrated that fear of failure in academic settings leads to greater anxiety, unstable self-esteem, the belief in low control in situations, self-handicapping (Marsh & Marsh, 2003; Martin, 2010), and increased cheating (Monte & Fish, 1989). Elliot & Church (1997) and Elliot & Sheldon (1997) found that fear of failure lead to poorer test grades, decreased intrinsic motivation, and a decreased level of engagement in academic achievement environments and pursuits. Method: Participants College students who are 18 years and older and are enrolled at least part-time in a community college or a university were recruited to participate. Participants were recruited using Social Media & Sona Systems (University Research Tool: Cloud based subject pool software). Some participants may have received extra credit for participating in the study, but no other compensation was given for participating. Procedure Participants clicked a link that directed them to a Qualtrics survey where they were presented a consent form. They agreed to participate by clicking the yes button, then they were presented with the questionnaires in the following order: Consent Form, Self-Compasion Scale, Neff (2003), Test-Anxiety Scale, (Sarason, 1980), Performance Failure Appraisal Inventory Questionnaire (PFAI), (Conroy, D. 2002), and a Demographics Questionnaire. After completing all questionnaires, students saw a debriefing form to read and were thanked for participating. Results: All data has been collected and analyses are being conducted over winter break. Correlational analyses, regression analysis and a path analysis will all be reported.
The Correlation between Academic Supplies and Academic Performance

Research Area: Social Work
Student Presenter: Malissa Harris, Rylei Jaramillo, Celia Suarez
Faculty Mentor: Dr. Ebony Lang
Authors: Malissa Harris
Department: Social Work
Student Classification/Affiliation: Senior

Abstract: Individuals attending college lack resources for academic supplies to help them achieve academic success. Academic performance is defined as the measurement of a student’s academic achievement across various academic subjects. Academic achievement and student success are affected by multiple factors such as a student’s access to academic supplies. Academic supplies are a hidden cost when attending college. These academic supplies include textbooks, workbooks, access codes for online and in-person classes, lab manuals, and calculators. Students must also consider stationery materials such as pens and paper, notebooks, pencils, highlighters, notecards. These hidden costs must also be considered by the student and added to the total expenses of academic materials. The average supply cost of courses in the United States for an undergraduate student in 2016 was $1,200. In 2020, 65 percent of students reported not buying course materials due to the soaring prices (Lumpkin, 2020). As a result, students are not receiving the materials necessary to achieve their desired academic performance. Furthermore, the cost of attending college has an “annual growth rate of 6.8%” according to Bustamante (2019). The average cost of college for each student in the United States per year is $35,720 (Hanson, 2021). In Texas alone, the average cost of attendance for public universities is $19,325, compared to the national average of $25,615 (Hanson 2021). This exploratory study examines the correlation between academic supplies and academic success, graduation and drop-out rates, and the need for students’ access to academic supplies. Walberg’s Theory of Educational Productivity aids this study in understanding how each of the nine factors mentioned earlier affect students’ academic achievement as well as graduation and retention rates among college students. The research design is a mixed methodology with an equal emphasis on qualitative and quantitative components. The student researchers used a non-probability purposive sampling method and developed a survey instrument that consisted of 15 questions regarding demographics, dropping a course, first generation students (traditional versus non-traditional students), classification, course materials, grade point average (GPA), and resources for academic supplies. The sample size consisted of 75 participants. The answers to these questions consist of yes or no, multichoice answers, short answers, or selecting a number on a rating scale between 1 to 5. This study aims to provide data on if the lack of academic materials for a course will decrease a college student’s academic success in the course. Researchers used quantitative analysis for the demographic, Likert scale, listing, and multiple-choice questions and qualitative analyses for analyzing the open-ended question by identifying codes, categories and collapsing into sizeable themes. Results indicated correlation between academic materials and academic success providing implications for the need of full student access to academic materials and resources. As a future social worker service indicates that individuals will be provided with the resources and the opportunity to succeed academically and financially to reach their full potential.
47. Awareness about Resources Available to Persons Affected by Sexual Crimes

Research Area: Social Work
Student Presenter: Courtney Jett, Miriam Gonzales, Corrine Cagle, Ashleigh Foreman
Faculty Mentor: Dr. Ebony Lang and Dr. Lindsey Marek
Authors: Courtney Jett, Miriam Gonzales, Corrine Cagle, Ashleigh Foreman
Department: Social Work
Student Classification/Affiliation: Senior

Abstract: Sexual violence refers to sexual activity where consent is not obtained or freely given. Anyone can experience sexual violence, but most victims are female. More than 1 in 3 women and 1 in 4 men have experienced sexual violence involving physical contact during their lifetimes. The person responsible for the violence is typically male and is usually someone known to the victim. The person can be, but is not limited to, a friend, coworker, neighbor, or family member. There are many types of sexual violence. Not all include physical contact between the victim and the perpetrator (person who harms someone else) — for example, sexual harassment, threats, and peeping. Other sexual violence includes unwanted touching and rape. Once a sexual violence act has occurred it is vital for the survivor to seek advocacy and emotional support to aid in their recovery. These services could come in the form of crisis intervention, counseling, support groups, education, and family enrichment groups. This research is an exploratory study to investigate the level of awareness for the resources that are available to the survivors of sexual violence. The student researchers use a non-probability purposive sampling method with a targeted sample size of 100 participants. The participants involved in the study are individuals who are over the age of 18 and reside in one of the six counties in the community area where the survey is conducted. The student researchers worked with an Advocacy Center within the local community to conduct their study. The objective assesses the level of the awareness of these resources within the counties, assist the Advocacy Center in developing new ways of engaging their targeted population, and to provide a clear understanding of the resources available for sexual assault victims. Student researchers perform various quantitative analyses to test the hypotheses and have a deeper understanding of awareness experienced by participants. The research is relevant to social work because it implements the core value of social justice. In assessing the level of awareness of the resources offered in the community, and improving the engagement measures helps to ensure the targeted population has an opportunity to heal and live a normal life. The results of the research inform all levels of social work practice. On the micro level social workers educate themselves about resources in their community so they can direct survivors of sexual violence to the best resources available. At the mezzo level social workers can educate surrounding organizations and the community about services available within the community for survivors of sexual violence. On the macro level, social workers could advocate for expansion of the existing engagement measures to better reach the targeted population.
48. Awareness of College Resources Available to Students

Research Area: Social Work
Student Presenter: Mariel Olvera and Jamie Ramos
Faculty Mentor: Dr. Ebony Lang and Dr. Lindsey Marek
Authors: Mariel Olvera
Department: Social Work
Student Classification/Affiliation: Senior

Abstract: There are over 200 pantries nationwide on College Campuses (Running Campus Food Pantry, 2021). Resources on college campuses are not always utilized by college students. In previous findings, student researchers learned that qualifying students are unaware of the resources readily available to them. On several occasions, individual college students are confused if they qualify for resources on college campuses. As a result, only a fraction of college students take advantage of these college resources or are even aware of the resources on college campuses. The student researchers aim to determine how aware college students are of resources on their campus. The student researchers reviewed a total of ten articles associated with resources on college campuses. The student researchers identified Maslow’s Hierarchy of Needs to inform their study as it relates to people’s well-being. Maslow’s Hierarchy of Needs relates to the academic performance of college students because, in order for students to perform well academically, their basic needs must be met. The study aims to investigate the lack of knowledge of resources available to students. The study is essential since it offers insights into a lack of resources being utilized by students. With the assistance of a campus pantry, the student researchers answer the following questions: How knowledgeable are college students about the resources available to them? What is their level of awareness about resources available? The student researchers conduct an exploratory study with a targeted sample size of 50 participants. The student researchers explore reasons for college students’ awareness of resources on campus. The study design is mixed-methodology with an equal emphasis of qualitative and quantitative questions. Researchers use quantitative analysis for analyzing the demographics, and qualitative analysis for analyzing open-ended questions to identify categories into sizable themes. Data is retrieved anonymously and analyzed using Microsoft Word, Excel, and the Statistical Package for the Social Sciences. The participants selected have been chosen with the guidance of the agency. The overall results encourage students to become more aware of resources available to them. Providing service to students who need assistance acquiring food or academic resources is relevant to social work because it is being aware of others basic needs.
The Impact of Intimate Partner Violence [IPV] Training on College Students’ Level of Knowledge about IPV

Research Area: Social Work  
Student Presenter: Kayli Rodine  
Faculty Mentor: Dr. Ebony Lang  
Authors: Kayli Rodine  
Department: Social Work  
Student Classification/Affiliation: Senior

Abstract: Intimate partner violence [IPV] is a worldwide epidemic that poses serious psychological and physical threats to victims. Nearly a quarter of women and a tenth of men have experienced some form of IPV within their lifetime (CDC, 2020). Many survivors of IPV experience long-term effects even after they left the abuse situation. Intimate partner violence [IPV] has been identified as a public health concern due to the effects that it has on survivors (Center for Disease Control [CDC], 2020). IPV is defined as mental, physical, or sexual control by a current or former dating partner (World Health Organization [WHO], 2012). The student researcher developed an exploratory study which examines the benefits of educating college students on the signs of IPV and the resources available to victims. The Transformative Learning Theory informs this study because it examines the influence of education on an individual’s perspective of the world through focus on the two main characteristics of learning: Logical and emotional. The aim of this study is to inform the reader of the threat that IPV poses to victims’ individual functioning and impact of creating a united community that encourages active bystanders and early reporting. The student researcher provided 25 participants with a pre-test to determine their level of comfortability when recognizing signs of IPV and informing victims of the resources available to them. Participants completed a 30-minute training covering signs of IPV, demographics of survivors, resources for survivors, and bystander responsibility. The training was followed with a post-test that evaluated the participants’ level of knowledge about the topic as well as the participants’ change in familiarity with the topic. Data was retrieved anonymously and analyzed using MS Excel and the Statistical Package for Social Sciences. The student researcher tested four hypotheses focused on the level of knowledge of IPV along with additional statistical analyses. Quantitative analysis for the demographic specifically testing differences between groups. The student researcher conducted qualitative analyses using deductive process for analyzing the open-ended question by identifying codes, categories and collapsing into sizeable themes. Through the development and implementation of an educational training, the student researcher identifies the effects of presenting educational IPV information. The social work value of social justice is exercised in the study through advocating for primary prevention in the community. The results provide details regarding the impact of educating communities on topics of social injustice to encourage advocates who are supported by education and experiences. The study combines social work knowledge and values to examine the effects of intervening in community issues and assisting survivors in their ability to achieve social functioning apart from their abusers.
50. Experiences of Stress on Caregivers During the COVID-19 Pandemic

Research Area: Social Work
Student Presenter: Alexis Rodrigues and Jadyn Luna
Faculty Mentor: Dr. Ebony Lang
Authors: Alexis Rodriguez, Jadyn Luna, McKenzie Hall, Alexis Hayes, Eduardo Rios, Tiffany Hall
Department: Social Work
Student Classification/Affiliation: Senior

Abstract: A countless number of children, families, and child welfare agencies have been greatly affected by the COVID-19 pandemic, since March 2020. In the beginning of COVID-19, child welfare agencies and caregivers lacked the ability to provide daily essentials to the children due to nationwide shutdowns and quarantine. COVID-19 has had a substantial effect on the world and in specific foster parents and agencies, reported a significant increase of stress added to their daily life. COVID-19 has potentially impacted 400,000 children in the foster care system. Civil action requiring immediate action for continuous 24-hour supervision created an additional strain on many group homes due to mandatory two-week quarantine for a positive test increasing the stress levels of foster parents. It also placed more responsibility on parents and agencies leading to an increase in mental health issues. Limited research discusses the increased COVID-19 related responsibility of foster parents and increases in their stress levels. Though there have been studies regarding the impacting on individuals’ mental health and the results have been negative. COVID-19 has affected countless individuals due to nation-wide shut downs and quarantine. Due to the mandate that requires one caregiver to stay awake overnight, quarantine for group home foster parents can have detrimental effects on their stress levels. When a child tests positive, the entire home has to be quarantined for two weeks, and this can become stressful due to an increased amount of responsibility. When this happens, house parents have no relief time until they are out of quarantine. The American Psychological Association reported that “on average, adults with lower reported stress levels report sleeping more hours a night than do adults with higher reported stress levels,” and house parents are having to alternate staying awake for two weeks with no assistance. According to Harriet Frazier, Vice President of Children’s Services at Fosters Home, there are not enough resources in order to remain safe for the overnight staff to come in when a house is quarantined. This mixed methods study examines the extent foster families and agencies were affected by the COVID-19. Although there are limited resources on how the homes will remain safe with the lack of overnight staff due to quarantine, it is important that foster parents’ mental health is not put at risk and there are no extra stressors during this time. Student researchers assembled a survey of 20 questions consisting of time spent working, questions on how COVID-19 affected stress on the caregivers and children’s behaviors, as well as Sheldon Cohen’s Perceived Stress Scale to measure the caregiver’s stress levels. Student researchers used descriptive statistics for basic demographics along with correlations, measures of central tendency, and measures of variability to test their hypotheses. Student researchers input data in SPSS to run t-tests as well as one sample and two sample chi-square tests. The results inform the need for assistance to multiple populations through provision of resources and addressing the mental health of caregivers.
51. Recognizing Faculty of Color within Predominately White Institutions
Research Area: Social Work
Student Presenter: Jody Smith and Gabriela Guerrero
Faculty Mentor: Dr. Ebony Lang and Dr. Jennifer Edwards
Authors: Jody Smith and Gabriela Guerrero
Department: Social Work
Student Classification/Affiliation: Senior
Abstract: White males have dominated American higher education (Bledstein, 1976; Fass, 1989; Graham, 1978; Solomon, 1985). Many Predominantly White institutions (PWI) are impacted by the limited visibility for its faculty of color. Visibility refers to how an individual is valued and recognized by others (Brighenti, 2007; Simpson & Lewis, 2005). Recognition effectively creates a pleasant working environment that motivates the employees to be committed to their work (Freeman, 1978). Visibility can be beneficial and empowering when it facilitates having a voice or the ability to speak and be heard, and where one can control how they are perceived and represented (Lollar, 2015). Invisibility often disadvantages overlooked groups by denying them recognition (Lewis & Simpson, 2012; Simpson & Lewis, 2005). For the dominant groups, invisibility strengthens these norms, leaves their privilege unquestioned and unchallenged, and allows them to further their control and authority (Simpson & Lewis, 2005). Research has found that faculty of color are expected to engage in stereotypical activities, work harder to be recognized as professors, and experience racism and prejudice from their co-workers (Joseph & Hirshfield, 2011). In the United States, diverse faculty members, including professors, assistant professors, associate professors, other faculty, and graduate assistant teachers equal half or less of faculty members (The National Center for Education Statistics, n.d., para. 2). Minorities often encounter 'uninviting territory' as they begin their academic careers in a majority setting. Minority faculty do not receive a proportionate share of sponsorship from superior faculty (Wolfé & Dilworth, 2015). The majority are power holders; professors from the same majority group who have opportunities that lead them to increased publications and professional development (Settles et al., 2019). Lack of recognition professors receive among universities and negative experiences contribute to qualified doctoral applicants bowing out from their academic careers (Brunsm et al., 2017; Jayakumar, Howard, Allen, & Han, 2009) and contribute to current faculty of color to quit. The lack of visibility and acknowledgment of professors of color has an impact on faculty retention and recruiting. Faculty of color efforts go ignored or overlooked, making it more challenging to attain or be considered for higher-level positions. This study addresses the following question: What is the level of awareness amongst faculty and students of how faculty of color are recognized within predominantly White institutions of higher education? The student researchers set out to educate and raise awareness about the underrepresentation of faculty of color in predominantly White institutions, gain insight into other viewpoints on the topic, and identify potential changes for minority faculty. A mixed methodological approach is used in the study with targeted sample size of 50 participants including students and faculty. The results provide additional insight to lead to further exploration of resources to assist this unrecognized population.

52. The Effects of Missing Documentation on the Foster Youth
Research Area: Social Work
Student Presenter: Emory Stout, Jessica Mata, Maize McMurry, Journee Coker
Faculty Mentor: Dr. Ebony Lang
Authors: Emory Stout
Department: Social Work
Student Classification/Affiliation: Senior
Abstract: A major problem directly affecting the foster care population, and specifically Caring Hearts for Children (CHFC), is the miscommunication between foster care agencies in Texas. The miscommunications occur due to missing documents, which are the obligation of TDFPS to guarantee these documents are submitted. TDFPS are assigned numerous cases, making the handling of documentation more difficult. TDFPS does not have enough caseworkers and in 2011, at the beginning of the lawsuit, “55 percent of caseworkers had caseloads exceeding 30 children, and 24 percent had caseloads exceeding 40 children” (Children’s Rights, paragraph 3). Agencies have just recently started tracking and updating each child’s plan of service to verify if a youth received their required documents once they exit the foster care system (Diaz, para 12). It is deemed negligent if any documentation goes missing or is destroyed (Margolin, 2011). The target population for this study are staff who work for a local foster care agency serving children assigned from Texas Department of Family and Protective Services. The study aims to discover how the foster children are being directly impacted by the handling of documentation. The student researchers seek to advocate for more education on the cause of the miscommunications that are taking place between agencies. Along with using data from the surveys, the student researchers also use secondary data from child notebooks provided by a community based foster care agency. Within the notebooks the student researchers consider demographics of the children involved, and review the documentation details located within each identified to pull as much information as possible to assist in understanding the population who is impacted by any missing documentation.
53. The Lack of Participation and Engagement of Volunteers for Child-Based Programs

Research Area: Social Work
Student Presenter: Hannah Stovall, Jennifer Etter, Megan Sample, Alexis McCue
Faculty Mentor: Dr. Ebony Lang
Authors: Hannah Stovall
Department: Social Work
Student Classification/Affiliation: Senior

Abstract: Many camp-based programs for children require the service of volunteers. Volunteers help in ensuring campers’ needs are met in a safe and efficient environment. While having enough volunteers during camp events is a vital component, many camp-based programs face the challenge of finding potential volunteers. The lack of participation and engagement of potential staff members presents the problem of having an insufficient number of staff to meet the needs of campers during camp sessions. Due to limited numbers of interested potential volunteers, local camp-based programs face the challenge of safely and efficiently conducting camp. Limited volunteers equate to a limited number of campers that will be allowed to attend camps. The student researchers conduct an exploratory study through assessment of participants representing current and previous volunteer pools. The student researchers developed the following research question: What incentives would increase the volunteer pool within camp-based programs for children? Prior to collecting and analyzing data on the identified research question, the student researchers developed four hypotheses focused on volunteering positions, motivation, and incentives. The student researchers target a sample size of 100 participants while utilizing a purposive probability sampling approach, as the survey is emailed out to all current and former volunteers. Through their survey, the student researchers collect information with the intention of becoming better informed on the reasons motivating volunteerism. Student researchers discover possible deterrents of volunteering and also identify and analyze the factors affecting the lack of participation and engagement of volunteers for children-based camp programs. This study aims to understand the reasons for the lack of participation and engagement of potential staff members due to recruitment efforts. By addressing the lack of participation and engagement, this study provides opportunity to assess the specific issues and challenges of staff recruitment experienced at local camp-based programs.

54. Factors Influencing the Volunteering of CASA Advocates from Diverse Backgrounds

Research Area: Social Work
Student Presenter: Anntanette White
Faculty Mentor: Dr. Ebony Lang
Authors: Anntanette White
Department: Social Work
Student Classification/Affiliation: Senior

Abstract: Various studies have shown that the percentage of ethnically diverse volunteers needed are much lower than the ethnically diverse children in the system (Victoria Advocate, 2018). These studies indicate advocates from various diversities have natural communication, behavior and attitudes that are important to the children placed in the foster care system that are of similar diversities (Victoria Advocate, 2018). Many advocates are unaware of the ethno-cultural of the children and are inexperienced in providing the best service plan (Victoria Advocate, 2018). CASA has determined the ratio differences but the factors that influence diverse ethnicities to volunteer are unknown (CASA For Children, 2021). Urban counties are more populated with foster children than rural counties due to the number of foster homes. CASA, Court Appointed Special Advocates is an organization of community volunteers that are recruited, trained, and appointed by the judicial system to advocate for children involved in the child welfare system and improve their wellbeing by researching the best interest of the child CASA Texas, 2021). CASA Advocates are highly trained volunteers from the child’s community whose responsibility is to get to know the child and advocate for their safety, well-being and permanency while in foster care (CASA Texas, 2021). This mixed methodological study with a quantitative emphasis aims to determine factors that influence volunteers from ethnically diverse population to volunteer for CASA. The student researcher developed surveys in English and Spanish that included demographic questions, 20 Likert scale questions and 3 qualitative questions. The targeted sample size is 25 participants. Student researchers examined ten literature articles relating to factors that influence diverse populations to volunteer. The student researcher uses descriptive statistics of frequencies, measures of central tendency, and measures of variability as well as nonparametric testing of relationships within groups and parametric testing for differences between groups. The researcher conducts qualitative analyses using deductive process for analyzing the open-ended question by identifying codes, categories and collapsing into sizeable themes. The results of the study determine factors that are preventing ethnically diverse community members from reaching out to CASA and volunteering their time, experience, and knowledge.
55. Rural Demand Forecast Projection

**PERS Recipient**

Research Area: Rural Small Business and Economic Development

Staff Presenter: Bill Leaverton

Author: Bill Leaverton

Department: RIED

Abstract: The TSU SBDC set out to continue its focus upon assisting the rural entrepreneurs fulfill their dream of opening small businesses by honing in on much needed market research. Market research is the most difficult portion of a business start-up. Especially, in a rural setting. Determining the correct demand and forecasting revenue accurately could very well mean the difference between obtaining necessary funding, solvency and longevity. Overstating this forecast could certainly place a strain on cash flow and or cause an early demise of a small business. Since this aspect of a small business is so crucial, the SBDC decided it would attempt to create a model to better forecast this demand. This model will allow rural entrepreneurs to: 1. Provide entrepreneurs the ability to defend financial projections to a lender. Thus, providing better access to capital. And, increase loan success rates within the rural community. 2. Provide TSU SBDC with a precise instrument designed to construct financial models for businesses of all types and locations. 3. Allow TSU SBDC to apply for a larger grant that, in essence, would create a primary research center within TSU. Through the assistance of CAE and Troy Thorne, and Dr. Scott Cook, we determined the best way to approach a model would be to obtain sales tax data that is sorted by zip code and NAICS code for each county in the state of Texas for the period of 20 years. In theory, we would be able to replicate our local condition using similar demographic data of other locations. This would provide relevant information that would help us compare locations and determine a confidence factor. Thus, providing the necessary confidence of a demand forecast. This forecast could then be used to present financial statements to lenders and be able to defend the forecast. The end result is a much more robust financial model that provides the entrepreneur and the lender with solid financial information they can utilize to determine viability. This project is on-going. Once the data is obtained, scheduling time with the appropriate data scientists will be the next task to accomplish.

56. Optimal Design Process for a Wind Turbine Blade Through Numerical Analysis and Experimental Results in North Texas

**PERS Recipient**

Research Area: Renewable Energy

Student Presenter: William Flores and Silverio Vazquez

Faculty Mentor: Dr. Hoe-Gil Lee

Authors: Dr. Hoe-Gil Lee

Department: Mechanical, Environmental, and Civil Engineering

Student Classification/Affiliation: Seniors / Mechanical Engineering

Abstract: Wind energy is utilized using a wind turbine and the wind blows the blades of the turbine, which rotates an electric generator to produce electricity. For producing the maximum wind energy, the wind turbine blades are the most important parts of a wind turbine in terms of performance of the power system. Thus, the design and shape of the turbine blade has a major impact on the performance, which indicates the energy conversion process of kinetic energy associated with the wind speed. This research involves two parts. There are design and simulations, and measurements, validations, and testing using 3D printed prototype based on experimental acquisition data from wind tunnel and a strain-gage measurement system. A wind turbine blade length determines how much wind power can be captured as they rotate around a central hub and the aerodynamic performance of wind turbine blades is very different between a flat blade and a curved blade. In order to improve the wind turbine power and the aerodynamic effects by using the curved profile, twisted and propeller-type blade design for producing more power, the wind blades need to have an aerodynamic profile to create lift and rotate the wind turbines, but curved airfoil type blades are more difficult to make but offer better performance and higher rotational speed making them ideal for electrical energy generation. This research finds the following results of studies: First, the airfoil designs with a smaller airfoil thickness (below 12%) experience stall at earlier angles of attack than thicker (above 12%) designed airfoils. Second, the initial decrease in percent thickness from 24% to 12% in the airfoil results in roughly 38% more energy production. Third, thinner blades with an airfoil thickness ranging between 10% and 8% started trending towards inefficiency likely due to the airfoils’ early entrance into the stall region. Fourth, the maximum stresses and deflections decrease from 97.09 MPa to 12.26 MPa and from 186 mm to 2.48 mm, respectively, as airfoil thickness increases in both simulated analysis with similar results in experimental analysis. Lastly, smaller blade thickness greater than 12% poses failure risks as well as increasing deflection and vibrational effects ultimately reducing the blades’ AEP by around 3% for each blade thickness decrease from NACA 2424 to NACA 2408. In order to optimize and improve the performance of the wind turbine blade system, the design process is iterated to find the best performance using engineering optimization methods.
57. Effects of Low-Intensity Fatigue on Motor Unit Firing Properties During Maximal Voluntary Isometric Contractions

PERS Recipient
Research Area: Neuromuscular Physiology
Student Presenter: Lyric Richardson
Faculty Mentor: Dr. Micheal Luera
Authors: Lyric D. Richardson, Amy E. Riera, Emma D. Bozarth, Dr. Micheal J. Luera
Department: Health and Human Performance
Student Classification/Affiliation: Graduate Assistant - Human Performance Laboratory

Abstract: Rehabilitation from injuries impairing the neuromuscular system are often difficult to quantify due to task specificity of the affected or immobilized limb or limbs. Often, exercise regimens with clinical practitioners are designed to progress motor performance to a capacity that reflects muscle force production to pre-injury capacity. Modulation of force production from these tasks are regulated from various mechanism in the central and peripheral nervous system. The neural activation of these systems can be recorded as electrical impulses using several non-invasive techniques. Recently, the ability to examine these during fatiguing exercise has provided further insight into activation patterns and firing properties in central (i.e., motor and pre-motor cortex) and peripheral locations (i.e., skeletal muscle). Tracking motor neuron activation from these affords opportunities to investigate the regulation and modulation of task specific performances, and can improve the capacity to derive performance criteria for rehabilitation. PURPOSE: The purpose of this investigation was to examine the effects of low-force isometric fatiguing contractions on motor unit firing properties during maximal voluntary contractions (MVCs). METHODS: Following 3 MVCs, four lower-body resistance trained males (yrs., ht. ±., wt ±.) performed 60 second submaximal (30% MVC) isometric ramp contraction of the knee extension exercise. Knee extensions were performed on a custom-built seat using an S-beam load-cell to measure isometric force production of the quadriceps muscle group. During the fatiguing contractions, participants were encouraged to perform as many trapezoidal ramp contractions (i.e., 30%) as possible, until they could no longer sustain the required force production. Fatigue was established when the participant could no longer maintain the contraction force within 10% for no less that 3 seconds during the isometric hold. Surface electromyography signals were collected from the vastus lateralis of the right leg and were decomposed into their constituent motor unit action potential (MUAP) trains for further analysis. Paired samples t-tests were used to compare the changes in slope and y-intercepts of the MUAP amplitude vs mean firing rate relationships before (PRE) and after (POST) fatigue. RESULTS: There were significant differences between the PRE and POST slopes and y-intercepts of the MUAP amplitude vs mean firing rate relationships (p < 0.05). DISCUSSION: The low-intensity fatiguing contractions elicited responses in motor unit firing properties that are consistent with previous findings. Although there were fewer motor units identified in the POST MVCs, the accuracy in the recordings following decomposition analysis were able to accurately validate a quantifiable amount of motor units for further processing techniques and statistical analysis. These advanced technologies and techniques in identifying local (peripheral) responses in skeletal muscle fatigue will continue to provide robust information in the modulation of force production of motor performance.

58. Evaluation of Online Learning Tools for EL Learners

Research Area: TESOL & Curriculum and Instruction
Presenter: Dr. Ricardo Lumbreras, Jr.
Authors: Dr. Ricardo Lumbreras, Jr.
Department: Curriculum & Instruction

Abstract: Many of the topics discussed in the education of EL Learners in public schools suggest using technology to bridge the linguistic gaps of our students. Evaluating those tools to ensure they are meeting the needs of our curriculum and our learners is essential. Furthermore, selecting the appropriate descriptors and developing a rubric for measuring these descriptors will aid in choosing the best CALL (Computer Assisted Language Learning) tools to assist our students. This poster and accompanying discussion will present relevant research related to this topic and show the before mentioned rubric designed to support this critical topic.
59. Food Insecurity Amongst College Students: A Mixed-Methods Study

Research Area: Social Work
Student Presenter: Maira A. Munoz
Faculty Mentor: Dr. Lindsey N. Marek, LMSW, LCDC-I
Authors: Dr. Lindsey N. Marek and Ms. Maira A. Munoz
Department: Social Work
Student Classification/Affiliation: Senior

Abstract: The problem this research study addresses is that food insecurity can affect a student’s ability to complete their education, which includes poor health outcomes, low academic performance, and low cognitive functioning (Gundersen & Ziliak, 2015). The purpose of this study is to evaluate the prevalence of food insecurity amongst college students at a higher education, Texas campus. The researchers examined the association between food insecurity, demographic characteristics, GPA, and the impact of the Covid-19 pandemic. A cross-sectional survey was utilized and sent to students who were enrolled in a program within a Texas higher education campus. The survey used a questionnaire which consisted of a modified version of the Household Food Security Survey Module (HSSM). The questionnaire also included demographic, Likert-Type scale, and multiple-choice questions. Qualitative open-ended questions were also included within the questionnaire. Results indicated if there was a statistically significant difference between students enrolled in a higher education program and experiencing food insecurity as well as other potential factors. College students who are experiencing food insecurity are an important public health problem which can affect a student’s academic performance, retention rate, and graduation outcome. Understanding food insecurity on a college campus can help college stakeholders understand the need to advocate for and develop a food pantry to help students be better positioned within their academic career.

60. Mycorrhiza Associated with Quercus marilandica

PERS Recipient
Research Area: Natural Resources
Student Presenter: Hannah N. Lindsey
Faculty Mentor: Dr. Donald G. McGahan
Authors: Hannah N. Lindsey and Dr. Donald G. McGahan
Department: Wildlife and Natural Resources
Student Classification/Affiliation: Undergraduate

Abstract: Climate change is exerting pressure on plant communities. Diminished water use efficiency from changing precipitation timing coupled with increased evapotranspiration from lengthened warm temperature seasons, nutrient dynamic interruptions from decreases in water potential, species invasion pressures together with and novel, or rejuvenated activity, of pests are all stresses to oaks (Quercus) species native to Texas and across the world. Of particular concern in Texas is the vascular tree disease oak wilt caused by Ceratocystis fagacearum. One vector of oak wilt spread is through xylem connections via root grafts, but beetles of the family Nitidulidae are implicated as the vectors. Plants can get help obtaining nutrients such as phosphorus (P) from the soil from a symbiotic partnership with mycorrhizal fungi. There are different forms of mycorrhizal colonization of plant roots. The overarching goals of this study are to establish modifications in Hoagland’s solution nutrient levels that support container studies of oaks—we expect a lower phosphorus concentration to be best to study mycorrhizal-root symbiosis on Quercus and to isolate and identify type–arbuscular mycorrhiza versus ectomycorrhizal—and eventually the species of mycorrhizal associations with multiple species of Quercus roots. To accomplish study of oak-mycorrhizal interactions oak seedlings with mycorrhizal infections collections are desirable and it is necessary to learn to make Hoagland’s solution. Seedlings of Q. marilandica were collected form three disparate locations in Erath County Texas. Hoagland’s solution was created in an unmodified form. Twenty-four Q. marilandica seedlings were collected. Cursory inspection of seedling roots via hand lens or dissecting microscope revealed extensive root infection. Eighteen seedlings perished post collection. Six survived to be moved into three-gallon jugs of unmodified Hoagland’s solution and aerated to maintain oxidation. Black plastic was wrapped around the jugs to exclude sunlight. Seedlings were monitored every three days and photographed weekly. All six seedlings transferred to Hoagland’s solution also perished in 60 days. Insufficient number of seedlings survived to study modifications of Hoagland’s solution. The eighteen seedlings that did not survive long enough to be transferred to Hoagland’s solution all were extensively infected with mycorrhiza. We conclude that Q. marilandica when collected for this study were already extensively infected, and relied greatly on, the mycorrhiza. We further conclude that excavation of even very young seedlings damages the mycorrhiza enough to cause considerable stress to the seedling and this stress is mostly unrecoverable leading to death. For the next step, either many more seedlings will need to be collected, or acorns might be germinated and presented to soil in a controlled volume to be infected. The purpose of this study was to observe mycorrhizal infections and determine if the plant and mycorrhiza can be maintained in a hydroponic state. Seedling mortality prevented Q. marilandica mycorrhizal interaction typing and collection of the mycorrhiza across the collections.
61. Service Learning and Beyond
Research Area: Service Learning
Authors: Dr. Veronica Molina, DSW, LMSW, ACSW
Department: Social Work and Communication Disorders
Abstract: Service learning integration in courses is an opportunity to introduce students to civic engagement. However, adding a service-learning project in a course can also enhance the student’s understanding of course objectives. The following poster presentation will highlight how service-learning can be used beyond civic engagement with a presentation of several unique service-learning projects that amplified student learning.

62. Quanah, Texas: Student Research and Public Challenges in Rural Texas
PERS Recipient
Research Area: Public Policy, Rural Texas, Tourism
Student Presenter: Ms. Lea Hart
Faculty Mentor: Dr. Eric V. Morrow
Authors: Ms. Lea Hart
Department: College of Liberal and Fine Arts – Department of Government, Legal Studies, and Philosophy
Student Classification/Affiliation: Senior/History
Abstract: For the Summer of 2021, a PERS grant was received to employ three students in policy research for a Fall 2021 policy project in the POLS 4340 US Public Policy course. The research was focused on gathering data/information on the 4 standard policy contexts: social, cultural, economic, and political. Each student was assigned an area of research to create the parts of a community profile to be used by students in the Fall course as a foundation for further research on public challenges in Quanah, Texas. At the beginning of the Fall term, the students in the course met with city and county leaders to discuss the most pressing public challenges. These included tourism, workforce development, water management, and the need to expand community services such as child care and the resources of the public library. The students in the class were divided into four teams to research these issues while learning the basics of the policymaking process. The student teams were charged with identifying the specific challenge in rural Texas; researching local, state and federal agencies, legislation and judicial decisions related to each issue; identifying how the specific challenges have been addressed in other rural communities; and identifying resources through government agencies and programs as well as organizations and foundations that could address these challenges. The students also learned the methods of communication in the policymaking sphere, both in oral and written form. At the conclusion of the semester, members of each team traveled to Quanah to tour the community, meet with local leaders, and present their research and recommendations. These recommendations will be given to city and county leaders in written form so that they can prioritize their goals. Tarleton State will continue to work with these leaders to pursue grant and program funding based on the student research. This poster presentation will focus on the student work on tourism as related to economic growth and development. The presentation will highlight the research process and the engagement with the community, as well as the outcomes based on the recommended policy options. The presentation will also emphasize the quality of this model for student research both focused on rural Texas and providing potential for grant funding in a collaboration between the University and communities.
63. Characterization of a Mesquite-Prickly Pear Flat with Aerial Photos

**PERS Recipient**
Research Area: Ecology
Presenter: Bryan Dunn
Faculty Mentor: Dr. Darrel Murray
Authors: Bryan Dunn, Dr. Darrel Murray, David Johnston
Department: Wildlife and Natural Resources
Student Classification/Affiliation: Undergraduate

Abstract: Semi-arid grassland ecosystems worldwide have been encroached by woody legumes in the *Prosopis* genus. These sparse-canopied trees change the sub-canopy herbaceous composition and production of rangelands. In mesquite (*Prosopis glandulosa* Torr.) encroached areas of the Southern Great Plains of North America, herbaceous transition occurs rapidly as percent canopy cover increases across the range of 25 - 40%. This transition results in a degraded state with cool-season grasses, annual forbs, and prickly pear. The first step in restoration is removal of the mesquite canopy. We utilized aerial photographs and Natural Resource Conservation Service (NRCS) state transitions models (STMs) to make inferences about changes in woody plant cover through time at a site located in Palo Pinto Mountains State Park. Aerial photographs were classified within arcGIS software into woody & non-woody vegetation. Changes in percent woody cover through time was then used to determine vegetation states within STMs. For this site, the time to recover woody species percent cover was somewhere in the range of 10-15 years. Based on our findings and interpretation of related STMs, clearing mesquite alone does not constitute restoration of the plant community.

64. Characterization of a Mixed Native-Invasive Grassland

**PERS Recipient**
Research Area: Ecology
Presenter: Wyatt Welch
Faculty Mentor: Dr. Darrel Murray
Authors: Wyatt Welch, Dr. Darrel Murray, David Johnston
Department: Wildlife and Natural Resources
Student Classification/Affiliation: Undergraduate

Abstract: Exotic grass invasions present a particular problem for restoration of native grasslands and savannas, especially those with similar life histories and adaptations as native grass species. Highly managed grassland systems often have introduced plant species that have naturalized and become invasive. The original native C4 bunchgrasses of the southern Great Plains, including little bluestem (*Schizachyrium scoparium* (Michx) Nash), have become invaded by King Ranch bluestem (*Bothriochloa ischaemum* (L.) Keng) and other grasses. This has created secondary-growth mixed invasive-native grassland communities, often with much lower native plant diversity than historical, old-growth grasslands. In this project, we utilized aerial photographs, field measurements, and Natural Resource Conservation Service (NRCS) state transitions models (STMs) to make inferences about changes in invasive-native grass cover at a site in northern Erath County. Based on presence of honey mesquite (*Prosopis glandulosa* Torr.) and KR bluestem, the current STM vegetation state appears to be a Converted Land State with remnant little bluestem populations. Drones combined with field measurements appear to be a promising method for interpretation and management of degraded areas.
65. Canopy Insect Assemblages of Cedar Elm (Ulmus crassifolia) and Green Ash (Fraxinus pennsylvanica) in Narrow versus Wide Riparian Buffers at Timberlake Biological Field Station, Mills County, Texas

**PERS Recipient**
Research Area: Entomology
Student Presenter: Casey O’Neal
Faculty Mentor: Dr. Allan Nelson
Authors: Casey O’Neal
Department: Biology
Student Classification: Graduate, M.S. Biology Aug 2021

Abstract: The Lower Colorado River in Texas has been degraded by damming of rivers and abusive agricultural practices that have damaged riparian forest buffers. Nelson, A. et al. found that cedar elm, Ulmus crassifolia, and the endangered green ash, Fraxinus pennsylvanica, had the highest importance value of woody plant species in the riparian forest buffers at Timberlake Biological Field Station (TBFS) in Mills County, Texas. Oak trees in the family Fagaceae and genus Quercus are hosts for the largest number of Lepidopteran pests, possibly due to being one of the most widespread and speciose groups of trees. In comparison, there has been little research of Lepidopteran pests on the much smaller Fraxinus and Ulmus genera. Additionally, there is little research on insect pests overall on these two tree species outside of the exotic Emerald Ash Borer (EAB), Agrilus planipennis, on green ash. Insects were collected from cedar elm and green ash in narrow and wide riparian forest buffers at TBFS using purple sticky traps and black Lindgren funnel traps to determine insect assemblages for these tree species, and if tree species or buffer width had a significant effect on community assemblages. The data gathered was analyzed using Project R and R Studio to describe the collected insect communities via abundance, richness, Shannon’s diversity, Pielou’s evenness, and Hill numbers. Communities in the narrow riparian buffer had significantly greater abundance than wide buffers, but their community diversity was found to be 88.85% similar. Green ash trees had significantly higher abundance than cedar elm trees, but the difference in abundance of Lepidopterans was insignificant and the two communities were found to be 83.65% similar overall. However, hemipterans were significantly different between elms and ashes, with ashes having the most true bugs. The EAB was not detected during sampling, but an infestation of forest tent caterpillars, Malacosoma disstria, was observed targeting green ash, and a management plan of vitamin E being applied basally to green ash trunks was suggested to protect critically endangered species of ash like the green ash at TBFS.

66. Marijuana Dispensaries and Juvenile Offending

**PERS Recipient**
Research Area: Land Use and Crime
Student Presenter: Juan Salinas
Faculty Mentor: Dr. SooHyun O
Authors: Dr. SooHyun O, Juan Salinas
Department: Department of Criminal Justice
Student Classification/Affiliation: Senior

Abstract: Despite the increase in the number of states or cities that legalize marijuana use for either medical or recreational purposes, not many studies examined the link between the medical marijuana dispensaries (MMD) and crime for youth. Much of the work focused on adult crime and thus we know very little about the link between MMD and youth delinquency. Thus, this study examines how medical marijuana dispensaries are associated with youth delinquency. More specifically, the present study draws upon opportunity theories, posits that the presence of dispensary in each block is positively associated with youth offending. Using the crime data from the Colorado Springs police department and information on medical marijuana dispensaries in Colorado Springs, we examine the relationship using the Hierarchical Linear Model. Discussion of policy implications for both the criminal justice system and law enforcement agencies targeting juvenile crime places is followed.
67. Bridging the Digital Divide to Promote Economic Development in Rural Texas

**PERS Recipient**
Research Area: Rural Economics
Student Presenter: Cahlen Cheatham
Faculty Mentor: Dr. Edward Osei
Authors: Cahlen Cheatham and Dr. Edward Osei
Department: Agricultural Education and Communication
Student Classification/Affiliation: Senior Agribusiness and Economics Major (Double Major)

**Abstract:** Bridging the Digital Divide in Texas is critical to the success of the state’s economy and to the wellbeing of its residents. Data suggests that inadequate broadband access causes significant limitations on agriculture, business, entertainment, healthcare, education, and communication. Increased broadband availability will only bridge the producer side of the Digital Divide. The consumer side -- broadband adoption -- must also be bridged to allow the state to achieve maximum benefits. This project focuses on contributing solutions to the aforementioned obstacles by providing more specific data on the economic impact of the Digital Divide, connecting various stakeholders around the state, increasing the amount of broadband adoption advocacy resources, and possibly surveying affected stakeholders. The main objective addressed by the project is estimation of the impact of broadband adoption on economic development. To accomplish this objective, we assembled the required data and used econometric techniques to estimate the impacts of county-level broadband adoption metrics on county-level income and employment indicators. Specifically, we utilized multiple regression and synthetic control methods to determine the impacts of incremental broadband adoption rates on current year and subsequent year GDP and employment indicators. Counties were designated as rural or urban depending on the USDA rural-urban continuum codes. Our data confirmed that urban counties in Texas had higher broadband adoption rates than rural Texas counties. The results indicate that counties with higher levels of broadband adoption also experience higher levels of GDP and employment in subsequent years. The results of the project will form the basis for additional research proposals and projects earmarked for the upcoming year.

68. Marketing of Cannabis: Methodology to Practice

**Research Area:** Marketing Strategy
**Student Presenter:** C. Grace Lampo and Vanessa Cates
**Faculty Mentor:** Dr. Robert Pellegrino
**Authors:** C.G. Lampo, V. Cates, J. Nestor, K. Wright.
**Department:** Marketing and CIS
**Student Classification/Affiliation:** Undergraduate/Upper division

**Abstract:** Students completed the first ever course about the cannabis business ever taught at Tarleton State University. The final project in the class was to develop a marketing strategy for a local business that is trying to operate in this new space. In 2020 cannabis was a $18.3 Billion-dollar industry. This was a 71 percent increase from 2019 making the cannabis industry the fastest growing industry in the United States.
69. Cortical Activity Measured With Low-Intensity Fatiguing Contractions of the Quadriceps Muscle Group

PERS Recipient
Research Area: Neuromuscular Physiology
Student Presenter: Emma Bozarth
Faculty Mentor: Michael Luera, PhD
Authors: Emma D. Bozarth, Lyric D. Richardson, Amy E. Riera, Amber Harris Bozer, Michael J. Luera
Department: Health and Human Performance
Student Classification/Affiliation: Graduate Assistant - Human Performance Laboratory

Abstract: Modulation of force production required during exercise is regulated from various mechanisms in the central and peripheral nervous system. Fatigue is influenced by various mechanics that may hinder the ability to continuously sustain force production. The neural activation patterns of these systems can be recorded as electrical impulses using several non-invasive techniques. The ability to examine these during fatiguing exercise has provided further insight into activation patterns in the central nervous system (i.e., motor and pre-motor cortex) during sustained muscle contractions. Electroencephalography (EEG) has been recently utilized to examine changes associated with central fatigue, but limited advancements in technology for neuromuscular fatigue have inhibited progression in this area of research. Purpose: The purpose of this study is to discover the effects of low-intensity muscular fatigue on central mechanisms. Methods: Following 3 Maximal Voluntary Contractions (MVCs), four lower-body resistance trained males (23yrs. ±2, ht.176cm ±6., wt. 89kg ±16.) performed 60 second submaximal (30% MVC) isometric ramp contraction of the knee extension exercise. Knee extensions were performed on a custom-built seat using an S-beam load-cell to measure isometric force production of the quadriceps muscle group. During the fatiguing contractions, participants were encouraged to perform as many trapezoidal ramp contractions (i.e., 30%) as possible, until they could no longer sustain the required force production. Fatigue was established when the participant could no longer maintain the contraction force within 10% for no less than 3 seconds during the isometric hold. Cortical activity was recorded with a 24-electrode electroencephalogram (EEG) soft cap. Once EEG signals were referenced, bandpass filtered, and cleaned, gamma and beta frequency band data and topographic maps were computed for electrodes over the cerebral cortex (C3, Cz, and C4). Three separate repeated measures ANOVAs (C3, C4, Cz) were used to compare the frequency bands (Gamma and Beta) over time (pre, mid, post) during the first 3 seconds of the force plateau of the pre and post contractions. Results: There were no significant differences over time in any of the electrodes/bands (p > .05). Discussion: These data indicate that low-intensity muscular fatigue is not mediated by central mechanisms in the C3, C4, Cz electrode spaces in the higher frequency bands (beta and gamma). Future research will examine other central mechanisms that underlie the neural circuit involved in muscular fatigue.

70. Anthropometrics and performance test correlations in male rodeo athletes

Research Area: Strength and Conditioning, Rodeo Athletes
Presenter: Jared Conley
Authors: Jared Conley, Dr. Colin Pennington, Dr. Andy Wolfe
Department: Department of Sport Science, School of Kinesiology
Student Classification/Affiliation: Kinesiology Graduate Student – Exercise Science

Abstract: Despite the growing participation and popularity of collegiate rodeo, precious little has been investigated on the sport or its athletes (Meyers & Laurent, 2012). As such, this production works to partially remedy this lack of information by investigating the relationship between male collegiate rodeo athlete anthropometrics and performance test results. Following IRB guidelines, 14 (20.86 ± 1.17 years; 178.2 ± 7.85 cm; 86.48 ± 21.39 Kg) male Tarleton State University (TSU) rodeo athletes participated in two consecutive six-week resistance training programs. Pre- and post-test athlete data was gathered and included the following: body fat percentage, lean body mass, vertical jump height, T-test and 300-yard shuttle times, barbell back squat, bench press, trap bar deadlift one repetition maximums, and single- and multi-hand reaction times. Data analysis revealed means, standard deviations, and descriptive statistics. Results show that the 300-yard shuttle had a significant relationship with body fat percentage (r=0.805, p=0.005), lean body mass (LBM; r=0.675, p=0.032), T-Test (r=0.788, p=0.007), vertical jump (r=-0.953, p=0.003), single-hand total reaction time (r=0.857, p=0.014), and multi-hand total reaction time (r=0.781, p=0.038). While previous studies have found a relationship between body fat percentage and 300-yard shuttle results (Collins et al, 2014), few, if any, have found a correlation to other performance tests in rodeo athletes. In addition to addressing the significant lack of knowledge on collegiate rodeo athletes, results in this study assist strength and conditioning specialists in the development of accurate predictions on performance test results and athletes. Furthermore, results from this study can aid in improving the manner in which they design their training programs. * Interesting finds: Strong relationship between body fat and lean body mass, vertical jump, and 300 shuttle; Strong relationship between lean body mass and T-test & Shuttle, but nothing else; Very strong relationship between vertical jump and Shuttle, T-test and shuttle; Shuttle and BF, lean body mass, T-test, vertical jump, single-hand total, and multi-hand total reaction time; The only relationship between max strength tests is with each of the other strength tests (lean body mass nor body fat & had a relationship with maximal strength).
71. The relationship between performance tests in female rodeo athletes

Research Area: Strength and Conditioning, Rodeo Athletes
Presenter: Jared Conley
Authors: Jared Conley, Dr. Colin Pennington, Dr. Andy Wolfe
Department: Department of Sport Science, School of Kinesiology
Student Classification/Affiliation: Kinesiology Graduate Student – Exercise Science

Abstract: Human kinematics research has observed all levels of almost every major sport, resulting in a profusion of information from athlete demographics and injury tendencies to advanced physical training protocols (Kerr et al., 2016; Smith et al., 2014). Collegiate rodeo and its athletes, however, represent one of the few sports that has yet to experience sufficient research investigation (Meyers & Laurent, 2012). Thus, the purpose of this work is to offer some mediation for this critical issue via the investigation of the relationship between female collegiate rodeo athlete anthropometrics and their performance test results. In accordance with IRB guidelines, 29 (20.51 ± 1.48 years; 164.2 ± 8.2 cm; 66.22 ± 10.1 Kg) female Tarleton State University (TSU) rodeo athletes participated in two consecutive six-week resistance training programs. Pre- and post-test athlete data was gathered and included the following: body fat percentage, lean body mass, vertical jump height, T-test and 300-yard shuttle times, barbell back squat, bench press, trap bar deadlift one repetition maximums, and single- and multi-hand reaction times. It was found that the 300-yard shuttle had a significant relationship with lean body mass (LBM); r=0.598, p=0.019, T-test (r=0.569, p=0.034), and average multi-hand reaction time (r=0.631, p=0.012). No significant relationship was found, however, between the 300-yard shuttle and body fat percentage, vertical jump height, or single-hand reaction time – all of which were found to be related within the male population in a similar study investigating the same performance variables. The results from this study not only reduce the gap in information on rodeo athletes, but they also illuminate some significant relationships and training considerations. Based on the information in the results, strength and conditioning specialists can make more accurate predictions on performance results and reaction-time capabilities for rodeo athletes. This information also suggests a possible lack of relationship between vertical jump height, body fat percentage, and 300-yard shuttle results; a female rodeo athlete may be capable of a better 300-yard shuttle or vertical jump despite her body fat percentage – this finding has practical relevance, as it does not pattern the relationship of performance variables for females in other sports. Future studies may further investigate this unexpected finding. * Interesting finds: There is no relationship between body fat % and any performance test; LBM has a significant relationship with 300-yard shuttle, barbell bench, and Trap bar deadlift, but not BB squat; Average multi-hand reaction time has a strong positive relationship with both the t-test and 300-yard shuttle; No relationship with lean body mass and vertical jump; Significant relationship between 300-yard and T-test; No relationship with T-test/300-yard shuttle and maximal lifts

72. Developing a physical profile of collegiate male rodeo athletes

Research Area: Strength and Conditioning, Rodeo Athletes
Presenter: Jared Conley
Authors: Jared Conley, Dr. Colin Pennington, Dr. Andy Wolfe
Department: Department of Sport Science, School of Kinesiology
Student Classification/Affiliation: Kinesiology Graduate Student – Exercise Science

Abstract: With research scoping athletic performance, skills assessment, and injury prevalence, it would appear that collegiate rodeo has a respectable base of literature in the field exercise science (Meyers, LeUnes, & Bourgeois, 1996; Meyers & Laurent, 2012). Unfortunately, however, most of these literary works have been authored by only a small handful of scholars, with the large majority written by one individual (Meyers et al., 1980-2010). As such, there is both a limited number of contributors and informative articles available on collegiate rodeo and its athletes. The purpose of this work, therefore, is to reduce the severe lack of information available on the sport and athletes of rodeo. In accordance with IRB guidelines, 14 (20.86 ± 1.17 years; 172.8 ± 7.85 cm; 86.48 ± 21.39 Kg) male Tarleton State University (TSU) rodeo athletes participated in two consecutive six-week resistance training programs. Pre- and post-test athlete data was gathered and included the following: body fat percentage, lean body mass (LBM), vertical jump height, T-test, 300-yard shuttle times, barbell back squat, bench press, trap bar deadlift one repetition maximums (1RM), and single- and multi-hand reaction times. The authors investigative approach included and exploratory analysis, including means and standard deviations, of the aforementioned performance variables. Descriptive data analysis revealed that the trap bar deadlift 1RM had a significant relationship with the bench press 1RM (r=0.874, p=0.005) and back squat 1RM (r=0.938, p=0.002). Interestingly, however, there was no correlation between any 1RM value and vertical jump height, lean body mass, nor either anaerobic running test – this finding is particularly interesting, as recent scholars of rodeo athletes’ physiology have hypothesized that physical profiles of rodeo athletes would parallel athletes from anaerobic sports. Although the participants in this study are experienced rodeo athletes, most were categorized as novice lifters; because of a lack of experience performing resistance training programming, it is likely that 1RM performances were based increased neuromuscular efficiencies (Tauffe et al., 2015) – i.e. a ‘learning effect’. The authors acknowledge the number of participants is too small to make sweeping assumptions about exercise programing and a physical profile of collegiate rodeo athletes, this study - and its potential for further extrapolation and analyzation - can offer some remediation to the significant lack of scientific literature available on collegiate rodeo.
73. Investigating correlations among anaerobic power predictors in female rodeo athletes
Research Area: Strength and Conditioning, Rodeo Athletes
Presenter: Jared Conley
Authors: Jared Conley, Dr. Colin Pennington, Dr. Andy Wolfe
Department: Department of Sport Science, School of Kinesiology
Student Classification/Affiliation: Kinesiology Graduate Student – Exercise Science
Abstract: The research on almost every major sport, and the athletes that participate therein, is both expansive and impressive. Sufficient and valuable work has been produced on swimming, cycling, American football, and countless other sports (Strass, 1988; Olmedilla et al., 2018, Gibbs et al., 2015) – research in and on these sports began with developing a physical profile of athletes [i.e. describing the physical characteristics of athletes]. Despite the growing participation in collegiate rodeo, however, “the sports medicine knowledge and facilities conducive for optimal performance that have existed for traditional sports over the years still remain elusive for many in this sport” (Meyers & Laurent, 2012). Thus, this work will attempt to increase the base of knowledge available on the sport and athletes of rodeo – including establishing a baseline profile of rodeo athletes. In accordance with IRB guidelines, 29 (20.51 ± 1.48 years; 164.2 ± 8.2 cm; 66.22 ± 10.1 Kg) female Tarleton State University (TSU) rodeo athletes participated in two consecutive six-week resistance training programs. Pre- and post-test athlete data was gathered and included the following: body fat percentage, lean body mass (LBM), vertical jump height, T-test 300-yard shuttle times, barbell back squat, bench press, trap bar deadlift one repetition maximums (1RMs), and single- and multi-hand reaction times. The authors investigative approach included and exploratory analysis, including means and standard deviations, of the aforementioned performance variables. Descriptive data analysis revealed that the trap bar deadlift 1RM had a significant relationship with the bench press 1RM (r=0.722, p=<0.001), back squat 1RM (r=0.63, p=0.001), and LBM (r=0.431, p=0.035). Interestingly, however, there was no correlation found between any 1RM test and vertical jump height nor either anaerobic running test. A similar trend was seen in the males that participated in this study. As there was a significant relationship observed between LBM and 1RMs, it is arguable that perhaps an increased LBM will lead to higher 1RM. As many of these athletes were novice lifters, however, it is much more likely that increased neuromuscular efficiency was attributable to their 1RM performances (Tauffe et al., 2015). While this is but a glimpse into the collegiate rodeo athlete, this study (and its potential for further observation and analyzation) can begin to mend the severe lack of information currently available on collegiate rodeo. Further extension of research in this line could lead to developing specified exercise programing for female rodeo athletes’ sport performance, periodization, and even injury prevention.
74. Breast carcinoma cell-derived extracellular matrix supports for tumor growth and invasion

**PERS Recipient**

Research Area: Cancer

Student Presenter: Sienna Becker

Faculty Mentor: Dr. Girdhari Rijal, MLS(ASCP)

Authors: Sienna Becker and Dr. Girdhari Rijal

Department: Laboratory Sciences, Public Health and Nutritional Sciences, TSU, Fort Worth Campus

Student Classification: MS Student

Abstract: Extracellular matrix (ECM) is an essential component of the microenvironment for both normal and tumor tissue. It is a dynamic complex mixture of structural proteins, glycoproteins, proteoglycans and other soluble proteins, which provides scaffolding systems to maintain tissue structure, and supports cell-ECM communications to modulate various cellular functions. Excess deposition of ECM, which can alter the normal tissue microenvironment, suffices to create the abnormal microenvironment to the cells, resulting in abnormal tissue growth. In a tumor tissue, excess ECM deposition also results in stiffness that triggers the tumor growth and progression. As known, fibroblasts are the major sources of ECM production in both normal and tumor tissue. However, cancer cells also produce a significant quantity of ECM proteins during cancer progression. Collagen is the most abundant protein in the ECM, and has a critical function for the tumor growth, migration and metastasis along with other ECM proteins like hyaluronan, TNC, peristin, fibronectin, laminin and integrin ligands. This study demonstrates that cancer cell-derived ECM proteins mediate cell-to-cell and cell-matrix communications for the tumor progression. In this study, ECM from MDA-MB-231 cell lines had been included together with collagen type I and Matrigel. Hydrogel from cECM, collagen and Matrigel was used to coat glass slides, and to scaffold for the cells during tumoroid cultures. The culture on non-coating glass slides served as the control culture. Human umbilical vein endothelial cells (HuVEC) and MDA-MB-231 cell lines were selected for both 2D and 3D culture to exhibit proliferation rate and expression level of certain markers which play the vital role for cell-cell and cell-ECM interactions. E-cadherin, focal adhesion kinase (FAK) and α3β1 were selected for the study, which are some of important makers required for growth and invasion. Non-coating culture supported for the better proliferation pattern of both cell types compared to coating cultures on collagen type I, Matrigel and cECM regardless of expression level of above three markers. HuVEC cells expressed E-cadherin, FAK and α3β1 on all three different matrices with no significant changes. However, MDA-MD-231 cell lines showed expression of E-cadherin and higher expression of FAK and α3β1 on cECM compared to others. Re-expression of E-cadherin and higher expression of FAK in MDA-MB-231 cell lines increased the tumor growth and invasion. The FAK expression by cancer cells grown on Matrigel was less compared to its expression on cECM, but the proliferation was higher compared to that on cECM. It showed that the proliferation of cancer cells was independent of the FAK expression or might be dependent on other factors present in the Matrigel like certain soluble protein factors. The α3β1 expression by cancer cells was higher in cECM compared to collagen type I, but lesser compared to Matrigel. It showed that α3β1 expression corresponded with the proliferation rate. The increased expression of the E-cadherin, FAK and α3β1 during the tumoroid formation indicated the increase in cell-matrix and cell-cell interactions and supported the infiltration of cells to the matrices, thereby increasing the size of tumoroid by time.
75. Enhancement and Application of the Nutrient Tracking Tool to Support Water Quality Trading Markets

PERS Recipient
Research Area: Environmental
Faculty Presenter: Dr. Ali Saleh
Authors: Dr. Ali Saleh, Bijay Pokhrel, and Seth Dempsey
Department: Texas Institute for Applied Environmental Research
Associated Student: Seth Dempsey
Associated Student Classification/Affiliation: Undergraduate

Abstract: The Nutrient Tracking Tool (NTT) and Chesapeake Bay Nutrient Trading Tool (CBNTT) are internet-based decision-making programs that have been developed by the modeling team at Texas Institute for Applied Environmental Research at Tarleton State University during the past several years. The potential for using NTT for the State of Texas is currently being examined. TIAER employed and trained (a Business Computer Information System student) to assist in data collection and validation of NTT for the State of Texas. Data requirements for running NTT for the State of Texas include soil information obtained from US-NRCS Soil Survey Data, climate data from PRISM data, detailed descriptions of and crop management practices from local management practices. The Nutrient Tracking Tool for Research and Education (NTT-RE) (version 21-09) was validated for research plots located at the Grassland Soil & Water research laboratory in Riesel, Texas. The close values of measured and predicted indicate that the use of the NTT for the State of Texas for simulated crops evaluated in this project is a great step to determine the applicability of NTT for other major cultivated crops (e.g., Cotton) in Texas. We will present the process and results of this project the President’s Excellence in Research Scholars Research Symposium. We believe this PERS project funded by TSU president played a significant role to adopt NTT for the State of Texas. This also project provided a great opportunity for students to gain substantial knowledge and skills by learning the latest environmental modeling systems, management decision tools, and data collection and analysis methodologies.

76. Farm Management Practices Impact on Regional Environment in Upper North Bosque River Watershed: An Assessment Project

PERS Recipient
Research Area: Environmental
Faculty Presenter: Dr. Ali Saleh
Authors: Dr. Ali Saleh, Emad Ahmed, Joree Burnett, and Bianca Willis
Department: Texas Institute for Applied Environmental Research
Associated Student: Bianca Willis

Abstract: Nutrient and sediment losses, particularly the excessive phosphorous (P), from agricultural lands affect the environmental health of the North Bosque River Watershed (UNBRW), in north central Texas. The degradation of this watershed is a major concern among stakeholders, since the UNBRW affects the regional economy and environment as an important source of drinking, irrigation, and recreational waters. Project partners have used historical water quality/quantity data obtained by Texas Institute for Applied Environmental Research (TIAER) and other agencies (e.g., Texas Commission on Environmental Quality, TCEQ) to evaluate and identify the point and non-point sources of water pollutants in UNBRW. Results from this project have provided essential information identifying the land management practices impacts on contaminants of concern in UNBRW. The historical data analysis, GIS maps, site visitsations, and monitoring activities show that the trend of P in UNBRW has a general downward pattern in most evaluated sampling sites. However, high levels of soluble and total phosphorous were found on sampling sites located on the west side of UNBRW. This was due to predominant land use in this watershed consist of dairy waste application fields (WAFs). Based on the findings in this project, we recommend a follow-up study to identify the exact sources of the contaminants through detailed management inventory, monitoring and modeling processes. The modeling system will be used to evaluate the priority practices to alleviate the contaminants of concern in this watershed. The opportunity for a graduate student to work side-by-side with professionals at TIAER and College of Science and Technology (COST) in this project will allow the student to gain knowledge and skills in Geographic Information Systems (GIS), data collection, and modeling analysis methodologies. This opportunity will also provide the student with experience in working with a multidisciplinary and multicultural research team. Additionally, the student will have the opportunity to learn writing proposal skills by assisting the PIs in development of research proposal grants for the next phase of this project.
77. Use of Environmental DNA to Quantify Aquatic and Terrestrial Vertebrate Biodiversity

PERS Recipient
Research Area: Wildlife Ecology
Student Presenter: Doreen Mata and Tiffany Leitner
Faculty Mentor: Dr. T. Wayne Schwertner and Dr. Heather A. Mathewson
Authors: Doreen Mata and Tiffany Leitner
Department: Department of Wildlife and Natural Resources
Student Classification/Affiliation: Graduate Students
Abstract: Environmental DNA (eDNA) is genomic DNA from an organism that is found in environmental samples, such as water, sediment, and feces. Analyses of eDNA have been used to identify the presence of aquatic vertebrates, as well as animals in adjacent riparian areas. As techniques are becoming ever more powerful, the capability is evolving to not only perform population genetics analysis of eDNA on aquatic organisms, but also extend presence-absence analysis to vertebrates occurring farther away from the water source that have a more tenuous connection with water sources. We evaluated the feasibility and accuracy of using eDNA to determine presence of species of conservation concern. Our focus was on a community of semi-aquatic turtles and ringtails (a terrestrial mammal; Bassariscus astutus) on two Texas Parks and Wildlife Department Wildlife Management Areas. These species are of conservation concern and they are logistically challenging to survey using traditional field methods. For aquatic turtles, we collected 60 water samples and trapped turtles from seven locations across the McGillivray and Leona McKie Muse WMA (789 ha), Brown County, Texas during April–September 2021. Our focal species were red-eared sliders (Trachemys scripta elegans), yellow mud turtles (Kinosternon flavescens flavescens), common snapping turtles (Chelydra serpentina), common musk turtles (Sternotherus odoratus), Texas river cooters (Pseudemys texana), spiny softshells (Apalone spinifera), and Pallid shiny softshells (Apalone spinifera pallida). We had 58 successful trapping days (of 90 days with traps deployed) and marked 113 individuals (52 male and 57 female red-eared sliders, three common snapping turtles, and two yellow mud turtles). For the ringtail portion of the study, we deployed 13 camera traps and collected 72 water samples from 13 sites across the Roger R. Fawcett WMA (2,209 ha), Palo Pinto County, Texas during June–August 2021. We selected camera placement to maximize likelihood of detection around water sample locations. We captured three individual ringtails at one location. We extracted tissue samples from aquatic and terrestrial focal species and will use a polymerase chain reaction assay to compare eDNA metabarcoding results from water samples to obtained tissue samples to identify presence in the watershed. We will then compare results from traditional field methods (e.g., direct trapping, marking, radio telemetry of turtles, and camera traps for ringtails) to detections in water samples. Validating this methodology contributes to our ability to conserve and manage for other vertebrate species. Successful results may provide a powerful tool for researchers to identify populations of aquatic vertebrates and to survey for elusive species in a noninvasive, temporally, and financially feasible manner.

78. Dealing Cannabis in the Age of the Dark Web

Research Area: Dark Web Cannabis Sales
Student Presenter: Ryan Rider, Sofia Brabham
Faculty Mentor: Dr. Olga Semukhina, Dr. Tara Shelley, Dr. Chris Copeland
Authors: Ryan Rider, Sofia Brabham, Dr. Olga Semukhina, Dr. Tara Shelley, Dr. Chris Copeland
Department: Criminal Justice
Student Classification/Affiliation: Ph. D. Student/Criminal Justice
Abstract: This study examines the new age of digital drug dealers. There is an emerging trend of selling a variety type of cannabis on the Dark Web. Using data collected from April of 2020-April 2021, the research utilizes content analysis of approximately 1500 vendor narratives and images from the White House Market of cannabis related products that include: flowers/buds, joints, edibles, concentrates, and vaping cartridges, etc. This study will compare marketing approaches from dark-web vendors to traditional marketing strategies used by clear web retailers. There is a notable pattern of dark-web dealers using a variety of marketing strategies resembling clear-web marketing approaches. Marketing strategies for dark-web sites include detailed product descriptions, descriptions of tantalizing effects, medical benefits, shipping/refund policies, customer privacy, and customer retention strategies. Notable examples of marketing strategies by drug vendors will be presented. This work contributes to the literature on drug offending generally and makes a unique contribution about drug offending in the digital age. The world of digital drug dealing represents an extension of the drug market and provides evidence of traditional marketing strategies used by dark-web vendors.
79. Did the COVID-19 pandemic lockdown of 2020 affect 911 service calls to the police in Dallas?

Research Area: Criminal Justice
Student Presenter: Steve Romero
Faculty Mentor: Dr. Olga Semukhina
Authors: Steve Romero, Olga Semukhina
Department: Criminal Justice
Student Classification/Affiliation: Ph. D. Student/Criminal Justice

Abstract: The onset of the COVID-19 pandemic in the spring of 2020 brought about an unprecedented change on how local and state governments dealt with containing the pandemic. To halt the spread of the virus extraordinary lockdown measures were instituted through stay at home (SAH) orders. This study analyzes the effect of the lockdown measures on the nature of 911 calls for service in Dallas, Texas and if the effects also transpired in the historically high and low crime areas. The study uses calls for service data from the Dallas Police Department for the pre-pandemic period of March 23, 2019, through April 30, 2019, and the time frame of the SAH order that was issued in Dallas on March 23, 2020, through April 30, 2020, when it ended. The calls for service were divided into five categories: business-related, emergency and criminal, non-emergency, public safety, and traffic to understand a potential change. The study hypothesizes that non-emergency and business-related calls increased due to the changes in routine activities of many individuals. The paper also suggests that the categories of emergency and criminal, public safety, and traffic calls decline due to the increase of people staying home and not driving on the roadways. Finally, the paper proposes that level of changes in calls for service was different in high crime areas when compared to low crime areas.


Research Area: Criminal Justice
Student Presenter: Marissa Hayes
Faculty Mentor: Dr. Olga Semukhina
Authors: Marissa Hayes, Dr. Olga Semukhina
Department: Criminal Justice
Student Classification/Affiliation: Doctoral student

Abstract: The COVID-19 pandemic has fundamentally changed how the world works and how human beings interact with one another. The full picture of the impact of those changes are only just beginning to be known or understood. In particular, the specific impact of COVID-19 lockdown on minorities and women as victims of crime, who are already overrepresented in the literature as crime victims, is a currently unknown. Using the theoretical frameworks of routine activities theory, general strain theory, and social disorganization theory, this study sought to evaluate the extent to which minorities and females are represented as victims of interpersonal violent crime in the framework of the COVID-19 pandemic. More specifically, this study hypothesizes that aggravated assaults, will show a significant decrease during the lockdown period due to the disruption of social patterns and lack of peer groups, and 2) within that group of aggravated assaults, this study will examine whether detected victimization patterns hold true for victims of all races and gender. This quasi-experimental secondary data analysis used record management system police data from Dallas, Texas, to examine the daily incident rates of aggravated assaults in the weeks preceding lockdown (February 3, 2020, to March 15, 2020), during lockdown (March 16, 2020, to April 30, 2020), and after lockdown (May 1, 2020, to June 12, 2020) with the total sample size N=1,433. The hypotheses of the study were that females and racial minorities would be disproportionately represented as victims of aggravated assault during the three pandemic periods and that an intersectionality exists between gender and race as victims. Women and minorities are already victim to inherent deprivations of equal rights under predominantly white male patriarchal systems (Indira, 2021; Steffensmeier et al., 2010). With the addition of a global pandemic, those deprivations are made even more significant, and may even set back progressive movements that have been working for decades to correct sexism and racism (Indira, 2021). One-way ANOVAs were used to compare weekly means of aggravated assaults for women and minorities with other race and gender groups. It is important that this specific lens of victimization of women and racial minorities is closely examined in relation to the coronavirus pandemic so that the structural inequalities of these groups are not ignored, and we continue to press forward with mitigating and correcting those inequalities as we move into a new normal post-COVID-19. This research study will help provide risk assessment for minorities and females and their likelihood to remain or become victims of crime in this new post-COVID-19 world.
81. Experimental Study of Heat pipe-Fin-PCM in Battery Thermal Management
Research Area: Thermal-Fluid Science
Presenter: Audrey Gold
Authors: Audrey Gold and Dr. Nourouddin Sharifi
Department: Engineering Technology
Student Classification/Affiliation: Department of Mechanical, Environmental, and Civil Engineering
Lead Author Affiliation: Department of Engineering Technology
Abstract: Lithium-ion batteries are well-known for their use in electric vehicles because of their high energy capacity and power density. However, they usually suffer from a high temperature rise due to heat generation within the batteries which deteriorates their life-span. In this work, a passive cooling technique such as heat pipes (HPs) and or fins integrated with a phase change material (PCM) is utilized. An experimental test bed composed of heating and cooling sections is designed. The cooling section is PCM housed within a vertically-oriented cylindrical enclosure and the heating section is a cartridge heater with similar dimensions as a lithium-ion battery. The heater is concentrically secured on top of the PCM enclosure and is embedded within the PCM. To improve the heat transfer between the PCM and the cold environment air, HPs and or fins are integrated within the PCM. Thermocouples are installed within the PCM, on heater and heat pipes surfaces. The temperature and time of melting and solidification of the PCM is recorded at different power levels ranging from 5-12 Watts. Results concluded that the heat pipes significantly increase the temperature regulation of the PCM. The temperature of the PCM that is reached prior to full melting of the PCM is much higher in the experiment with HPs than that of the experiment without heat pipes. The PCM provides uniform heater surface temperature and HPs-fins significantly reduce the PCM and eventually heater surface temperatures.

82. Voices from the Field: Inmate Perspectives about Illegal Cannabis in North Texas
Research Area: Illegal Marijuana, Cannabis, Trafficking
Student Presenter: Alexis Soriano
Faculty Mentor: Dr. Tara Shelley, Dr. Olga Semukhina and Dr. Chris Copeland
Authors: Alexis Soriano, Dr. Tara Shelley, Dr. Olga Semukhina, and Dr. Chris Copeland
Department: Criminal Justice
Student Classification/Affiliation: Masters/Criminal Justice
Abstract: This study is derived from a National Institute of Justice (NIJ) U.S. Department of Justice sponsored grant on Illegal Marijuana and Drug Related Violent Crime in North Texas. A random sample of approximately 220 inmates from the Tarrant County Jail were surveyed in the summer and fall of 2021 regarding a wide range of marijuana topics, their knowledge of the local drug market, and their use of social media and emojis for drug transactions. This presentation will examine if there are generational differences across inmates in their use of social media and emojis for drug transactions.
83. Microbiome comparison of native and invasive grasses of Texas to develop a remediation strategy to restore native prairie ecosystems

PERS Recipient
Research Area: Native, Invasive, Microbiome, Genomics, Ecology
Student Presenter: Kelly Carroll
Faculty Mentor: Dr. Janice Speshock
Authors: Kelly Carroll, Jeff Brady, Dr. Janice Speshock, Bianca Willis, Kristin Sefcik, Dacie Judd, Caroly Leija
Department: Biological Sciences
Student Classification/Affiliation: Graduate student (M.S) in COST

Abstract: Microbiomes constitute the collection of microorganisms that live inside of every living being, impacting survival and reproduction. The microbiomes of plants are less well understood compared to those of animals, but they are just as important for the survival of the host plant. This project sought to identify the specific compositions of the microbiomes of two grass species: little bluestem (*Schizachyrium scoparium*), a common high-value Texas native bunchgrass, and King Ranch bluestem (*Bothriochloa ischaemum var. ischaemum*), a virulently invasive Eurasian bunchgrass that threatens native prairie ecosystems across Texas. Over the course of the summer of 2021, the student collected 388 root and leaf samples of both grass species, as well as 42 samples of the soil that they are growing in, from sites across Texas where the two species coexist together. Those samples were added to previous collections, to create a total of 739 samples. The student’s sample collection covers 35 counties in Texas, including permitted collections from 11 State Parks. From those samples, the student isolated and sequenced the 16S and ITS regions of the microbial DNA present to identify which bacteria and fungi, respectively, made up each plant species’ microbiomes and soil microbiomes; 511 of these sequences were assembled into a DNA sequencing library and shipped to the Texas A&M Genomics Core Facility for DNA sequencing. The student used QIIME 2 DNA analysis software to analyze the sequencing data in order to discover microbial ecology associated with successful or unsuccessful competitive relationships between LBS and KR. Understanding the microbiomes of these two grass species and how they shift based on the location and the host plant’s proximity to the other species could be a key to understanding how King Ranch bluestem invades native prairie ecosystems so readily, and it could lead to a natural remediation strategy to restore native Texas grasses by inhibiting invasive plant growth with selected microbial inoculants. This project brought together resources from multiple nonprofit organizations and was funded in part by USDA-NLGCA, NPSOT, TSU COST, CMWMA, and Texas A&M AgriLife Research in Stephenville, where the project was conducted.
Innovative and Cost-Effective Methods of Detection and Plant Derived Food Grade Materials for Treatment of Microplastics from Water

**PERS Recipient**
Research Area: Environmental Chemistry and Water Treatment
Student Presenter: Jeri LaNiece Gill and Nick Rasmussen
Faculty Mentor: Dr. Rajani Srinivasan
Department: Chemistry Geosciences and Physics

**Abstract:** Microplastics are a new emerging contaminant that is becoming detrimental to aquatic environments globally. This issue is due to high demand of plastic production and lack of disposal management practices. The purpose of the research conducted was to identify plant-derived polysaccharides that are effective in removing microplastics from aquatic environments. The current treatment of wastewater and freshwater uses the synthetic polymer, polyacrylamide, to remove microplastics. However, polyacrylamide is linked to health concerns. Food based plant derived polymers are non-toxic, biocompatible, biodegradable, polyfunctional, and highly chemically reactive. They also have chelation and absorption capacities which allows them to better flocculate than synthetic polymers.

In previous research in our laboratory, Fenugreek (Trigonella Foenum graecum), Cactus mucilage (Opuntia Ficus -Indica), Aloe Vera (Barbadensis Miller) mucilage, Okra mucilage (Hibiscus esculentus) and Psyllium mucilage (Plantago psyllium) have been proven successful in the removal of various pollutants in the different water sources. These polysaccharide-based polymers contain chemical and biological properties that aid in the removal of contaminants using flocculation process. In the present research polysaccharide-based polymers were used to study their efficiency in removing microplastics in various sources of water like ocean, fresh water, ground water and estuaries. Different combinations were used to optimize the polymer concentration for maximum removal of microplastics from live water samples. Three different combinations of the polysaccharides were used for the study during the this grant period. The three combinations used for the study were Fenugreek and okra, fenugreek and Tamarind and Fenugreek and cactus in 1:1 ratio at three different concentrations 0.5 g/L; 1g/L and 2g/L. The contact times were varied from 0 minutes to 60 minutes. From the results it was found that best combination was found to be okra and fenugreek with 60% removal at 2g/L as compared to polyacrylamide with contact time of 30 minutes. Due to the time constraints not all the combinations could be tested. The results of individual polymers with the same water showed lesser microplastic removal as compared to the combinations. The results have proven that polysaccharides are a more efficient alternative to polyacrylamide in removal of microplastics.
85. Evaluation of a novel, Non-Toxic, Plant-Based Delivery System for Oral Delivery of Insulin in a pig model

PERS Recipient

Research Area: Interdisciplinary (Chemical, Biological and Animal Science (Agricultural))
Student Presenter: Gustavo Vazquez, Miguel Carrillo, Josh Moore, Faith Elownger, Renata Van Geem
Faculty Mentor: Dr. Rajani Srinivasan, Dr. Kimberly Guay

Abstract: Diabetes mellitus is a long-lasting chronic disease which occurs when blood glucose levels rise three times above normal range. Type 1 diabetes causes blood glucose levels to rise when the pancreas can no longer produce insulin due to the immune system attacking the pancreatic beta cells. Overtime the damaged beta cells will either not produce any insulin or not enough to meet the body’s needs. The current treatment for Type 1 diabetes involves multiple daily insulin injections or wearing an insulin pump which cause multiple side effects and discomfort. Currently, insulin cannot be taken orally because it is a polypeptide protein which will be degraded/inactivated by proteolytic enzymes and harsh acidic conditions in the Gastrointestinal (GI) tract. Therefore, it is foremost to develop a non-toxic oral delivery system that can protect the insulin in the GI tract and make its delivery to the target cells successfully. In this study, the effects of the non-toxic, plant-based, polymer fenugreek as a delivery system for oral administration of insulin in a porcine model were evaluated. Fenugreek polymer was extracted from its seed. Finely powdered form of the polymer was grafted to insulin using microwave method. One standard unit of insulin per kilogram of the pigs’ weight was used as per literature, at a 4:1 ratio using the microwave method. Once dried, 0.0113 g of the finely powdered precipitate was packed into one pill. Once the pigs had acclimated to their new environment for one week and blood glucose levels had been taken for each pig for one week, eight of twelve pigs were induced with diabetes through the administration of 50 mg/kg of streptozocin through the jugular vein. Once diabetic, four pigs, two females and two males, started being treated with the pills containing the insulin and fenugreek treatment and the other four pigs, also two females and two males, started being treated with pills containing fenugreek only at the same concentration of fenugreek as that found in the insulin and fenugreek pills. The remaining four pigs, two females and two males, were not induced so that they could serve as controls. Of the four pigs being treated with insulin and fenugreek, pig number 79, male pig, had the greatest decrease in blood glucose from diabetic levels back down to normal levels. Pig number 64, female pig, had a slight decrease in blood glucose levels from diabetic levels back down to pre-diabetic levels. Pig number 23, male pig, had constant diabetic levels throughout. For the polymer only group all the pigs’ blood glucose levels remained constant. Blood samples were taken each week for further biochemical and spectrophotometric analysis. After three weeks of observation pigs were euthanized, and heart, lung, pancreas, spleen, kidney, and muscle samples were harvested for pharmacokinetic, pharmacodynamic and histological studies.

86. Associations between Bison, Black-tailed Prairie Dogs and Small Mammal Communities at Caprock Canyons State Park

PERS Recipient

Research Area: Community Ecology
Presenter: Madison Gover
Authors: Madison Gover and Dr. Philip Sudman
Department: Department of Biological Sciences
Student Classification/Affiliation: Graduate Student

Abstract - Within the unique ecotone subregion of the caprock escarpment lies Texas Parks and Wildlife Department’s Caprock Canyons State Park (CCSP) and its reintroduced southern plains bison (Bison bison bison) and black-tailed prairie dogs (Cynomys ludovicianus). Historically, these two keystone species played a fundamental role within the Great Plains prairie ecosystem. Little is known regarding how bison and prairie dog reintroductions affect small mammal communities in this unique plains subregion. As such, the relationship between these two species and small mammal communities at CCSP was investigated. Sherman live-trapping and mark-recapture techniques were used to gather data to determine small mammal species density and richness related to three sample locations: ungrazed, bison grazed, and prairie dog and bison grazed. Vegetation measurements were also recorded at each point where a trap successfully captured a mammal and at an equal number of random points within each trapping grid. Data will be presented comparing the three sample locations with respect to species richness, species density and vegetative similarities/differences within and between sample locations.
87. One Health Approach for Ovine Dysgnathia: Modern technology for sheep improvements

PERS Recipient
Research Area: Agriculture, Genetics
Student Presenter: Bradley Barker
Faculty Mentor: Dr. Jolena Waddell
Authors: Bradley Barker, Darren Hagen, Paige Williams, Dr. Jolena Waddell
Department: Animal Science
Student Classification/Affiliation: Post-Baccalaureate/Animal Science

Abstract: Ovine dysgnathia is observed within a variety of breeds throughout the central Texas region. These deformities can be phenotypically described as agnathia (no lower jaw) and brachygnahtia inferior (undershot jaw), and appear to be familial. It is suspected that the two malformities are associated with the same gene and that a correlation between the two could be used to improve both defects. Blood samples from the 12 agnathia sheep and relatives, plus 24 brachygnahtia sheep and relatives were collected for sequence analysis to map the causative allele of jaw deformities. Phenotypes including distance from upper dental pad to the lower teeth were also collected for affected sheep and immediate relatives. Whole blood samples were collected and stored on ice prior to whole DNA isolation. Purified genomic DNA was sequenced at 30x coverage by BGI Genomics. Sequence analysis is ongoing at Oklahoma State University. The 36 individuals sequenced averaged 643,969,624 reads (150bp each) per sample, with 96.595 trillion total nucleotides sequenced. The reads were mapped to the Oar_rambouillet_v1.0 genome with >95% of reads mapping uniquely in all samples. Using the Genomics Analysis Toolkit (GATK) from The Broad Institute, an average of just over 30 million SNPs per individual have been called. The team is currently working to merge all genotypes into a unified set. These data will be combined with previously genotyped individuals to identify genomics regions or SNPs associated with jaw deformity in sheep. The OneHealth approach of using dental x-ray technology is planned for a no-cost follow up analysis for further phenotyping and assay validation. With the combination of sequence data and phenotypes, the research team is optimistic towards the discovery of a causative allele and the development of a selection tool for producers to improve the productivity and welfare of domestic sheep.
88. Large-Scale Experimental Study on the Use of Biochar to Treat Oil Contaminated Soils

PERS Recipient
Research Area: Civil and Biological Engineering
Faculty Presenter: Daniel Martinez
Authors: Daniel Martinez and Dr. Fei Wang
Department: Mechanical, Environmental and Civil Engineering
Associated Student Name: Daniel Martinez
Associated Student Classification/Affiliation: Senior Undergraduate

Abstract: Oil spills can result in a significant negative impact on the environment, economy, and society. Numerous oil spill incidents caused by pipeline leaks have been reported all over the world. Several types of remediation technologies have been developed including biological, chemical, thermal, and physicochemical methods. Bioremediation is recognized as the most sustainable and environmentally friendly method. However, two problems limit its application: (1) oxygen is required for the growth of oil degrading bacteria; and (2) treatment is a slow process. Biochar has the ability to solve these problems perfectly by two mechanisms: (1) biochar could absorb oil from soil for immediate oil removal; (2) biochar includes nutrients for the growth of oil degrading microorganisms without oxygen. In addition, biochar is cost-effective and sustainable since it can be produced by wood chips, branches, and sewer sludge. Large scale tests were conducted to consider the several possible influencing factors for the proposed treatment technology. The large-scale tests were conducted in a plastic test box with a dimension of 2 ft x 1.5 ft x 1.25 ft. Five large scale tests were conducted to investigate the effects of depth of the biochar barrier (i.e., 2, 4, and 6 inch) and test duration (i.e., 14, 28, and 56 days) on the oil removal efficiency. All biochar barriers had a width of five inches. A No.20 steel mesh basket was formed to fit excavated dimensions for each test in order account for most of the biochar fill at final measurements. A 14-day control trial was also performed with the same initial oil content but no biochar. The soil mixture of 80% concrete sand and 20% bentonite clay by weight was used in the large-scale tests and compacted at optimum moisture content of 11% with an initial oil content of 8%. At the conclusion of each trial, the biochar fill was oven-dried to evaporate water content and measure increase in mass resulting from adsorption of the crude oil only. Additionally, after each test, the bacterial colonies were counted to understand the bacteria growth with and without biochar in soil samples from top, mid-depth, and bottom of the test box. Net dilutions of $10^6$, $10^7$, and $10^8$ were selected for grown cultures. All bacterial cultures were grown on a potato dextrose yeast extract agar medium over a one-week period at 30°C. We have the following major findings from the tests in this project: (1) the weight of absorbed oil are approximately nine times the self-weight of biochar; (2) the absorption stopped after 5 days when we can consider the biochar is saturated with oil; (3) the oil removal rate is time-dependent which decreases with the elapsed time; and (4) the existence of biochar could stimulate the growth of oil degrading bacteria in oil contaminated soils.
**89. Dependence of Catechol-Flavone Distribution Coefficients on pH of the Aqueous Phase**

**PERS Recipient**

Research Area: Biochemistry, Medicinal Chemistry  
Student Presenter: Taryn Gibbs  
Faculty Mentor: Dr. Lance Whaley  
Authors: Taryn Gibbs, Marcus Gregory (University of North Texas), Sara Tuck (Duke University), Michael H. Abraham (University College of London), Dr. William L. Whaley  
Department: Chemistry, Geosciences and Physics  
Student Classification/Affiliation: Honors student, Chemistry/Physics double major  

Abstract: Catechol-flavones and catechol-flavonols have been demonstrated to have neuroprotective activities that are relevant for the treatment of neurodegenerative diseases. The compound 7,8-dihydroxyflavone (7,8-DHF) has shown efficacy in preclinical models of Alzheimer’s disease, Parkinson’s disease, Huntington’s disease, and amyotrophic lateral sclerosis. The catechol-flavonols, fisetin and quercetin, have also exhibited neuroprotection in models of these diseases. Some of these same compounds have exhibited the ability to inhibit the growth of neuronal tumor cells in culture. For flavonoids to be effective as oral medications for brain disorders, they must be absorbed through the small intestine, delivered through the blood stream and transported across the blood-brain barrier. The logarithm of the 1-octanol/water partition coefficient (LogP) is the most commonly used descriptor for predicting the absorption, delivery, metabolism and excretion (ADME) properties of drugs. Due to problems with self-association, decomposition, and low aqueous solubility, accurate LogP values are hard to measure for complex flavonoids. Simple catechol-flavones were used to measure the positional effect of the catechol group on LogP. Flavone, 7,8-DHF, 5,6-dihydroxyflavone, 6,7-dihydroxyflavone, 2',3'-dihydroxyflavone, 3',4'-dihydroxyflavone and 3,2'-dihydroxyflavone (3,2'-DHF) were assayed using a modified “shake-flask” method with detection by UV absorbance. Measured LogP values were generally in between those predicted by the ACD/Labs Percepta Platform and those calculated by the Abraham General Solvation Equation. For each compound, the reverse-phase chromatographic retention factor (k’) was determined using an octadecyl-silane (ODS) column with an acidic methanol/water mobile phase. A good correlation between Logk’ and LogP was obtained. The 1-octanol/aqueous buffer (pH values of 6.2, 7.4, and 7.8) distribution coefficients (LogD) were also determined for each compound. Good correlations between Logk’ and LogD were obtained; however, 3,2’-DHF exhibited very low LogD values at pH=7.4 and 7.8. These results are consistent with a pKa value between 5.0 and 6.0 for 3,2’-DHF that confers ionic character at pH values greater than 7.4. The compound 7,8-DHF exhibited a very low LogD value at a pH of 7.8. This result is consistent with this compound having a pKa value near 7.4. Accurate values for LogP and LogD (pH= 6.2, 7.4 and 7.8) are the key physical parameters that are needed to predict the absorption, distribution, metabolism and excretion (ADME) properties for catechol flavones to be considered as potential drugs for the treatment of neurological diseases and certain types of cancer.  

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**90. Supraventricular Tachycardia Study Using a Dynamic Computer Generated Atrium**

**PERS Recipient**

Research Area: Biomedical  
Student Presenter: Avery Campbell and Gavin McIntosh  
Faculty Mentor: Dr. Bryant Wyatt  
Authors: Avery Campbell  
Department: Mathematics  
Student Classification/Affiliation: Junior/Engineering and Sophomore/Mathematics and Computer Science  
Abstract: The leading cause of death globally is heart disease, followed by strokes. Supraventricular Tachycardia (SVT), though not in itself deadly, is a leading cause of strokes, heart attacks, and heart failure. Therefore, one could argue that SVT is indirectly a leading global killer. SVT is a term used to describe all events where the atria beat too rapidly or out of sync with the ventricles. This out-of-sync beating between the atria and the ventricles can cause blood to pool in the atria creating clots that can then travel to the brain or coronary arteries resulting in a stroke or heart attack. SVT events also greatly reduce the stroke volume of the heart, and if they persist for extended periods of time they can cause a permanent reduction in ejection fraction, possibly resulting in congestive heart failure. In a normally functioning heart, the sinus node acts as an orchestra conductor and methodically sends out a periodic electrical impulse. This electrical pulse starts a chain reaction throughout the heart causing the heart muscles to rhythmically contract and produce an orchestrated beat. Rogue electrical impulses can cause chain reactions to occur at the wrong place and at the wrong time, disrupting the sinus rhythm. The beating heart is a multi-dimensional nonlinear dynamical system that is sensitive to initial conditions. Hence, SVT events can produce chaotic outcomes that are impossible to predict with great accuracy. Doctors and researchers need a computer-generated dynamical model of the atria that they can perform experiments on. This research creates such a model. The model beats in real-time and can be adjustable down to the individual muscle level. This will allow researchers to create initial conditions that will produce SVT events that they can attempt to eliminate with simulated ablations. This work will greatly increase our understanding of what causes SVT events and how to eliminate them.

**91. Application of Machine Learning Methods to Identify Piezo Ion Channel Kinetics**

**PERS Recipient**

Research Area: Biophysics and Machine Learning  
Student Presenter: Renato Rios  
Faculty Mentor: Dr. Jun Xu  
Authors: Renato Rios  
Department: Computer Science and Electrical Engineering; Mechanical, Environmental, and Civil Engineering  
Student Classification/Affiliation: Junior  
Abstract: Patch-clamp electrophysiology data is vital for understanding ion channel behavior but is laborious to idealize for analysis in research. Previous studies have demonstrated that convolutional neural networks and long short-term memory architecture can automatically idealize complex single-molecule data more quickly and accurately than traditional methods. In this preliminary study of the work, we attempt to recreate the (1) trained model development and (2) model prediction performance using a new unseen dataset using source code and recordings/data. This model requires no parameters set by researchers, as is required in traditional methods of ion channel classification, and requires fewer data processing steps as it only necessitates the data filename and path. This methodology may allow researchers to save time and resources by simplifying the data idealization, automatically specifying the number of channels present, and by possibly reducing the number of samples for analyzing patch-clamp electrophysiology data in ion channel research. In the work presented, we train a deep learning model as outlined in the original paper and then utilize the model to analyze previously unseen data using ion channel records provided by Celik et al. The model used here requires Keras framework with Tensorflow backend. Anaconda on Windows 10 was utilized, and the code was then edited and run on Spyder, a free and open-source scientific environment written in Python. The PC ran on an 11th Gen Intel® Core™ i7-1165G7 with only 16.0 GB of RAM and no GPU. The data sets and source code used are provided by Celik et al. and freely available on GitHub. Here, a hybrid recurrent convolutional neural network (RCNN) model was used to idealize ion channel records. Convolutional neural networks were used in deep learning for learning patterns given complex data and classification problems. Recurrent neural networks were used for time series analyses, but performance degrades on longer time scales in a problem known as the vanishing gradient problem. A long short-term memory (LSTM) network, a type of recurrent neural network, was used in the presented model to address the vanishing gradient problem. In our current study, we attempt to replicate a similar qualitative & performance comparison of a single ion channel and five ion channel data shown by Celik et al. in their original paper. In essence, the main goal at this study stage is to demonstrate the feasibility of applying Machine learning to identify channel kinetics, specifically that of Piezo Ion Channels, in future works.
The Economic Impact of Cotton Prices and Production in Texas

PERS Recipient
Research Area: Agricultural Economics
Student Presenter: Cord Brown
Faculty Mentor: Dr. Mark Yu
Authors: Cord Brown, Dr. Mark Yu
Department: Agriculture and Consumer Sciences
Student Classification/Affiliation: Senior

Abstract: Cotton is a critical agricultural commodity, generating about 9% of the state's total agricultural receipts and 29% of the nation's cotton revenues in 2016. On average, Texas grows 5.9 million acres and produces 27.5 billion bales of cotton annually, which represents about 48% of acreage and 47% of production in the U.S. The cotton industry is important in the state, which generates about $25 billion annually, and employs over 200,000 Texans every year. In 2018, the United States produced around 17.6 million bales of cotton, and Texas produced about 6.85 million bales alone, which makes up 38.9% of U.S. production. Over the last thirty years, cotton has maintained an average price of $0.63/lb, with the lowest price of $0.32/lb in 2001 and the highest price of $0.93/lb in 2011. Texas is the top producer in the country, and most of the state’s cotton is grown in the Panhandle. There are a lot of challenges when producing cotton. Many factors can impact the price of cotton which include the input prices, government policies, weather, and chemical costs. Hence, it is critical to study how these changes affect the industry. Objective: The overall objective of this research is to identify the factors that impact cotton production and prices in West Texas. More specifically, this research will 1) directly show how factors and production costs affect cotton prices and production, and 2) find the best regression model to study the factors that interfere cotton production. Data and Methods: Research will use data for various different categories. This analysis will be factoring the price of seed and chemicals for production costs. There will also be data showing what the price cotton has been over several years. Another set of data this study will cover is how much cotton is produced in the Panhandle and how it compares to Texas as a whole, and compare it to the United States. This research will be showing tables and graphs to visually show all that it takes to produce cotton. The data will come from the USDA, and will range from the last 30 years. This study will also have graphs over regressions and correlation analysis. Expected Results: This study will provide realistic data to understand how factors affect the cotton market. This will include major production costs and input costs. Using what is researched in this data, a forecast should be made about the cotton market, as well as give the reader a better understanding of what goes on in the cotton industry. This investigation will also prove how much of an economic impact cotton can have in the United States, but most importantly Texas.