Program and Abstracts
Celebration of Student Scholarship

Showcase of Student Research, Scholarship, Creative Work, and Performance Arts

April 17, 2024

Celebration of Student Scholarship
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Program Overview

7:45 - 8:45 a.m.   **Registration – Oral presenters required to register during this time | 3rd Floor ADUC**

9:00 - 11:50 p.m.   **Oral Presentations | ADUC 301, 310, 320, 321, 322, and 326 with intermittent 10 min. breaks before each hour**

11:00 - 12:45 p.m. **Registration – Poster Presenters /Poster Set Up | 3rd Floor ADUC**

1:00 – 3:00 p.m.   **Poster Presentations | ADUC Ballrooms**

3:00 – 4:00 p.m.   **Poster Removal**

4:00 – 5:00 p.m.   **Award Ceremony | ADUC Theater**

Special Thank You to the Following:

Division of Academic Affairs/Office of the Provost/Document Services/Camden-Carroll Library

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Shannon Harr   *Janet Cline*

Celebration of Student Scholarship Planning Committee

Megan Boone   *Katy Carlson*   *Greg Corso*

Janet Cline   *Shannon Harr*   *Alexis Mathews*

Andrew Sexton

Concurrent Session Moderators

Megan Boone   *Mike Dobranski*   *Shannon Harr*   *Sylvia Henneberg*

Philip Krummrich   *April Miller*   *Donell Murray*   *Chris Schroeder*

Judges

Elizabeth Ash	*Julie Baker*	*Bernadette Barton*	*Chris Beckham*
Donna Besant	*Savannah Blair*	*Mark Blankenbuehler*	*Stephen Brigham*
Eric Brown	*Skyler Cantrell*	*Doug Chatham*	*Steve Chen*
Jennifer Clark	*David Eisenhour*	*Geoff Gearner*	*Wilson Gonzalez-Espada*
Connie Hardesty	*Janelle Hare*	*Flint Harrelson*	*Patrica Harrelson*
Jeffrey Hill	*Brandon Hughes*	*Eric Jerde*	*Smita Joshi*
Golam Kibria	*Shari Kidwell*	*Zachary Lee*	*James Masterson*
Rus May	*Melissa Mefford*	*Douglas Mock*	*Kim Nettleton*
Jen O'Keefe	*Michele Paise*	*Anindita Paul*	*Siriporn Peters*
Kent Price	*Alireza Rahemi*	*Janet Ratliff*	*Tathagata Ray*
Rebecca Roach	*Emmalou Schmittzehe-Skarbeck*		*Alana Scott*
Gabria Sexton	*Lisa Shannon*	*Mee-Ryoung Shon*	*Sam Stapleton*
Joyce Stubbs	*Steve Stubbs*	*Fujuan Tan*	*John Waite*
Lisa Wallace	*Lucinda Ward*	*Tyler Ward*	*Rodney Watkins*
Rebecca Wright			

Welcoming Statements

Dr. Jay Morgan, President:

Our vision is for Morehead State University to be universally recognized for teaching and scholarship of the highest quality resulting in student success. To ensure the optimal environment for learning, Morehead State University has a long tradition of combining great teaching with success in scholarship and creative productions. Our academic programs provide a wealth of opportunities for students to work alongside experienced faculty in meaningful research and creative initiatives that stretch our students' intellectual horizons.

The faculty member who mentors students in research and other creative activities provides the stimulus that challenges imaginative minds often in new and innovative ways that would be impossible with the confines of the conventional classroom. Our deep commitment to a culture of undergraduate research results in a rich educational experience for our students and empowers our diverse population of scholars to reach their educational goals.

The Annual Celebration provides a welcome opportunity for everyone to see the products of these unique intellectual partnerships – products that are remarkable in their originality, scope, and depth. As you review the Celebration of Student Scholarship program, you will discover a wide range of student accomplishments in individual and group research projects, creative efforts, and artistic performances across all academic disciplines.

When considering the accomplishments on display at this year's Celebration, I am confident that through the continued efforts of all those involved, our University will establish itself as a primary destination for students who wish to become both active partners in the process of discovery and exceptional citizens of our increasingly challenging world.

The Annual Celebration of Student Scholarship is a time when we can all pause to reflect on the outstanding efforts of this community of scholars and to recognize the tremendous efforts of our students in research, scholarship, and creative productions.

I encourage you to attend this showcase and provide your support and encouragement to our young scholars and artists, as well as to the members of our faculty and staff who have shared of their time and talent to help their students bring these projects to reality. Thank you for your participation!

Dr. Raj Parikh, Provost, and Vice President for Academic Affairs:

Welcome to the Spring 2024 Celebration of Student Scholarship event. I look forward to viewing the variety of scholarly and creative works of our students and their faculty mentors. I believe that students need to build on their foundational knowledge by participating in research and creative endeavors. I thank our faculty who selflessly devote their time and talent in helping students in this journey. And this annual Celebration event exemplifies the ideal learning environment Morehead State University strives to create in which scholarship, teaching, and service come together. We take great pride in our students' accomplishments and congratulate them. We hope you will use this experience to become the intellectual leaders of the next generation.

Dr. Sylvia Henneberg, Dean, Caudill College of Arts, Humanities, and Social Sciences

The Celebration of Student Scholarship is a testimony to undergraduate student success at MSU. Every year, undergraduate research fellows collaborate with faculty mentors one on one, allowing our students to take their studies beyond the classroom and to put their energy into projects that help them both discover and demonstrate their passion for their fields of study. We join the university community in recognizing these exceptional students and their achievements on this special day.

Dr. April D. Miller, Dean, Volgenau College of Education

The Celebration of Student Scholarship is a unique opportunity to showcase research conducted by students with faculty mentors. The Volgenau College of Education students work with faculty in one-to-one research projects which enhance their practice in the schools and their understanding of inquiry in the real world. These projects extend beyond coursework to elevate student learning at both the university and school levels. Congratulations to each of our presenters!

Dr. Johnathan Nelson, Dean, Elmer R. Smith College of Business and Technology

The Celebration of Student Scholarship provides us with the opportunity to honor and showcase the excellent work made possible through faculty mentoring students through the research process. As students participate in research, their understanding of their academic discipline and how it can be applied to real world issues grows. Equally important, this research experience helps students further develop critical thinking and communication skills, as they prepare to present their research discoveries. In so many ways, undergraduate research represents the best of what we are trying to do as an institution for our students — to provide deep active-learning experiences, that allow our student to grow as they are supported by faculty mentorship.

Dr. Ahmad Zargari, Dean, College of Science & Engineering

Undergraduate research fosters the creation of a community of scholars that is essential to the intellectual health of the university. The Celebration of Student Scholarship provides us with an exceptional opportunity to recognize and celebrate the scholarship efforts of faculty mentors and student researchers, and to display the creative work accomplished through faculty and student's collaborations. The relationship among faculty mentors and student scholars is enhanced when they work together to discover and disseminate new knowledge.

Undergraduate research and creative activity offer students opportunities to gain research experience in their fields of study. Students working with faculty in scholarly activities experience the excitement of discovering new knowledge and learn important life skills that enable them to develop problem solving, critical thinking along with oral and written communication skills.

A. FRANK AND BETHEL C. GALLAHER MEMORIAL MUSIC PERFORMANCE COMPETITION

Established as a memorial in 2004 to A. Frank and Bethel C. Gallaher, who believed strongly in the value of education and competition, the competition proposes to challenge music students to excel in performance artistry. This competition is open to full-time (minimum of 12 semester hours) undergraduates enrolled in the Department of Music, Theatre and Dance who meet the criteria established by the endowment. There is a semi-final competition (adjudicated) held no less than four weeks prior to the final competition, if it is deemed necessary, to select an appropriate number of candidates for the final competition which is also adjudicated and takes place on the second Friday in April. The winning performer receives a cash prize and agrees to performing the same repertory from memory at the annual Honors Convocation.

2022-2023 Gallaher Competition Winner: Nicholas Robbins

Kentucky saxophonist, Nicholas Robbins, is based in Morehead and currently pursuing a BM in saxophone performance at Morehead State University. Before studying at Morehead State, Nicholas went to high school in small-town Jenkins Kentucky where he was active in the community. He participated in the local community band, KYVA winds, and helped organize and participated in "Saxophone Extravaganza," an event where Southeastern Kentucky saxophonist would come together, prepare, and perform chamber music. Nicholas is involved in many of the ensembles at Morehead State University, including their Jazz Ensemble, Symphonic Winds Ensemble, and Moresax. In the past, he has participated in Morehead State's Concert Band, University Chorus, and Concert Choir. Nicholas has been in the Lockegee Saxophone Quartet and is currently in the Amburgey Saxophone Quartet. Outside of the University, he occasionally participates in the Cave Run Symphony Orchestra. Nic's primary teachers have included Benjamin Morris, Nathan Mensink, and Jenny Collins.

Molly McBride Tutoring Excellence Award

The Molly C. McBride Memorial Scholarship Endowment was created in 2013 to honor the life of former MSU student, Molly McBride. McBride's life ended prematurely at the age of 21 on May 18, 2013, after being involved in an automobile accident. At the time of her passing, she was a junior biomedical science major at Morehead State University and was planning for a career as a physician's assistant. Molly was a dedicated student who enjoyed helping others, especially through her work as a tutor in MSU's Tutoring and Learning Center. Each year the Molly C. McBride Tutoring Excellence Award is given to a tutor who demonstrates superior tutoring skills and caring for MSU students.

The recipient of the 2022 Molly C. McBride Tutoring Excellence Award is **Kate Gross**. Kate is a junior agricultural major from New Madison, Ohio. She has been a Tutoring and Learning Center tutor for one and a half years. She has not only assisted with individual appointments but has held drop-in tutoring, hosted study groups, and served as an embedded tutor in mathematics courses.

Experiential Education Awards
presented by the Center for Career Development and Experiential Education

2023 Faculty of the Year

The winner of the MSU Faculty of the Year award is **Dr. Alana Scott**, Associate Professor of History in the Caudill College of Arts, Humanities, and Social Sciences. Dr. Scott has encouraged and supported countless students over the years in their internship experiences. She is a champion of hands-on learning experiences, as is evidenced by her ongoing engagement with Level Up. According to students, Dr. Scott is a "student focused and personable professor" who "pushes her students to work hard and produce significant material" who is also "a great support as role model and mentor". Another student shared that Dr. Scott "encouraged me to really reach out and start my path…and get an internship. She said that it was one of the best ways to gain valuable work skills and life experience, and I wholeheartedly agree with her. With that push I needed, I gained a wonderful experience at my internship." To sum up Dr. Scott's impact, a recent MSU alum shared that "Dr. Scott's emphasis on human connection and networking has resulted in other internship opportunities."

2023 Employer of the Year

The winner of the Employer of the Year award is **UK King's Daughter Medical Center** in Ashland, KY. King's Daughter's Mission is to care, to serve, to heal and their vision is to provide world -class care in their communities. This award recognizes Samantha Chaffins, a Radiologic Technologist and Clinical Instructor, who embodies both this mission and vision with her work, which includes supervising MSU radiology students completing their clinical experiences. This can be seen with the testimony of a recent MSU student who said that "Sam went above and beyond for me. She provided me study materials that have helped me prepare for my board exams. She's shown me how to evaluate an imagine and decide if it's diagnostic. She's shown me what certain pathologies look like on an image. She has given me freedom and has treated me like a tech already. This has given confidence in myself that I will need when I enter the field on my own." Mrs. Chaffins and King's Daughters exemplify the positive impact experiential education has on students gaining academic knowledge and professional skills.

2023 Student Intern of the Year

The winner of the Student Intern of the Year is **Emma Horn**, an Agronomy Major from Pendleton, KY who interned with the Natural Resources Conservation Service office in Morehead. While interning with NRCS, Emma had the opportunity to be a part of daily job duties such as surveying, planning and implementing conservation practices as well as restructuring farm records, creating presentations for local schools, and assigning in the recording and planning of conservation plans. According to her on site supervisor, Emma has been "a wonderful example of professionalism, she has represented NRCS well, whether it be in the office or the field. Her skills are what make her deserving of this award but her character is what makes her a perfect choice." This internship provided Emma the opportunity to build valuable career skills such as teamwork, critical thinking, and professionalism. Emma took advantage of this opportunity to build not only technical skills in her field but also valuable career skills such as teamwork, critical thinking, and professionalism.

2023-2024 Community and Civic Engagement Faculty

The faculty recipient of the Community and Civic Engagement Award is **Dr. Michele Paise**, an Associate Professor of Music and Music Education Coordinator in the Caudill College of Arts, Humanities, and Social Sciences. Dr. Paise was selected for her engagement with the community of Morehead through her March to Service project entitled: "Random Acts of Music." Dr. Paise and her students planned a variety of musical service projects through collaborating with elementary schools, music teachers, local businesses, the Cave Run Symphony Orchestra (CRSO), and others to engage in partnerships that would be mutually beneficial for all involved. The "Random Acts of Music" project encompassed public performances across campus, an undergraduate Music Research Symposium, guest speakers in the field of music education, volunteer work in music teachers' classrooms, reading musical children's stories to local students at CoffeeTree Books, volunteering at the District 8 Elementary Honors Chorus event, volunteering at the District 8 high School Choral Assessment event, working with a local Girl Scout troop on completing their music badge, and an Instrument Petting Zoo, where music education students taught local children about orchestral instruments prior to the Safari-themed CRSO concert.

2023-2024 Community and Civic Engagement Staff

The staff recipient of the Community and Civic Engagement Award is **Ms. Sara Larson**, the Assistant Director of Advising and Retention. Sara was selected for her work as an advisor in supporting the Herron Leadership Organization, a student organization that is made up of students from each of the 22 counties of MSU's service region selected for their leadership abilities. Sara supports each of the Herron Leaders during their weekly meetings where they complete hands-on service projects to give back to the local community, such as making Valentine's Day cards for nursing home residents in each students' hometowns, putting together teddy bears for patients at St. Claire Healthcare, and many more ways in which they contribute to the campus community. For the last two semesters, Sara has coordinated the Herron Leaders to assist with helping first-year students give back through making over 150 tie blankets for child patients at St. Claire as part of Make an Impact Day for First Year Seminar**.**

2023-2024 Community and Civic Engagement Student

The student recipient of the Community and Civic Engagement Award is **Ms. Haley Edrington**, a junior Veterinary Technology student. As an exemplary student, Haley demonstrates a commitment to excellence in her academic pursuits, coupled with a compassionate approach to animal care. Her leadership shines through her proactive involvement in initiatives such as the partnership with Saving the Animals of Rowan (STAR), where she spearheaded volunteering efforts to provide essential care for rescued animals. Additionally, Haley's initiative in organizing events like the Vet Tech Club (VTC) Community Dog Wash showcases her ability to mobilize resources and foster community engagement by inviting community members to bring in their dogs to be bathed by students in the Vet Tech program. Serving as an Agriculture Ambassador, she passionately shares her experiences with prospective students, leaving a lasting impression with her professionalism and dedication. Through her efforts in organizing community tours and hosting industry leaders at MSU's Farm, Haley not only enriches the educational experience of her peers but also strengthens connections within the veterinary community, such as 4-H, FFA, and other high school groups.

Concurrent Oral Presentations
Session 1| ADUC 301
Moderator: April Miller

9:00 - 9:15 a.m. **The Power Of Adaptation: The Amphitryon Theme Throughout Western Literature**

CS-1

Emily Russell*. Dr. Philip Krummrich, mentor, **Department of English and Modern Languages, Caudill College of Arts, Humanities and Social Sciences**

The Amphitryon theme has inspired many plays over the centuries, along with operas, musicals, and even a full-length film. One reason for the enduring popularity of the theme is the flexible cast of characters. In this presentation, I will analyze how playwrights explore the possibilities of the basic six characters of the story, and in some cases add additional characters.

9:15 - 9:30 a.m. **Clyde Davenport: Exploring The Fiddle Stylings Of The Cumberland Plateau Region**

CS-2

Violet Updike*. Mr. Jesse Wells, mentor, **Department of Music, Theatre & Dance, Caudill College of Arts, Humanities and Social Sciences**

The present study we're examining is the unique fiddle stylings of multi instrumentalist, Clyde Davenport. Davenport was born October 21, 1921, in Mount Pisgah, Kentucky. By the age of 9, Davenport strived to play the fiddle, soon building one out of barn boards and mule hair for the bow. Not even a full day after, Davenport was playing fiddle tunes that he heard his dad play. Davenport kept more than 200 rare fiddle tunes that he learned from his father and grandfather, and popularized and shared them with many musicians in his region. Over the course of this school year, we have explored recordings, the history, inspiration and the legacy left by Clyde Davenport. Through this exploration, the result were musical transcriptions of only a percentage of the fiddle tunes he made popular. To fiddlers and other musicians, Clyde Davenport is an inspiration who continues to live on in our music.

9:30 - 9:45 a.m.   **Cosmopolitan Whiteness: A Hidden Motive For Skin Whitening In Thailand**

CS–3   *Rachel Feger*. Dr. Constance Hardesty, mentor,* **Department of Sociology, Social Work & Criminology, Caudill College of Arts, Humanities and Social Sciences**

Skin whitening is a process used to lighten areas of hyperpigmentation, or achieve an overall paler complexion. In countries with an agrarian past, there is often a concurrent beauty standard that favors light skin. This is because dark skin is associated with lower class, outdoor laborers, while light skin is associated with the upper class. Today, this dichotomy still exists in many countries with a prominent agricultural sector, where those privileged enough to work in an office building tend to have more money, more respect, and lighter skin. Along with many other countries in Southeast Asia, people in Thailand associate light skin with success in business, intelligence, and trustworthiness. Consequently, many Thai people, especially women, lighten their skin to avoid discrimination and increase their confidence. It is a commonly held belief in Western countries that the act of lightening skin is an attempt to obtain Caucasian whiteness. However, this project analyzes Thai skin whitening advertisements outside of the Western zeitgeist of racialized whiteness, and looks through the lens of cosmopolitan whiteness. Specifically, we assert that the desire for white skin is a desire for transnational mobility.

Concurrent Oral Presentations
Session 2| ADUC 301
Moderator: Philip Krummrich

10:00 - 10:15 a.m.   **Joseph Bonaparte: Incompetent King Or Compassionate Leader?**

CS–16   *Carley Mooney*. Dr. Alana Scott, mentor,* **Department of History, Philosophy, Politics, Global Studies & Legal Studies, Caudill College of Arts, Humanities and Social Sciences**

Born in January 1768, Joseph Bonaparte was born on the Italian island of Corsica. More than a year later, his brother Napoleon Bonaparte would be born in the newly made French island as well. Joseph was a charming intellectual and beloved by many, becoming a successful lawyer and politician. As his younger brother gained control over Europe, Joseph was made the king of Naples. His time there was brief, but he managed to create a successful financial program to reduce debt, ease agricultural burdens, and ushered a flourishing era of the arts and education. However in 1808, Joseph was made the king of Spain. He was welcomed with revolt from the Spanish people, a sentiment that would remain throughout the entirety of his reign. Napoleon and future historians regard this time as a failure. In the historical context, Joseph Bonaparte is often placed in the shadows of his fearsome brother. When he is involved in discussion the conversation is focused on his failures as the king of Spain. His lack of prior military and administrative experience combined with the dissent of the Spanish people is rightfully regarded as a failure. However, Joseph's time as the king of Naples displays his potential as a leader. While Joseph Bonaparte's capabilities as a leader are limited by his minimal executive experience, his administrative decisions had the potential to be successful and his genuine adoration for the people he ruled over cannot be overstated.

10:15 - 10:30 a.m.   **How Napoleon Bonaparte Used Fashion To Forge His Empire**

CS–17   *Alura Schaum*. Dr. Alana Scott, mentor,* **Department of History, Philosophy, Politics, Global Studies & Legal Studies, Caudill College of Arts, Humanities and Social Sciences**

Following the turmoil of the Reign of Terror, the French people sought a strong leader to rebuild their country in a new way, with a new upper class. A significant movement of post-revolution society was the rejection of all things relating to the style of the previous aristocracy, one such example being the way they dressed. The turn of the century ushered in a complete change in the silhouette of French fashion, as opposed to the full skirts and layers of crinoline that was common until the late 1790s, the 19th century brought the "empire" waistline and saw it popularized by Joséphine de Beauharnais, the wife of Napoleon I.

Although it is widely acknowledged that Napoleon was a strategic leader on the battlefield, it is not often considered just how thoroughly he thought ahead of time in regards to his plans for the Paris fashion scene. Through various research, I sought to discover the true impact that fashion had on the construction of Napoleon's empire by examining the progression of clothing and the significance that it held amongst the people. Napoleon Bonaparte had an extreme awareness of the magnitude of importance that fashion had over the French people and he used it to his advantage by utilizing it to promote his military's admiration via uniform, as a method of gaining control over his aristocrats, and distinguishing his dynasty from those before and after him.

10:30 - 10:45 a.m.   **The Path To Integration: Napoleon Bonaparte's Impact On The Jews**

CS–18   *Arwen Sergent*. Dr. Alana Scott, mentor,* **Department of History, Philosophy, Politics, Global Studies & Legal Studies, Caudill College of Arts, Humanities and Social Sciences**

Napoleon Bonaparte had a distinct history with the French Jews, beginning in his Italian campaign. The segregation he witnessed and the disenfranchisement throughout the ghettoes deeply affected him. These experiences motivated him to combat the religious and social persecution faced by French Jews through legal and social changes. Thus, some Jewish people regard Bonaparte as a savior and as an important contributor to their history. In particular, Bonaparte encouraged the granting of citizenship to French Jewsand the open practice of their religion , and contributed to the growth of other social and economic freedoms.

Concurrent Oral Presentations
Session 3| ADUC 301
Moderator: Philip Krummrich

11:00 - 11:15 a.m.

CS-34

The Role Of Women In Napoleonic France

Carter Abshire*. Dr. Alana Scott, mentor, **Department of History, Philosophy, Politics, Global Studies & Legal Studies, Caudill College of Arts, Humanities and Social Sciences**

Napoleon Bonaparte not only shaped the political and military landscape of Europe but also significantly impacted domestic norms, especially those related to gender roles. Napoleon's rule coincided with a period of social transformation, marked by changing perceptions of masculinity, femininity, and women's role in society. His policies, decisions, and interactions with women during his reign provide a unique lens through which to examine gender dynamics in the early 19th century. This paper explores the various aspects of Napoleon's influence on gender roles and relations, shedding light on the intersections of power, politics, and gender during the Napoleonic era. How did Napoleon's policies impact women's rights, education, and social status? Answering this question is crucial for understanding how French feminist movements were impacted by the reign of Napoleon, providing insights into the social and political dynamics of the time.

11:15 - 11:30 a.m.   **Napoleon: The Corsican Revolutionary**

CS-35   *Emma Crouch*. Dr. Alana Scott, mentor,* **Department of History, Philosophy, Politics, Global Studies & Legal Studies, Caudill College of Arts, Humanities and Social Sciences**

Napoleon Bonaparte is widely acclaimed for being the greatest emperor of France, and while countless of his accomplishments took place for the sake of expanding France's greatness, it's easy to overlook the fact that Napoleon was not French. Instead, Napoleon was from an island called Corsica and spent much of his early life condemning the French for invading his home nation. In fact, having Corsican rebels for parents, growing up in the middle of a war against France, and hearing about Corsican nationalism as a child all played a significant role in how Napoleon later ruled France. Many of Napoleon's main ideas were a direct result of his upbringing, especially considering the revolutionary propaganda that came with being raised during the Corsican fight for independence against the very country Napoleon hated for so long. These three characteristics of Napoleon's youth shaped the policies he created for France later in his life because being born into an influential and rebellious Corsican family had lasting effects on Napoleon's life. In addition, many of those same policies still exist and are used today, and without Napoleon's revolutionary beginnings in Corsica, these rules may have never existed.

11:30 - 11:45 a.m.   **Visualizing Mayapán's Outlying Centers And Regional Distribution**

CS-36   *Sam Darbyshire*, Jaxson Brewer*. Dr. Timothy Hare, mentor,* **Department of Sociology, Social Work & Criminology, Caudill College of Arts, Humanities and Social Sciences**

We present the identification and analysis of the outlying minor centers surrounding the ancient city of Mayapán from the Late Classic (600-850 CE), across the Terminal Classic (850-1100 CE) and Postclassic (1150-1500 CE), and into the Colonial Periods in the 44 km2 area of the 2013 Mayapán LiDAR Survey. The centers outside the city walls were identified in the airborne laser scanning (ALS) data, and all were ground-checked using traditional pedestrian survey methods. Most previous research in the area focused on the two monumental centers within the urban core. We seek to better understand the diverse organization of minor centers distributed in the rural area surrounding the city by systematically identifying the form, components, and organization of each. We use these systematic procedures to analyze and explore the religious, political, economic, and broader cultural influences on the organization of these minor outlying centers and characterize the extent of variability in their form and structure. The objective is to identify the fundamental nature of small rural centers in their environmental contexts and identify critical similarities and differences among them. We use this analysis to enhance our knowledge of regional interconnections, shift the focus of study from the isolated city to the broader relationships connecting people at multiple settlement levels, and support further research in and around Mayapán. In this presentation, we display the major architectural and environmental features and their spatial arrangement for each minor center and quantify their population densities, boundaries, and production activities.

Concurrent Oral Presentations
Session 4 | ADUC 310
Moderator: Mike Dobranski

9:00 - 9:15 a.m.   **Inspiring Growth One Show At A Time**

CS-4   *Hadley Pierce*. Ms. Octavia Biggs, mentor,* **Department of Music, Theatre & Dance, Caudill College of Arts, Humanities and Social Sciences**

Being offered an Undergraduate Research Fellowship here at Morehead State University (MSU), was an opportunity of my dreams. I am Hadley Pierce and I have worked for MSU's educational theatrical tour company, The Little Company (TLC), for the past 3 years. Octavia Biggs is the director of the company and my mentor and she has taught me the importance of becoming an advocate for young people.
TLC is designed to bring arts education into the lives of young people. These students will experience live theatre and have exposure to theatrical experiences they may not have had in the past. Over the last two years, TLC has reached 7,500 students in Kentucky. Through developing the study guide, the post-show workshop (based on the drama standards for Kentucky), and the theatrical production, I have been given a chance to develop myself as a strong leader.
While exploring and developing my craft here at MSU, I have gained a strong understanding of the effects that arts education has on young people and their families. Arts education supports the emotional and social learning of students by developing a child's creative problem solving techniques, fine tuning their motor skills, decision making, and most importantly a brave way for the child to express themselves. Working with TLC encourages and teaches me to continue my growth as a professional arts educator. I have become extremely passionate in the pursuit of empowering children to find their VOICE in our society.

9:15 - 9:30 a.m.   **Transgender Joy: A Path To Resisting Oppression**

𝐂𝐒−5   *Megan Akers*. Dr. Bernadette Barton, mentor,* **Department of Sociology, Social Work & Criminology, Caudill College of Arts, Humanities and Social Sciences**

Drawing 29 on in-depth qualitative interviews, ranging in age from 21 to 73, this study explores transgender people's response to the ongoing anti-transgender legislation around the country and its relationship to transgender joy. We define transgender joy as a multifaceted term which encompasses the combination of gender euphoria, community, authenticity, and autonomy that result from being transgender. With this data we question the relationship between anti-transgender political campaigns and transgender joy and contend with the question whether transgender joy is a meaningful path to resistance to anti-LGBTQ+ and anti-transgender legislation. We consider anti-transgender political campaigns as any bills introduced as legislation that seeks to restrict the civil rights and bodily autonomy of transgender people. The ACLU is currently tracking 479 anti-LGBTQ+ bills nationwide, and 13 in Kentucky, so far in the 2024 legislative session. The size and scope of these campaigns nationwide makes scholarship centering transgender people imperative to understanding the current social and political zeitgeist. These bills are harmful to transgender people's mental and physical well-being, and this harm impacts transgender people's lived experience. We suggest that transgender joy can be harnessed as a possible antidote to the distress we are seeing surrounding anti-transgender political campaigns.

9:30 - 9:45 a.m.   **Unlocking Communication Benefits: A Study On The Role Of Successful Communication Skills In The Real Estate Market**

𝐂𝐒−6   *Bridgett Craig*. Dr. Donell Murray, mentor,* **Department of Communication, Media, Art & Design, Caudill College of Arts, Humanities and Social Sciences**

Having a communication background from a university is crucial in becoming a realtor. In the real estate sector, it is important to improve interpersonal skills, communicate effectively, build relationships with clients, negotiate deals more effectively, and market properties more efficiently. Communication and public relations are at the core of the real estate world. Real estate is a very competitive market and gaining the slightest advantage can lead you to the top. This market is more than property transactions, it's a people business as well. For real estate agents who want to stand out and thrive in their field, embracing public relations as a strategic component of their entire marketing efforts is a prudent investment that may generate considerable rewards such as enhanced communication channels, effective collaboration with partners, monetary benefits, independency, and community advantages.

Concurrent Oral Presentations
Session 5 | ADUC 310
Moderator: Donell Murray

10:00 - 10:15 a.m.

Teaching Low Socioeconomic Rural Appalachian Kids: Are They Different Than Other Students?

CS-19

Caroline Caudill*, Laurabeth Oliver*, Madison Woosley*. Dr. Jeannie Justice, mentor, **Department of Foundational and Graduate Studies in Education, Volgenau College of Education**

Is teaching low-socioeconomic rural Appalachian students different from teaching students in general? If so, how? Research suggests that this population of students is different, but what does that mean? Should a teacher of these types of students do anything different? Should lessons be structured differently? As education students who plan on teaching in this area, these questions are relevant. For example, if these students do better with visuals, then it would make sense for teachers of these students to incorporate more visuals in a lesson. Regardless, if the lesson is math, English, art, history, science, or whatever subject, if these students prefer learning in some way, it makes sense for a teacher to modify lessons to meet these students where they are and use any learning preferences to aid in their learning.

Three education students have been researching learning preferences of low-socioeconomic rural Appalachian students. Based upon this research, students modify lessons for this population of students. Then, using an action research design, the Education students use the Haldeman After School Program to determine if the lessons modified for this population are successful. This is the second year of collecting data at Haldeman After School Program. Students will compare the two years of data and use their own experiences to draw conclusions about teaching this population.

10:15 - 10:30 a.m.   **Classroom Managed: Teaching And Behavior Management Strategies Implemented In Eastern Kentucky Schools**

CS-20   *Sarah Miller*. Dr. Kim Nettleton, mentor,* **Department of Early Childhood, Elementary and Special Education, Volgenau College of Education**

In recent years, the increase in teacher attrition has become a salient issue in schools in both Kentucky and across the nation. In 2019, 44% of new teachers reportedly left the field within the first five years of teaching. Educators list student behavior challenges as one of their top concerns. Beginning teachers are often overwhelmed with misbehavior, causing a feeling of job dissatisfaction. Classroom management reduces the number of disruptions that occur and improves productivity.
Classroom management refers to strategies teachers use to create positive and effective learning environments for students. Crucial instructional time is lost when teachers lack effective classroom management skills. New teachers struggle to implement classroom management, resulting in a loss of instructional time and an increase in behavior issues. The lack of experience leaves many new teachers struggling to implement an effective management system that supports instruction and reduces misbehavior.
This research study examines data collected from educators of varying experience in Eastern Kentucky. The data results help to determine what strategies in classroom management are most successful. Using a mixed method of interviews and surveys, educators from elementary, middle, and high schools share how classroom management differs for each age group. Responses encompass various strategies regarding student behavior, parent involvement, previous classroom management training, and individual strategies implemented by beginning and experienced teachers. Evaluating classroom management strategies provides direction for new teachers struggling to identify their management style, allowing for an easier shift into implementing their own classroom management techniques in the field.

10:30 - 10:45 a.m.   **Appalachian Voices In The Classroom**

CS-21   *Gwendolyn Akers*. Dr. Rebecca Roach , mentor,* **Department of Early Childhood, Elementary and Special Education, Volgenau College of Education**

As educators, it is important that we recognize the types of literature that are present in our schools, and how the literature that is taught can affect our students and their education. Utilizing a survey method, we collected data from elementary, middle, and high school teachers within the service region of MSU regarding the prevalence of Appalachian literature in their classroom and in their school. Teachers were asked whether they determined the usage of Appalachian Literature in the classroom important, and whether the teaching of these "authentic" Appalachian voices helped their students in both their studies and their confidence. While our research survey is still in progress (will be closed next week), we are already seeing results of Appalachian Literature being underrepresented in the classroom. We hope our research helps unveil and promote the vital nature of teaching Appalachian literature in the classroom, as well as create a book list to guide teachers in the selection of this literature.

Concurrent Oral Presentations
Session 6 | ADUC 310
Moderator: Donell Murray

11:15 - 11:30 a.m.   **Artificial Intelligence In Microsoft Copilot: How It Is Used Is Business**

CS-38   *Cynthia Corona*. Ms. Connie Grimes, mentor,* **School of Business Administration, Smith College of Business**

The field of artificial intelligence (AI) encompasses a wide range of capabilities, from narrow to super intelligence. Artificial narrow intellgence (ANI), shown in virtual assistants like Siri and self-driving features such as Tesla's Autopilot, focuses on specific tasks. Artificial General Intelligence (AGI) aims to achieve human-level intelligence across various domains, while Artificial Super Intelligence (ASI) represents a level of AI surpassing human intellect. Although ASI remains theortical, understanding these distinctions offers insights into AI's evolution and potential.

In business intelligence, the integration of AI techniques such as natural language processing (NLP) and computer vision enables organizations to extract insights from diverse data sources. Through machine learning and AI integration, tasks like data cleansing and report generation are automated, allowing resources to be allocated strategically. Enhanced data analysis capabilities lead to more precise predictions and improved decision-making processes. Predictive analytics, powered by machine learning algorithms, optimizes operations, forecasts demand, and mitigates risks. By using historical data, businesses can anticipate market fluctuations, optimize inventory levels, and tailor sales strategies.

Despite limited adoption in small businesses due to knowledge gaps in AI, the accessibility is increasing, enabling enhanced profitability and productivity. Current applications like Copilot in Microsoft's suite of tools demonstrate AI's potential to augment various tasks, from creating presentations to drafting emails and analyzing data. Copilot serves as a smart assistant across Microsoft applications, assisting with tasks such as creating presentations, analyzing data, summarizing emails, organizing conversations, and refining documents, thereby enhancing efficiency and creativity.

11:30 - 11:45 a.m.   **Ticket Sales Forecasting In Professional Soccer**

CS-39   *Hadley Cytron*. Dr. William Tidwell, mentor,* **Department of Mathematics, College of Science**

Predictive analytics is a fast-growing field within the sports and entertainment industry, harnessing data and statistical modeling to predict future events or outcomes. This tool offers a strategic advantage for professional sports organizations in enhancing sales, marketing strategies, and the overall fan experience. In this real-world application, we take on the challenge of developing a mathematical model to forecast ticket sales for a professional soccer organization. Leveraging historical sales data and economic indicators, our approach integrates various mathematical techniques, including data transformation, correlation analysis, regression, and programming. The primary goal of this capstone project is to provide the organization with actionable insights for optimizing revenue from ticket sales. Hence, they can maintain a balance between affordability and profitability. This endeavor calls on knowledge from various disciplines, including mathematics, statistics, data science, and economics. By utilizing tools from each of these domains, we aim to offer a comprehensive solution to the unique demands of the sports industry, enabling the organization to make informed decisions and propel its success within the increasingly competitive discipline of business intelligence.

Concurrent Oral Presentations
Session 7 | ADUC 320
Moderator: Shannon Harr

9:00 - 9:15 a.m. **Meiotic Viability Of Genetically Engineered Circular Chromosomes In The Eukaryote Saccharomyces Cerevisiae**

CS–7 *Rebecca Bailey*. Dr. Melissa Mefford, mentor,* **Department of Biology and Chemistry, College of Science**

Prokaryotes generally have a single circular chromosome, while eukaryotes have multiple linear chromosomes capped by specialized repetitive DNA sequences called telomeres. Telomeres shorten as we age because they cannot be completely replicated before the cell divides. To overcome this shortening, telomeres can be lengthened by an enzyme called telomerase. However, >85% of cancer cells upregulate telomerase, allowing the cancerous cells to divide uncontrollably. Since telomeres and telomerase contribute to aging and cancer, we set out to understand why eukaryotes have linear chromosomes with telomeres instead of circular chromosomes. To this end, we have circularized three individual chromosomes in the single-celled eukaryote Saccharomyces cerevisiae. In asexually dividing haploid cells, the circular chromosomes exhibit no obvious phenotypes. A current hypothesis posits that eukaryotes evolved linear chromosomes to permit meiosis and sexual reproduction. To test this hypothesis, we have mated haploid yeast to form diploid cells. When transferred to minimal sporulation media, S. cerevisiae will enter the sexual reproductive cycle of meiosis. Meiosis will from four haploid cells, called spores in yeast, from a single diploid cell. Because the four spores are held together by a cell-wall like structure called and ascus, we can use a specialized microscope fitted with a moveable needle to dissect the four spores from a single round of meiosis. The dissected spores, if viable, will grow into a colony. Our preliminary data indicates that circular chromosomes decrease the viability of resulting spores, consistent with the hypothesis that linear chromosomes evolved to allow sexual reproduction.

9:15 - 9:30 a.m.   **Interaction Effects Of Bioactive Compounds In Thrombosis Therapy**

ℂ𝕊-𝟠   *Jack McFarland*, Cameron Gibson*. Dr. Smita Joshi, mentor,*
Department of Biology and Chemistry, College of Science

Occlusive thrombosis, a leading cause of global morbidity and mortality, claims the lives of 1 in 4 individuals. Developing novel antithrombotic treatments is crucial, as conventional antiplatelet drugs, despite their potency, have limitations like increased bleeding risk. Natural bioactive compounds offer a promising alternative due to their safety, efficacy, and affordability. This research project aims to identify and investigate the interaction effects of bioactive compound combinations in modulating thrombosis therapy.

This project hypothesizes that precise combinations of bioactive compounds such as garlic (allicin), ginger (gingerols), ginkgo biloba (flavonoids and terpene lactones), and turmeric (curcumin) can exert synergistic antithrombotic effects. These compounds, selected based on their historical use in cardiovascular health and demonstrated antiplatelet properties, have shown individual effects on platelet activity. However, the potential for synergistic effects in combination remains unexplored. The specific aims are:

Evaluate the efficacy of bioactive compound combinations in synergistically inhibiting platelet aggregation in vitro and preventing thrombosis in vivo.
Delineate the molecular mechanisms underlying the effects of these combinations on platelet biology.
Assess the safety and tolerability of these combinations.

Standardized bioactive compound extracts will be used in in vitro experiments such as platelet aggregation assays and Western blotting. In vivo investigations will involve a FeCl3-induced carotid injury model. Safety assessments will encompass acute and chronic toxicity studies. All data will be analyzed using appropriate statistical tests.
We anticipate identifying several combinations with antithrombotic properties. Our mechanistic studies will not only validate their clinical potential but will also provide valuable insights into platelet biology and function.

9:30 - 9:45 a.m.   **Vesicle Associated Membrane Proteins Influence Platelet Intracellular Cargo Packaging And Trafficking**

CS–9   *Cameron Gibson*, Jack McFarland*. Dr. Smita Joshi, Dr. Sidney W. Whiteheart, mentors,* **Department of Biology and Chemistry, College of Science**

Platelets are crucial to maintaining the vascular microenvironment. Upon vascular injury, they interact with extracellular matrix proteins and release cargo contents from their granules. De-novo synthesized or endocytosed cargo travel through specialized compartments like endosomes and are packaged in granules. These cargo molecules are important in inflammation, immunity, wound healing, and many other processes.

Platelet granule release is mediated by Soluble N-ethylmaleimide Sensitive Factor Attachment Protein Receptors (SNAREs) and their regulators. Apart from granule secretion, the VAMPs also play a role in intracellular trafficking. Platelets contain Vesicle-Associated Membrane Protein (VAMP)-2, -3, -4, -5, -7, and -8. To study how VAMPs regulate platelet cargo levels, we generated several VAMP-deficient mouse strains that lack either one or combinations of VAMPs. The theoretical levels of VAMPs in these platelets vary from 100% to about 15% based on previous mass-spec and quantitative blotting analysis. Using commercial antibody arrays, we probed for 53 different cargo proteins in VAMP-deficient platelets. Cargo levels were minimally affected (relative to wild-type) in VAMP7-/- platelets and drastically reduced in NBL2-/- platelets. (NBL2 is a sorting protein whose deletion causes Grey Platelet Syndrome). While all strains showed some decreases, VAMP-(2/3)Δ/Δ(7/8)-/- and VAMP-(2/3)Δ/Δ(8)-/- platelets showed significant reductions. These patterns suggest that all VAMP isoforms contribute to platelet cargo trafficking to some extent. The data further suggest that cargo distribution is stochastic, non-thematic, and could be regulated overlapping functions of the VAMPs. This is the first report indicating the relative contributions of VAMPs in platelet trafficking on a global level.

Concurrent Oral Presentations
Session 8 | ADUC 320
Moderator: Shannon Harr

10:00 - 10:15 a.m.   **The Mandelbrot Set And Complex Numbers**

CS-22   *Sebastian Hicks*. Dr. Mike Dobranski, mentor,* **Department of Mathematics, College of Science**

Fractals are beautiful creations coming from pure mathematics. This project started with the goal of finding more applications involving complex numbers in secondary mathematics education. This led to the Mandelbrot set and the fractals it produces in the complex plane. The final goal has been writing a computer program to make visual representations of this set.

10:15 - 10:30 a.m.   **Using Thin Layer Chromatography To Identify Lepraria Lichens**

CS-23   *Alyson Simpson*. Dr. Allen Risk, mentor,* **Department of Biology and Chemistry, College of Science**

When it comes to identifying dust lichens belonging to the genus Lepraria, to identify them based only on morphology proves to be difficult. However, thin-layer chromatography (TLC) has been used by previous researchers to identify compounds found within the Lepraria thallus which helped with the identification of samples. During the past year, TLC was employed within the Morehead State University (MSU) herbarium in order to identify Lepraria specimens from Carter Caves State Resort Park. The samples of the lichens were saturated in acetone and spotted onto a silica gel plate. The lower portion of the plate was then placed into a solvent system containing 20 mL toluene and 3 mL glacial acetic acid. TLC utilizes compound polarities and their different migration speeds to spread the compounds throughout the plate. The plates were then evaluated for several characteristics including Rf values, response to long and short-wave UV, hydrophobic spots, and compound colors in response to sulfuric acid exposure. The identification of each compound found within a sample then allowed for the identification of the species of Lepraria. This research was supported by a Morehead State University Undergraduate Research Fellowship and travel and supply grants from the Department of Biology and Chemistry.

10:30 - 10:45 a.m.   **Effects Of Exogenous Hormone Injections To Livestock**

CS-24   *Madison Werner*. Dr. Smita Joshi, mentor,* **Department of Biology and Chemistry, College of Science**

Estrogen and its derivatives play a significant role in livestock production. These hormones can improve growth rates, feed efficiency, and ultimately, meat and milk yield. However, consumer concerns regarding the safety of hormone residues in animal products are a major challenge. This review examined research on the impact of exogenous estrogen administration on livestock physiology, potential hormonal residue levels in meat and milk, and consumer concerns. Studies suggest that properly administered estrogen, alongside other growth promoters like testosterone and progesterone within FDA guidelines, does not lead to harmful levels of residual hormones in animal tissues. Additionally, research indicates these hormones enhance parathyroid function and calcium recovery, potentially improving overall animal health. However, the potential long-term health effects of such practices warrant further investigation. In summary, the data suggest that additional hormones are safe in moderation and are successful in increasing production in livestock operations.

Concurrent Oral Presentations
Session 9 | ADUC 320
Moderator: Shannon Harr

11:00 - 11:15 a.m.   **Predicting The Mechanism And Products Of Cs2 Capture By Nh3 An Exemplar Benchmark Study**

CS–40   *Shelbie Black*. Dr. Zachary Lee, Dr. David Dixon, mentors,* **Department of Biology and Chemistry, College of Science**

Preliminary electronic structure calculations, mainly density functional theory (DFT) and the correlated molecular-orbital (MO) methods of MP2 and G3(MP2), have been performed in order to study the reactions of CS2 with NH3 and H2O in the gas phase and to determine the plausibility and kinetics of thiocarbonic acid, thiobicarbonate, thiocarbamic acid, and thiocarbamate from the possible sequestration processes of CS2 by amines. An implicit self-consistent reaction field aqueous solvation approach (COSMO) was applied to the gas phase pathways to provide insight into these CS2 reactions in aqueous and humid atmospheric environments. The higher-level G3(MP2) calculations will eventually be benchmarked at the CCSD(T)/CBS level in collaboration with the University of Alabama. The results collected throughout this project and following studies may provide significant implications for CS2 capture by amines in both the gas phase and aqueous solution as well as in the solid state, analogous to amine capture of CO2 mechanisms recently established by the respective Dixon and Lee research groups. These mechanisms of CS2 sequestration may have serious environmental implications for the development of CS2 scrubbing techniques for industrial CS2 emissions as well as significant atmospheric and astrochemical relevance as it pertains to the possible formation of thiocarbonates and thiocarbamates in areas of high organosulfur content, such as Earth's permafrost or the atmospheres of Venus and Saturn's largest moon Titan.

11:15 - 11:30 a.m.   **Determining The Labeling Accuracy Of Nicotine Content Across U.S. E Cigarette Manufacturers Using Hplc And Gcms**

CS-41   *Josephine Traver*. Dr. Emmalou Schmittzehe, mentor,* **Craft Academy for Excellence in Science and Mathematics**

The popularity of nicotine usage, especially among adolescents, is increasing. However, studies have shown that the labeling of nicotine content on e-cigarette products is often inaccurate. Some products contain higher levels of nicotine than stated on the label, while others have lower levels. Due to the lack of FDA regulation on e-cigarette products, manufacturers in the U.S. are not held accountable for accurately disclosing nicotine content. This project aims to investigate whether the nicotine levels reported on e-cigarette labels align with the experimental findings. Implementing regulation in this area can ensure trust between e-cigarette users and U.S. manufacturers.

11:30 - 11:45 a.m.   **If You Liked It Then You Should've Put A Ring In It: Is Topoisomerase I Required For Circular Chromosome Segregation In The Eukaryote Saccharomyces Cerevisiae?**

CS-42   *Mara Stout*. Dr. Melissa Mefford, mentor,* **Department of Biology and Chemistry, College of Science**

Eukaryotic genomes comprise multiple linear chromosomes, while prokaryotic genome contain a singular circular chromosome. Unlike prokaryotes, eukaryotes are burdened with maintaining the ends of their linear chromosomes, also known as telomeres. Defects in maintaining telomeres is a major driver of both aging and cancer, motivating our lab to investigate why eukaryotic cells evolved linear chromosomes and telomeres. To study the role of linear chromosomes in eukaryotes, we have successfully engineered budding yeast, Saccharomyces cerevisiae, with individually circularized, telomere-free chromosomes. In haploid strains undergoing mitotic division, the circularized chromosome strains grow like wildtype. However, the circular chromosomes must be segregated differently due to the large structural difference. We propose that segregation must require topoisomerases, which are important nuclear enzymes involved in relieving torsional strain during DNA replication, transcription, and recombination. To test our hypothesis, we deleted the non-essential topoisomerase I (TOP1) gene in wildtype and circularized chromosome strains of S. cerevisiae. Preliminary data shows top1Δ causes growth defects in two circular chromosome strains, consistent with our hypothesis. We are currently testing the effect of a topoisomerase II inhibitor, doxorubicin, which should mimic the effects of topoisomerase gene deletion. Together, this data will shed light on how chromosomal architecture influences chromosomal segregation and cell proliferation. In the future, we plan to study topoisomerases during meiotic division, as we hypothesize that linear chromosomes are better able to undergo the vital crossing-over process and thus linear chromosomes evolved with sexual reproduction in eukaryotes.

Concurrent Oral Presentations
Session 10 | ADUC 322
Moderator: Sylvia Henneberg

9:00 - 9:15 a.m.   **Jams, Jelly Lichens, And Nature Preserves: An Analysis Of Jelly Lichens In Carter Caves State Resort Park**

CS-10   *Julia Fitzpatrick*. Dr. Allen Risk, mentor,* **Department of Biology and Chemistry, College of Science**

The lichen family Collemataceae contains what are affectionately characterized as the jelly lichens. Lichens are a collaborative living structure consisting of fungal filaments and algal cells. Jelly lichens differ from others in that they lack a distinctive algal layer and contain blue-green algae of the genus Nostoc. When wet, they become gelatinous in habit, leading to the name "jelly lichens". The objective of this study was to inventory the jelly lichens of Carter Caves State Resort Park (CCSRP), located near Olive Hill, Kentucky. Specimens recently collected from the park were identified and previously acquired specimens from CCSRP in the Morehead State University herbarium were re-examined. Seventeen species across five genera (Collema, Enchylium, Lathagrium, Leptogium, and Scytinium) were documented. Comparison with online databases indicated that five of the included species may be relatively uncommon in Kentucky. A recent and exciting discovery was the addition of Scytinium apalachense to the CCSRP lichen flora; the species has been previously collected only three times in Kentucky and in the eastern United States is limited to limestone areas in the Ozarks and the Appalachian mountains. Jelly lichens are known to be excellent indicators of environmental quality due to their sensitivity to air pollution. Monitoring the diversity of lichen species allows a general understanding of the park's well-being and assists in preserving natural resources in the state of Kentucky. This study was supported by Morehead State University Undergraduate Research Fellowship and a travel grant from the Department of Biology and Chemistry.

9:15 - 9:30 a.m.   **Inventory Of Lichens At Carter Caves State Resort Park, Carter County, Kentucky**

$$CS-11$$

Aliya Frisby*. Dr. Allen Risk, mentor, **Department of Biology and Chemistry, College of Science**

The goal of this research was to document the lichens present in Carter Caves State Resort Park (CCSRP). Lichens are composite organisms comprised of fungi and algae or cyanobacteria, and are incredibly diverse in both morphology and properties. They are also notably understudied, despite their status as indicators of air pollution and their potential for use in medicine. Known for its caverns, CCSRP is also interesting above ground, with over thirty miles of hiking trails and a 45-acre lake. Lichens in the park are abundant, as the landscape harbors tall hills and cliffs with limestone and sandstone outcrops along with low valleys and creeks. In order to inventory the lichens, voucher specimens were collected at many different sites of interest, allowed to dry, and identified with standard physical and chemical tests. These specimens were then placed in the herbarium of Morehead State University. To date, 177 species overall have been found at the park, composed of 72 crustose, 82 foliose, and 23 fruticose. Of these species, 156 have green algal and 21 have cyanobacterial components. Interesting finds include Scytinium apalachense, considered historic (not reliably reported in 20 or more years) in Kentucky, and Bilimbia fuscoviridis, a European species which was only first documented for North America in 2023. A wide-spread and common genus, Parmotrema, had a notable lack of variety compared to surrounding areas. This project was supported by the Undergraduate Research Fellowship Program at Morehead State University and a travel grant from the Department of Biology and Chemistry.

9:30 - 9:45 a.m.   **The Kentucky Ant Project**

$$CS-12$$

Josiah Kilburn*. Dr. Sean O'Keefe, mentor, **Department of Biology and Chemistry, College of Science**

Ants… you may see them as a house pest, but they are much more important. Not only are they often agricultural pests, but they may be the most important predatory insect on earth. For these reasons (and many more) we need to catalog and study ants. In the US alone, we know there are about 900 species of ants.

Kentucky is home to some of the most biologically diverse areas in the US, but there is little information on the ant species in the state. The sparse data that is present states that there are about half as many species of ants in Kentucky as there are in each of its bordering states. The goal of the Kentucky Ant Project is to remedy this data disparity.

Last year we predicted that there were 30 ant genera in Kentucky, from 6 subfamilies. This year we report 2 new genera to the state (Forelius and Dorymyrmex), and around a dozen new species records, with 2 appearing to be undescribed. We also will report the future plans for the project including student participation in collecting ant specimens.

Concurrent Oral Presentations
Session 11 | ADUC 322
Moderator: Sylvia Henneberg

10:00 - 10:15 a.m.   **An Updated Catalogue Of The Minimum Synchrotron Energies And Associated Magnetic Field Strengths Of Galactic Supernova Remnants**

CS-25   *Walker Hartman*. Dr. Thomas Pannuti, mentor,* **Department of Engineering Sciences, College of Science**

Two of the most fundamental properties of Galactic supernova remnants (SNRs) that are crucial for understanding both SNR evolution and cosmic-ray acceleration by SNRs are E(min) (the minimum energy required to power the observed synchrotron emission at radio frequencies from these sources) and B(min) (the associated magnetic field strength). Classically, these parameters were determined based on calculations that assumed an equipartition between the energy densities of the magnetic fields and the relativistic particles. These calculations have been modified by a new approach presented by Beck & Krause (2005) which considers not the ratios of the energies of cosmic-ray protons (CRPs) and cosmic-ray electrons (CREs) but instead the ratio of the number density of energies of CRPs and CREs. This new approach provides a more realistic analysis of equipartition calculations by considering variations in the ratio of CRPs and CREs as a function of energy. We have applied these modified equipartition calculations of E(min) and B(min) to a sample of 31 known Galactic SNRs and compared these calculations to values obtained for E(min) and B(min) using classical computations, and we compare our results using these two methods. To illustrate our work, we also present an X-ray and radio analysis of the poorly-studied Galactic SNR G340.6+0.3 using the results of published radio observations of this object along with our own spectroscopic analysis using an archival observation made with the Chandra X-ray Observatory and we incorporate these results into our work.

10:15 - 10:30 a.m.   **An Updated Catalog Of Candidate Radio Supernova Remnants In Nearby Galaxies And Their Properties**

CS–26   *Brannon Jones*. Dr. Thomas Pannuti, mentor,* **Department of Engineering Sciences, College of Science**

Observations of candidate radio supernova remnants (SNRs) in nearby galaxies offer the opportunity of examining members of this class of sources in a way that addresses challenges in observations of Galactic SNRs, namely significant distance uncertainties and considerable extinction along Galactic lines of sight. We have compiled a catalog of candidate radio SNRs in nearly twenty nearby (< 8 Mpc) spiral and irregular galaxies through a detailed literature search and we have computed crucial properties of these sources (namely radio luminosities, minimum energies required to power the observed synchrotron emission and the corresponding minimum magnetic field strengths) using equipartition calculations. Based on the optical and infrared fluxes of these galaxies, we have also computed star formation rates and metallicities of these galaxies with the intent of identifying correlations if present between these galactic properties and characteristics of the resident candidate radio SNR population. This sample is one of the most robust ever created for the study of the properties of candidate radio SNRs and will be particularly useful for comparisons with the properties of the population of Galactic candidate radio SNRs.

10:30 - 10:45 a.m.   **Green Energy Based Bluetooth Low Energy Star Network For Internet Of Things Applications**

CS–27   *Tyler Hall*. Dr. Anindita Paul, mentor,* **Department of Engineering Sciences, College of Science**

Due to the advancement of the low-power integrated circuit technology the application of internet of things (IoT) can be seen everywhere from domestic life, medical field to industrial applications. The IoT is a physical objects network embedded with sensors, software, electronics, and network connectivity, allowing objects to collect and exchange information. By 2030, it is estimated that there will be over 25 billion connected IoT devices globally. The power of IoT will be limitless if the IoT networks can be energy efficient. Use of Bluetooth Low Energy (BLE) can be a viable solution instead of using other wireless technologies like ZigBee, Bluetooth classic and Wi-Fi.

In our project we designed a general-purpose star network using BLE which can be used in real life applications like a) in medical field to make smart hospital building b) to ease Precision Agricultural c) cities trash collection d) managing inventory in warehouse or in a supercenter store.

As proof of concept, the BLE star network is formed using multiple ESP 32 microcontrollers as peripheral nodes and cellphone as central node. The ultrasonic sensors are used with each microcontroller to determine an object and its distance. It can find the object and distance by sending out high-frequency sound waves and measuring how long it takes for the sound to bounce back to the sensor. Energy harvesters that can scavenge energy from the ambiance used to power the device. Using energy-harvesting technique offers a solution to reducing battery waste and making proposed device more sustainable.

Concurrent Oral Presentations
Session 12 | ADUC 322
Moderator: Sylvia Henneberg

11:00 - 11:15 a.m.   **An Innovative System For Real Time Translation From American Sign Language (ASL) To Spoken English Using A Large Language Model (LLM)**

CS–43   *Larry Johnson*. Dr. Sherif Rashad, mentor,* **Department of Engineering Sciences, College of Science**

For millions of people with hearing difficulties, sign language of some form is used as the primary form of communication in many day-to-day situations. Considering the relative infrequency in sign language fluency globally, it is imperative that a novel system is created to facilitate communication for individuals with hearing impairments, especially in time-critical situations such as in medical environments. Ultimately, we aim to create a system that is portable, intuitive, and easily usable in an individual's day-to-day life. In this research project, we explore the efficiency and practicality of using a Large Language Model (LLM) to translate phrases in American Sign Language (ASL) directly to English sentences in real-time. The proposed system utilizes the Leap Motion Controller as a method to capture signing information from the user, where this captured information is transformed into glosses (word representations of signs) and provided to the proposed LLM for translation. The experimental results for both accuracy of sign recognition and ASL to English sequence translation show that the proposed system is promising.

11:15 - 11:30 a.m.   **Classification Of Facial Expressions Using Deep Neural Networks And Facial Feature Landmarking**

CS–44   *Yori Patrick*. Dr. Heba Elgazzar, mentor,* **Department of Engineering Sciences, College of Science**

Communication is inextricably associated with speech to most people, but many neglect the fact that most communication occurs without speaking. Nonverbal communication includes a variety of factors such as posture, gestures, and facial expression. Using these forms of communication is instrumental to understanding the intent behind a message, but some people struggle to or cannot understand nonverbal communication. Whether it is to help such individuals or to analyze other patterns in nonverbal communication, machine learning is shown to be able to observe and identify patterns in image data through studies which classify objects. Prior research has also been done in generating numeric data to describe the positions of facial features, so this research applies machine learning, facial feature landmarking, and deep neural networks to classify images of a person's face as expressing happiness, anger, surprise, fear, or sadness. Several experiments were conducted using the Multimedia Understanding Group's Facial Expression Database and the trained machine learning model achieved an accuracy of 82.32% with varying accuracies within each emotion.

11:30 - 11:45 a.m.   **Cultural Identity In The Appalachian Region**

ℂ𝕊−45   *Zander Mack*, Heather Parks*. Dr. Ann Andaloro, mentor,*
**Department of Communication, Media, Art & Design, Caudill
College of Arts, Humanities and Social Sciences**

This oral presentation explores the potential fusion of ethnic minority and even international cultures with the Appalachian traditions it's an educational presentation aimed at showcasing the rich tapestry of cultures that contribute to the communities identity. The presentation serves as a platform for individuals to express their perspectives on cultural diversity addressing the challenges and triumphs of integrating various ethnicities religions and cultural backgrounds. it's a celebration of unique differences that each culture brings to the Appalachian region fostering a dialogue on inclusivity and acceptance by highlighting the stories of people from diverse backgrounds. The understanding of the world to being open to diversity and it's an innovation to explore and appreciate the myriad ways in which diverse cultural expressions can harmonize with Appalachian heritage with the educational documentary film I have created along with this oral presentation. I hope to inspire a more inclusive society that recognizes and celebrates the contributions of all its members. I want this oral presentation to be the right step towards creating a community where diversity is not just acknowledged but cherished as an important part of its collective identity.

Concurrent Oral Presentations
Session 13 | ADUC 326
Moderator: Chris Schroeder

9:00 - 9:15 a.m.   **Craft Academy Solar Electric Racing (Caser)**

CS-13   *Alejo Stacy-Brandenburgh*, Ethan Moulton*, Graeme Miracle*, Jay Huang*, Anthony Blevins*, Erik Mills*, Gabrielle Dobson*, Jacob Layne*, Jayson Myers*, Natalie Wall*, Samuel Gross*. Dr. Steven Stubbs, Dr. Joyce Stubbs, Dr. Rachel Rogers, mentors,* **Craft Academy for Excellence in Science and Mathematics**

The Solar Car Challenge is a nationwide program in which high school and college students design and build a car powered by solar panels, competing at Texas Motor Speedway or in a cross-country race. In the Spring of 2021, The Craft Academy for Excellence in Science and Mathematics founded a Solar Car Team called Craft Academy Solar Electric Racing (CASER). The CASER team is entirely student-led, with the support of project mentors Dr. Rachel Rogers, Dr. Steve Stubbs, and Dr. Joyce Stubbs. As team members, it is our job to research what parts are needed, what quantities and sizes we need, and how they will fit into our Solar Car. Using the engineering design process, the CASER team was able to gain a greater understanding of the principles behind frame designing using cad software and frame construction. We had to make challenging decisions, such as how to account for the mounting of essential parts without cutting into overall efficiency of our Solar Car. We are improving upon previous CASER team designs, such as creating a more aerodynamic structure, redesigning the frame, and planning for the construction of the electrical element. Throughout this year, we have learned invaluable skills we can use later in our lives and careers, such as welding, teamwork, and problem-solving. We plan to finalize welding the frame together and creating the battery housing. By next year, we would like an established blueprint of the driving compartment in construction while working on the electrical components in separate teams.

9:15 - 9:30 a.m.   **Spiral: A New Novel Programming Language For Software Development**

CS-14   *Dalton Hensley*. Dr. Heba Elgazzar , mentor,* **Department of Engineering Sciences, College of Science**

This research project aims to explore and implement a novel programming language. Spiral is a dynamically typed interpreted language that relies heavily on runtime diagnostics and error reporting. Our findings indicate that the usability of a programming language is greatly influenced by the quality of the errors it reports to the end user. Therefore, significant time and care have gone into handling subtle (and expected) mistakes often made by programmers. Spiral also supports a comprehensive collection of features typical in other languages: variables, selection, iteration, abstraction, and application. Our hope with Spiral is to build a language that facilitates rapid debugging, improves code quality, and enhances the end-user experience.

9:30 - 9:45 a.m.   **Complex Iterative Mappings Generated Using Multi Valued Expressions**

CS–15

Ismael Zeidan*. Dr. Timothy O'Brien, mentor, **Department of Mathematics, College of Science**

This research explores a generalization of the Mandelbrot set for which the z-squared term in the Mandelbrot equation has been replaced with z raised to an arbitrary complex number, alpha. More specifically, we focused on those values of alpha which results in a multi-valued recursive sequence. Our research investigates the relationships between the branches of these sets. We developed original software in Python and introduced a framework for analyzing these mathematical objects. We focused our attention to two main subsets of the complex plane, the rational numbers and complex numbers of the form a+bi, where and b are natural numbers. Using techniques from complex analysis, we were able to prove that the patterns seen using our software holds true for every generalized Mandelbrot set with alpha in our subsets of interest. We have shown that when alpha is a rational number, it exhibits a particular cyclic pattern where the value of alpha determines the period. We also showed that when alpha is in the other subset of interest, each branch produces the same image, but scaled by an exponential factor.

Concurrent Oral Presentations
Session 14 | ADUC 326
Moderator: Chris Schroeder

10:00 - 10:15 a.m.   **Zero Divisor Graphs Of 3x3 Tridiagonal Matrices Over The Integers Modulo 6**

$\mathbb{CS}-28$ *Emily Blevins*. Dr. Rachel Barber, mentor,* **Department of Mathematics, College of Science**

Zero-divisors in modular rings have been widely explored and documented in mathematics literature, yet less is known concerning the existence of zero-divisors in the ring of restricted tridiagonal matrices over the integers modulo n, where n is some composite integer. We explore all zero-divisors in the ring formed by a restricted subset of 3x3 tridiagonal matrices whose entries are elements of the integers modulo 6. Particularly, we prove the number of zero-divisors which exist in this ring and how they can be found, later constructing the zero-divisor graph of this ring using a quotient graph and exploring its properties.

10:15 - 10:30 a.m.   **Algorithm For Determining If A Double Coset Digraph Is A Generalized Wreath Product**

$\mathbb{CS}-29$ *Benjamin Meyer*. Dr. Rachel Barber, Dr. Ted Dobson, mentors,* **Department of Mathematics, College of Science**

The necessary and sufficient condition to recognize wreath products given by Barber and Dobson is quite useful in some ways; however, if one wants to know if a particular vertex-transitive digraph is a wreath product, it might be difficult to apply their conditions. Barber and Dobson have eliminated this problem and give a polynomial time algorithm to determine whether or not a given double coset digraph is isomorphic to a wreath product. Additionally, they also give a polynomial time algorithm to determine whether or not a given double coset digraph is isomorphic to a generalized wreath product as well. The goal of my research project is to implement the algorithms in the algebraic coding language known as MAGMA, in which one inputs a double coset digraph and the program returns all the pairs of graphs of which the double coset digraph is a generalized wreath product.

10:30 - 10:45 a.m.   **The Final Three Card Trick: With Mathematics, You'll Never Lose Another Card Trick Again!**

CS-30

Hannah Phirman*. Dr. Robin Blankenship, Dr. Doug Chatham, mentors, **Department of Mathematics, College of Science**

The Final Three Card Trick is a card trick that involves choosing cards from a standard deck of 52, cutting the deck a total of seven times, and flipping every other card face-up until there are only three cards remaining face-down. The process feels random to the unknowing participant, but by using mathematics, I have proven that the deck stacking is not, in fact, random, and that the initial positions of the final three surviving cards can be known to the dealer from the very beginning. With this knowledge, I expanded to look at deck sizes of any number and found that the initial positions in these deck sizes is also known using mathematics. Special thank you to Dr. Doug Chatham for supplying propositions and proof sketches.

Concurrent Oral Presentations
Session 15 | ADUC 326
Moderator: Chris Schroeder

11:00 - 11:15 a.m.   **Investigating The Relationship Between Teacher Beliefs And Student Mindset**

CS-46   *Kristin Thacker*. Dr. William Tidwell, mentor,* **Department of Mathematics, College of Science**

Researchers and practitioners have, for years, claimed that students have different learning styles --- visual, audio, and kinesthetic. More recently, research shows that these learning styles are a myth. Students and teachers can sometimes perpetuate the belief that one may learn better from one learning style as compared to others. Doing so may endorse the belief that a student has fixed, unchangeable traits about their learning. Research shows that having the belief that our learning traits are fixed and unchangeable --- as opposed to growing and dynamic --- negatively affects student achievement. In this session, I will discuss my research: investigating if teachers' beliefs in learning styles play a role in affecting the mindset of their students and if teachers' mindsets affect the mindset of their students.

11:15 - 11:30 a.m.   **Investigating A Simple Dice Game**

CS-47   *Clay Morris*. Dr. Joshua Qualls, mentor,* **Department of Mathematics, College of Science**

Consider rolling five, fair six-sided dice. Combining the rolled numbers in any order using any of the four standard arithmetic operations, what is the probability that we can build zero? What is the probability that we can build some target number? What if we rolled a different number of dice? What if the dice had other numbers of faces? In this project, we considered the probability of being able to build zero for different numbers of different regular dice. Although the operations of addition and subtraction are more straightforward to consider combinatorically, the operations including multiplication and division are more complicated. We present several specific results and report on our progress.

11:30 - 11:45 a.m.   **Introducing The Fibonacci Sequence In Education**

CS–48

Kiersten Pannell*. Dr. Robin Blankenship, mentor, **Department of Middle Grades and Secondary Education, Volgenau College of Education**

My capstone project ties together education and mathematics. The goal is to experience teaching higher level math concepts at different grade levels: 5th, 7th, and 11th grade. Lesson plans were created to introduce and investigate the Fibonacci Sequence, Pascal's Triangle, and the Golden Rectangle. The Fibonacci Sequence relates to the KY standards of pattern and rule finding. The Golden Rectangle relates to the KY standards of using dimensions, area, and ratios. Pascal's Triangle relates to the KY standards of binomial expansion. After every lesson there was a reflection upon classroom management, the overall lesson, the students' understanding of the mathematics, and if the lesson demonstrated to students that higher level mathematics concepts not typically taught in public schools are important to learn and that they are capable of learning.

Concurrent Oral Presentations
Session 16 | ADUC 321
Moderator: Megan Boone

10:00 - 10:15 a.m.   **Retrospective And Prospective Impacts On Vote Choice In The 2004 United States Presidential Election**

CS-31   *Canaan Thacker*. Dr. James Masterson, mentor,* **Department of History, Philosophy, Politics, Global Studies & Legal Studies, Caudill College of Arts, Humanities and Social Sciences**

The 2004 United States Presidential Election proved to be a highly contested one, which concluded with a reelection victory by incumbent Republican President George W. Bush over Democratic nominee John Kerry in both the Electoral College and national popular vote margins. Contemporary theories of retrospective and prospective voting suggest that economic and security considerations are predominant among voters' candidate preferences. With extensive security concerns regarding the ongoing War on Terror and the 2003 invasion of Iraq, and an economic upswing beginning two years following the 9/11 attacks, this research seeks to measure the influence that retrospective and prospective economic and security issues had on voter preferences, controlling for alternative explanatory factors such as party identification, single-issue salience, and candidate favorability. This study adds to the existing literature by utilizing American National Election Studies (ANES) data in 2004 in addition to multiple statistical models to evaluate and assess the impacts of retrospective and prospective economic and security issues on individual vote choice in 2004. Moreover, this study controls for other rival causal mechanisms to effectively observe and compare the impact of retrospective and prospective issues relating to economic and security factors on multiple scales.

10:15 - 10:30 a.m.   **The Comparison Between Kidney And Sacral Length To Determine Fetal Gestational Age**

CS–32   *Lindy Kuhn*. Ms. Jennifer Clark, mentor,* **Department of Kinesiology, Health and Imaging Sciences, College of Science**

Gestational age defines how many weeks a woman is during pregnancy. Performing accurate measurements on a fetus is crucial for calculating gestational age. Gestational age can be found by various fetal measurements. Gestational age is also calculated by obtaining the patient's LMP (last menstrual period). Correlating gestational age by LMP to fetal measurements can help a physician detect any anomalies before a fetus is born. Some fetuses suffer from growth restriction or macrosomia which means they are too small or too large compared to the gestational age. Some women do not know their LMP, fetal measurements can be useful to identify the gestational age.

In this study, 123 fetal kidney lengths and 123 fetal sacral lengths were measured in millimeters to determine which parameter was the most accurate to calculate gestational age. Once these measurements were taken, they were compared to the pregnant volunteer's LMP using a Pearson correlation coefficient test. The results from this test were R=0.722 for kidney length and R=0.677 for sacral length. Therefore, concluding that measuring fetal kidney length is more accurate than fetal sacral length in determining gestational age.

This study is very beneficial for sonographers to know. It is the sonographer's job to obtain accurate measurements that will influence the health of a fetus. If a fetus is presenting with an anomaly in which the standard measurement cannot be obtained, the sonographer will be able to measure the kidney or sacrum to obtain an accurate gestational age.

IRB : 23-01-48

10:30 - 10:45 a.m.   **Miocene Fungi From The Amazonas Region Of Peru: Preliminary Paleoclimatic And Paleoecological Reconstructions**

CS–33   *Liberty Smallwood*, Ollie VanderEspt*, Chris Marsh. Dr. Erdoo Mongol, Dr. Jennifer O'Keefe, Dr. Juan-Filipe Montenegro, Dr. Diana Ochoa, Dr. Matthew Pound, mentors,* **Department of Engineering Sciences, College of Science**

Miocene sediments in the western Amazonas region record a unique mega-wetland ecosystem known as the Pebas System. This system existed under wetter and warmer than present conditions, prior to the final Andean uplift. Though the palynological record in the region has been studied extensively, fungal diversity remains poorly explored. Fungal remains from the Brazilian Amazonas have been identified to form-taxa only, without providing ecological or paleoclimatic information. We examine fossil-rich sediments from northeastern Peru that were deposited ca. 16.5 Ma, and therefore document the Miocene Climate Optimum warming. Here, the Fungi in a Warmer World (FIAWW) team applies the nearest living relative method to analyze preserved fungal remains, aiming to develop, for the first time, a fungi-based paleoclimatic reconstruction to be compared with existing plant-based counterparts. The samples are dominated by cosmopolitan amerospores but also contain taxa indicative of tropical wetland ecosystems. We further enhance the understanding of tropical fungal paleoecology, providing new insights to refine existing reconstructions for continental to marginal marine forested areas.

Poster Session
1:00 – 3:00 p.m.
ADUC Ballrooms

Safety And Risk Management In The Sculpture Studio

P-1 *Danielle Vigil*, Maija Wehr*. Mr. Michael Bowen, mentor,* **Department of Communication, Media, Art & Design, Caudill College of Arts, Humanities and Social Sciences**

This literature review examines risks within the sculpture studio and the most effective ways to minimize risks and promote safety. Inhalants pose a risk in the form of sawdust, plaster dust, spray paint, and metal grinds. Specific health effects of inhalants will be identified and used in determining the level of risk. In prevention of these negative effects, we will be reviewing the importance of safety equipment including masks, eye protection, and welding equipment. Management of risk ultimately comes down to management of the studio. This involves proper handling and storage of tools. Cleaning also maintains a safer environment, whether it be cleaning a bandsaw to prevent malfunction to keeping the general work area organized. Traffic and workflow need to be considered in a classroom setting of multiple students, so we examined an ideal organization and floor layout.

Photography Practicum: Learning The Basics Of Managing A Fine Art Photography Studio

P-2 *Ashley Routt*, Mason Pollock*, Chelby Justice*. Dr. Robyn Moore, mentor,* **Department of Communication, Media, Art & Design, Caudill College of Arts, Humanities and Social Sciences**

The photography practicum provides Art and Design student researchers with the practical experience of managing a fine art photography studio. Students learn how to operate, manage, and maintain industry standard fine art archival inkjet printers and scanners as well as a twelve-station analog black and white darkroom and alternative photographic process equipment. This project provides essential expertise and knowledge that students, as lab monitors, both share with other students and incorporate into their own fine art practice and professional activities. Student researchers learn how to mix, store, and dispose of photographic chemistry, provide daily assistance to undergraduate and graduate students, assist with photography-related student exhibitions and workshops, and generate ideas for improvements to the lab. Students also contribute to the ongoing revision of the Photography Lab Manual, which specifies best practices and operating procedures for future photography lab monitors. The practical knowledge gained from this experience is highly valuable to colleges, universities, community colleges, artist co-ops, and professional photography labs that seek to employ individuals to manage and teach both digital and analog photography practices. This research was funded with an Undergraduate Research Fellowship.

Analog Printing For Design

P-3 *Olivia Adams*. Mr. Joel Knueven, Ms. Elizabeth Mesa-Gaido, Mr. Jacob Lee, mentors,* **Department of Communication, Media, Art & Design, Caudill College of Arts, Humanities and Social Sciences**

We are learning about analog printing for design and assisting the Art & Design program to get stations/labs organized and usable for letterpress printing and screen press printing. We are using both of these media/technologies to create handmade designs. Objectives: increased understanding of historical design processes; gained technical knowledge in working with letterpress type and screen printing; combined type and image(s) to create designs; worked on organizing letterpress type; assisted in setting up screen print lab and multiple stations (chemical, spray, exposing, and printing); created step-by-step video instructions; and utilized letterpress printing and screen press printing. Results: gained technical knowledge in working with letterpress type and screen printing; co-designed and printed limited edition, hand screen pressed posters combining images and letterpress type for the Kentucky Folk Art Center's Minnie Adkins birthday celebration, which were sold as a fundraising initiative; guided and monitored screen printing for 300+ high school students who attended the Art & Design Program's Annual High School Art Day recruitment event on March 6; and used completed work as part of a BFA application.

A Light In The Hills: Helen Price Stacy

P-4 *Gwen Akers*. Dr. Matthew Sutton, mentor,* **Department of English and Modern Languages, Caudill College of Arts, Humanities and Social Sciences**

Utilizing the collection of Helen Price Stacy's papers held within the Camden-Carroll Library Archive system, we looked into Helen Price Stacy in relation to her work as an Appalachian writer and artist. Price Stacy was an avid writer, researcher, and reporter in her hometown of West Liberty, Kentucky, even earning an honorary doctorate from MSU. Looking at Price Stacy's nonfiction writings for her local newspaper, juxtaposed against her creative poetry, the image of an influential artist, speaker, and leader becomes clear. Encouraged by fellow writers and inspired by her hometown, Price Stacy sought to write about finding the light in even the darkest of times, finding her own voice along the way—nestled deep within the rich heritage and stories of Appalachia.

Presidential Debates And Substantive Responses

P-5   *Brady Lawson*, Michelle Lopez*, Grace Funke*. Dr. Douglas Mock, mentor,* **Department of History, Philosophy, Politics, Global Studies & Legal Studies, Caudill College of Arts, Humanities and Social Sciences**

Analysis over the extent to which televised presidential debates influence the learning of watchers or aid in information gathering about the candidates has already been done. The intention of this research is to examine the content of presidential debates to determine whether the quality of statements in presidential debates changed and to examine the extent to which viewers analyze the responses of the candidates. A ranking system has been created for the purposes of this research that ranks candidate's responses to a question posed by the moderator on a scale of "zero" to "four", with "four" being the presence of an analytical statement and "zero" consisting of vague general statements or a simple non-response to the prompt. This research aims to survey viewers about their analysis beginning with the Kennedy-Nixon debates of 1960 all the way through recent years with the Biden-Trump debates of 2020. The debate will be divided into sections, with responses by the candidates falling under a specific category such as foreign policy or personal character. Participants will then be asked to rank each candidate in each section of the debate on the scale from "zero" to "four". The purpose of this research is to identify if a trend exists in relation to relevance and substance of the candidate's responses as well as whether the quality of these responses have an effect on viewers' perception of who "won".

Love Canal **By Richard Newman**

P-6   *Brooklyn Minix*, Eli Thomas*, Alura Schaum*. Dr. Douglas Mock, mentor,* **Department of History, Philosophy, Politics, Global Studies & Legal Studies, Caudill College of Arts, Humanities and Social Sciences**

Richard Newman's 2016 book *Love Canal: A Toxic History from Colonial Times to the Present* takes readers on a journey through time as he examines one of the most infamous examples of environmental disasters in American history. Beginning with a comprehensive description of the economic history of the Niagara Falls area, Newman details exactly how "Love's Canal" came to be and why it was a failure in its initial purpose. Newman then moves to the creation of Hooker Chemical Company and the subsequent process of chemical dumping into what would later become a residential zone. Furthermore, Newman places the situation in *Love Canal* inside of a broader context by considering the various environmental justice movements taking place across the country at the time. Newman takes time to examine the intersections between class and environmentalism when it comes down to environmental disasters, all the while maintaining the major need for better policies regarding environmental managment. Through extensive research, Newman analyzes and explores the economic, social, and political factors that contributed to the disaster, bringing focus to the numerous instances where the government's lack of involvement and policy failed the innocent people who had once called *Love Canal* their home. Newman's "Love Canal" is not only a compelling narrative that brings awareness to a specific tragedy, but also a call to action that urges readers to confront their governments about environmental policies and work toward a more sustainable future.

How Dorceta Taylor's *Toxic Communities* Intersects Environmental Policy, Industrial Pollution, And The People Affected By Governmental And Company Actions

P-7   *Caitlyn Bledsoe*, Peyton McWilliams*, Adam Egan*, Myles Beasley*. Dr. Douglas Mock, mentor,* **Department of History, Philosophy, Politics, Global Studies & Legal Studies, Caudill College of Arts, Humanities and Social Sciences**

Dorceta Taylor's work *Toxic Communities: Environmental Racism, Industrial Pollution, and Residential Mobility* is an examination in which she documented the disproportional impact that industrial pollution has had on lower income and minority communities. She explained how residential mobility is determined by their ability to leave communities affected by hazardous waste sites or disproportionate industrial pollution. Taylor supported her arguments by presenting various different case studies of cities and communities across the United States. Taylor also discussed the efforts in which people are raising awareness for this relatively new study of environmental racism. Broaching the topic of environmental racism allows for a more ethnographic study of how pollution affects people that are deemed to be at the lower levels of society. In doing so, it allowed for us to see an interconnected web of what Taylor introduces in the title: environmental racism, industrial pollution, and residential mobility. We studied this in order to better understand the impact of corporate actors in the environmental justice scene and how it affects different people. In analyzing Taylor's *Toxic Communities*, we managed to get a grasp on the processes that communities go through in order to get justice for the environmental harm that has been done to their areas or how many go without receiving justice. To conclude, analyzing Dorceta Taylor's work Toxic Communities allowed us to see the connection between environmental law and policy, corporations, and the people directly affected by the actions of companies and the government.

Half Earth

P-8   *Adam McKinney*, Daniel Faccone*. Dr. Douglas Mock, mentor,* **Department of History, Philosophy, Politics, Global Studies & Legal Studies, Caudill College of Arts, Humanities and Social Sciences**

Half-Earth by biologist E.O. Wilson addresses how the earth is undergoing a mass extinction of biodiversity called the biodiversity crisis. Wilson proposes that we must set aside at least fifty percent of the Earth's surface for conservation while arguing how it is essential for maintaining ecosystem health and keeping the planet suitable for life. Over the years of professional ecological work, Wilson has observed this loss of species and habitats around the world, and he highly suggests that we change our behaviors of consumption and conservation of the ecosystems that we live in. The "Half Earth" solution that Wilson proposes, suggests that it's still possible to stop this extinction if we act swiftly. He also suggests that we need a substantial shift in human consumption patterns and humans' outlook on nature itself in order to set this change into action. Wilson's proposal stresses the need for immediate change in order to preserve and maintain preservation of all life on Earth.

An Analysis Of Rachel Carson's *Silent Spring*

P-9

Canaan Thacker*, Jared Vise*, Caleb Hammond*. Dr. Douglas Mock, mentor, **Department of History, Philosophy, Politics, Global Studies & Legal Studies, Caudill College of Arts, Humanities and Social Sciences**

Silent Spring, a book written by Rachel Carson and published in 1962, is commonly viewed as one of the most influential works regarding the modern environmentalist movement in the United States. Carson, a marine biologist by trade who spent the majority of her career working for the United States Fish and Wildlife Service, was inspired to write Silent Spring as a result of a trend within modernized agricultural practices that presented a heightened level of environmental concern. This issue was the use and over-reliance upon chemical pesticides, especially the chemical compound DDT, on natural environmental systems, surrounding wildlife, and humans themselves as traces of these chemicals progressed through the food chain. Carson's publication and its willingness to openly share these concerns were initially met with resistance by some scientists, chemical industry managers, and corporate lobbyists in agriculture, but the book was ultimately successful in shaping the perception of the American public against the overuse of chemical pesticides and in favor of the broadened environmentalist movement as a whole. This influence extended into the realm of public policy, as President Kennedy utilized Carson's publication to create a special pesticide study panel of the Science Advisory Committee, which would establish a trend of increased federal involvement in issues of environmental protection. Overall, this project details Carson's primary themes in a chapter-by-chapter analysis and highlights the significance of these claims towards American public perceptions and American environmental policy in the mid-late twentieth century.

The Beauty Of Black Gospel Music

P-10

Brianna Dorsey*. Dr. Eric Brown, mentor, **Department of Music, Theatre & Dance, Caudill College of Arts, Humanities and Social Sciences**

At the beginning of this year, I was given the opportunity to work with the university researching black gospel music. Over the semester I have observed and studied music throughout different decades, composed by both men and women of all ages. The objective of this research was to study the genre and to grow as a performer and composer of this music through research and analysis. As I worked throughout the semester, I discovered that there are many different sounds of black gospel with all kinds of traditions and cultures that are embedded into the text and harmonies. My musicianship has also grown, as I have been challenged to use my ear training and music theory knowledge to transcribe the music so that I could examine the harmonic progressions used. Overall, this has taught me a lot about Black Gospel, its history and contributions to American Culture.

Helping Band Students Succeed: Autism And The Music Classroom

P-11 *Nicholas Robbins*. Dr. Michele Paise, mentor,* **Department of Music, Theatre & Dance, Caudill College of Arts, Humanities and Social Sciences**

The purpose of this study was to examine literature about how students with autism learn and to compare best practice suggestions with current instrumental, music instructional procedures.

After exploring the research on autism and observing multiple band classrooms, the author made several recommendations for beginning band teachers to construct a better learning environment for all students.

12 Etudes For Aspiring College Musicians For The Development Of Aural Skills And Music Theory

P-12 *Alaina Cantrell*. Dr. Julie Baker, mentor,* **Department of Music, Theatre & Dance, Caudill College of Arts, Humanities and Social Sciences**

This project explores how to close the gap in music theory and aural skills for incoming flute music students. This etude book is designed to help flute students who do not have a strong background in aural skills or music theory, but still want to major in music. It would serve as an avenue for students to address shortcomings and prepare more fully for the rigorous music theory and aural skills courses encountered in the beginning of their degree. These courses often blindside incoming freshmen and this book would allow them to be prepared and set them up to be successful college musicians. This 12-etude book is designed to incorporate flute-specific etudes, music theory concepts, and aural skills concepts. Aural skills and music theory topics that will be addressed are: singing intervals, chord qualities, sevenths, inversions, and several other music theory and aural skills components.

The Correlation Between Past Trauma And Future Opioid Use Disorder

P-13 *Iesha Elam*. Dr. Monica Himes, mentor,* **Department of Sociology, Social Work & Criminology, Caudill College of Arts, Humanities and Social Sciences**

According to a recent national study, 57.8% of people have experienced at least 1 adverse childhood experience (ACE).Trauma can impact many aspects of an individual's life including emotional regulation, relationships with others, and even their sense of self. Research has shown a strong connection between traumatic childhood events and substance use. Furthermore, there are many studies, that show there is a direct correlation between traumatic childhood events and adult opioid use disorder. According to these studies, the number of childhood adverse experiences and the severity of the trauma associated with these events can increase one's propensity toward opiate use disorder. This was a descriptive study using survey methodology. Participants were recruited via social media and completed an anonymous online survey. Within this sample, (n=44), there was not a statistically significant relationship between the number of ACEs and the person's drug of choice. However, there were some interesting findings in the data that will be explored in the poster presentation.

Gender Inclusive Restrooms At Morehead State University

P-14 *Stephanie Perry*. Dr. Bernadette Barton, Dr. Constance Hardesty, mentors,* **Department of Sociology, Social Work & Criminology, Caudill College of Arts, Humanities and Social Sciences**

While attending Morehead State University, we observed a lack of accessible gender-neutral restrooms for transgender and nonbinary people on our campus. During the fall and spring semesters, we have engaged in the community work of getting gender-neutral signs for the designated single-use restrooms, sharing knowledge of the specific locations for gender-neutral restrooms, and creating the first multi-stall universal restroom on the main Morehead State campus. The campus currently has 26 gender-neutral restrooms scattered across university buildings that are only identifiable as "family" or by a total lack of signage. In order to begin the conversation surrounding inclusivity on our campus, we engaged with the community through open conversations and petitions with both faculty staff and students. Those conversations were met with curiosity and support for ensuring a safe and gender affirming environment for each individual who works or studies on the main campus. We worked toward creating a more inclusive environment that catered to all the needs of faculty staff and students, regardless of their gender identity. This presentation describes the rationale for gender inclusive restrooms, and the efforts we took to identify and increase them at Morehead State University.

Compassion Fatigue In Animal Shelter Workers

P-15 *Matthew Fitch*. Dr. Elizabeth Perkins, Dr. Suzanne Tallichet, mentors,* **Department of Sociology, Social Work & Criminology, Caudill College of Arts, Humanities and Social Sciences**

This research explores compassion fatigue among animal shelter workers across urban and rural counties throughout Kentucky. The data acquired from the survey was used to examine the similarities that indicate the "care and kill" phenomena and its effect on shelter worker resilience. Both internet and mailed questionnaires that included the Professional Quality of Life Scale (ProQol) were sent to management, supervisors, and any workers that would like to provide responses in all participating shelters. The surveys were anonymous and voluntary to protect individuals that elected not to take the survey, omit a question, or release themselves from the survey at any time. Throughout the survey, consistent themes were discovered during the coding of responses to certain questions. Some of these themes included, but were not limited to, disheartening feelings about euthanasia, failed or complete lack of healthy coping strategies, feelings of hopelessness, and lengthy rationalizations due to the passion that connects with the severity of compassion fatigue. Quantitative data analysis will also be conducted to study the prevalence of compassion fatigue in our Kentucky shelters.

Collateral Consequences Of College Admissions: Exploring The Attitudes And Experiences Of Students In Recovery

P-16   *Jason White*. Ms. Deirdra Robinson, mentor,* **Department of Sociology, Social Work & Criminology, Caudill College of Arts, Humanities and Social Sciences**

Universities and colleges promote diversity and inclusion while inconsistently denying students admission due to a criminal record. Over 70 million Americans have a criminal record, and over 600,000 leave prison with one ever year. Three out of five colleges and universities use background checks to screen out applicants with criminal records. A criminal record is used as the primal mechanism of poverty and inequality in America. This study aims to share the attitudes and experiences of college students that were denied admission into college due to an existing criminal record. Snowball sampling was used to recruit eleven former and current students who were interviewed and recorded. A thematic analysis was conducted to identify common experiences and recurring themes. The study's findings show that students getting denied admission reported feeling scared and unsure of their future. Participants reported a strong emotional reaction when receiving the denial letter, particularly around the word denial. The appeal process caused an intense emotional reaction leading participants to feel lost and hopeless. This study highlights the unneeded trauma and suffering that a criminal background check can potentially cause a student. The study also found that even after being accepted some students chose to attend a different college as a result of the humiliation caused by the appeal process. This research has been cleared by MSU IRB protocol number 24-01-58.

Are Women More Anxious Than Men? A Study Of The Relationship Between Gender And Anxiety

P-17   *Lacey Estep*. Dr. Monica Himes, mentor,* **Department of Sociology, Social Work & Criminology, Caudill College of Arts, Humanities and Social Sciences**

The high prevalence and increase of anxiety disorders among the adult population of the United States is a concerning trend. There are many possible factors that could contribute to anxiety's widespread presence, but the factor that this research study is focused on is gender. Previous research points out that women have higher levels of anxiety and are up to twice as likely to be diagnosed with an anxiety disorder than men. The reasoning behind the gender gap in anxiety is still unclear, though. This research study used survey methodology to further investigate gender and its role on anxiety. There were 155 participants within the study, and they were asked demographic questions as well as questions from the GAD-7 to measure their anxiety levels. A chi-square analysis was run on the gender and anxiety levels variables, and it was found that there is a statistically significant relationship between them ($x2 = 22.777a$, $p = .007$). More specifically, it was found that women have higher levels of anxiety than men, with 34.6% of female respondents having GAD-7 scores indicating severe anxiety compared to only 8.9% of male respondents. These findings suggest that there is a large gender discrepancy in anxiety levels that must be researched further to help find out the root causes of this gender gap.

30 Miles: The Difference In Maternal Health For Women

P-18 *Madison Beam*. Dr. Lisa Shannon, mentor,* **Department of Sociology, Social Work & Criminology, Caudill College of Arts, Humanities and Social Sciences**

The disparity in maternal health between rural and urban women has been recognized. This study aimed to understand the relationship between the distance women drive to the hospital and their maternal health, which is an understudied factor in the literature. This is a quantitative study that reached 52 women, using Shout Surveys. The survey consisted of questions asking women's distance to the hospital in miles during pregnancy, as well as various common maternal health issues such as weight during giving birth, hypertension or high blood pressure, high cholesterol, miscarriage, diabetes, blood clots, dental issues, and post-partum depression. Of the respondents, 92.5% of them reported having at least 1 maternal symptom. There was no relationship between distance and compiled symptoms ($X2 = 2.839$, $p=.430$) and distance someone lived from the hospital was not associated with their frequency of compiled symptoms ($r=-.069$, $p=.635$). There was a relationship between the symptom of weight during pregnancy and distance ($r=.312$, $p<.029$). Although in this study distance cannot be defined as a factor in maternal health, helpful information was still highlighted. There was a relationship between weight of participants during birth and their distance between hospitals and majority of women (92.5%) who took the survey did suffer from at least one maternal health issue. Continuing research to understand how social aspects, distance, and food deserts are affecting these maternal health issues and weight are important as the population of pregnant women and rural families are vulnerable populations who dire needs.

Potential Of Topical Applications In Managing Navicular Disease: A Review And Exploration

P-19 *Elena Verdecchia*. Dr. Smita Joshi, mentor,* **Department of Agricultural Sciences, College of Science**

Navicular disease is a condition affecting adult horses, causing inflammation and damage to the navicular bone. This can lead to lameness, impacting the horse's well-being and performance. There is significant interest in the equine industry to develop improved treatment options due to the prevalence of the disease, particularly in specific breeds like thoroughbreds. Currently, Tildren (intravenous) and Osphos (intramuscular) are bisphosphonate medications used for navicular disease. While these medications offer benefits, they may have negative long-term effects. This research project focuses on the potential drawbacks of current treatments and explores the concept of topical ointments as a possible new approach for managing navicular disease. Our literature review suggests that topical treatments could be a valuable avenue for future research. The goal of this research is to contribute to the development of topical treatments by identifying the need, potential challenges, and methods for evaluating their effectiveness (e.g., lameness scoring, X-ray analysis). Given the ongoing advancements in veterinary medicine, we believe this review can contribute to the exploration of new treatment options for navicular disease in horses.

Interrelationships Of Maternal Characteristics In Hair Sheep

P-20 *Rebekah Mills*, Madeline Walsh*, Audrey Burton, Jacob Lebrun. Dr. Flint Harrelson, Dr. Patricia Harrelson, mentors,* **Department of Agricultural Sciences, College of Science**

Since the spring of 2022, the MSU sheep flock has been an Innovation Flock for the Sheep GEMS project, managed by the University of Nebraska-Lincoln. The GEMS project is a multi-breed, national project evaluating longevity of ewes within flocks. Our part as a participant in the project involves collecting and sending raw data which is compiled into 1 very large data set. The research discussed here uses our preliminary data from the 2022, 2023, and 2024 lambing seasons collected from our Katahdin ewes (n =46; 1-5 years of age). Collected data included fecal egg count (FEC), body condition scoring (BCS), FAMACHA scores, teat and udder scores. Data were analyzed using the CORR procedure in SAS with a significance level set at $P < 0.05$. Udder depth provided the most correlations, including a negative relationship ($r = -0.21$) with ewe age and a negative relationship ($r = -0.21$) with FAMACHA. There was also a negative correlation ($r = -0.21$) between udder depth and BCS. Furthermore, ewe age was negatively related ($r = -0.28$) to FEC. Unsurprisingly, there was a positive relationship ($r = 0.22$) between udder and teat scores. Also, the BCS was positively correlated ($r = 0.21$) with mastitis incidence. The results of this project underline the importance of multiple traits which could contribute to ewes leaving the flock early.
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Impact Of Year And Animal Origin On Key Factors Of Ewe Longevity

P-21 *Audrey Burton*, Jacob Lebrun*, Rebekah Mills, Madeline Walsh. Dr. Flint Harrelson, Dr. Patricia Harrelson, mentors,* **Department of Agricultural Sciences, College of Science**

The MSU sheep flock is an Innovation Flock in the Sheep GEMS project through the University of Nebraska-Lincoln. The Sheep GEMS project is a national, multi-breed project that is focused on evaluating different sheep breeds and their longevity in different climates. As a participant, we collect/send raw data that is compiled. Our preliminary data from the 2022 (Year 1), 2023 (Year 2), and 2024 (Year 3) lambing seasons have been included. We collected measurements from Katahdin ewes (n = 46; 1-5 years old). We measured fecal egg counts (FEC), FAMACHA scores, body condition scores (BCS), teat and udder scores. Using the MIXED procedures of SAS, we evaluated these measurements for differences between year and origin. As the ewe flock was established in the summer of 2021, our ewes were sourced from 5 outside flocks. No interactions were observed, therefore only main effects will be presented. An effect of both year ($P < 0.01$) and origin ($P < 0.01$) was observed in FEC. A year effect was also observed on FAMACHA scores ($P = 0.01$). For BCS, both year ($P < 0.01$) and origin ($P = 0.02$) caused differences, with year 3 being the lowest. Teat placement scores were not impacted by year or origin ($P > 0.21$) whereas udder depth was only impacted by ewe origin ($P = 0.02$). Effects of year were widely seen and speak to the impact of year-to-year changes in environment.
IACUC #22-11-02

Economics Of Artificial Insemination In Cattle

P-22

Shelby French*, Marisa Brown*. Dr. Vijay Subramaniam, mentor, **Department of Agricultural Sciences, College of Science**

Artificial insemination (AI) is the collection of semen from a male animal and breeding a female animal with the collected semen. AI has a long renowned history, dating back all the way to 1780, and continues to evolve every day. The major objectives of this study are to (1) identify the pros and cons of utilizing artificial insemination in cattle, and (2) compare the economic costs of AI and natural mating. Some of the downfalls of this technology are the cost, ineffective samples, and sanitary risks. However, artificial insemination allows farmers to inseminate their cattle efficiently, farmers can integrate DNA variation and desired genetics in livestock, and acts as a safe way to impregnate cattle by not having the risk of a live bull being used. It can be observed within multiple studies that when looking at smaller herds it can actually be more cost efficient to utilize artificial insemination over natural service. However, there can be economic disadvantages such as the upfront cost of supplies – semen tank and gun – and the cost of training or personnel. This poster compares AI to natural mating in terms of conception rate, per calf value, increased revenue as a result of higher pay weight. This study suggests that there are more advantages than disadvantages for using AI if it is utilized correctly.

Economic Analysis Of Hay And Corn Production At Morehead State University's Derrickson Agricultural Complex

P-23

Luke Millay*, Caroline Adkins*. Dr. Vijay Subramaniam, mentor, **Department of Agricultural Sciences, College of Science**

Morehead State University's Derrickson Agricultural Complex (DAC) produces several agricultural enterprises and provides valuable hands-on experiences for students. The major goal of DAC is to prepare students for future careers in agriculture by enhancing classroom learning and introducing new and efficient farming technologies. Hay and corn are the two most dominant crop enterprises which cover 58 percent of total areas. In addition, the DAC produces hay from 6 different farms using the crop-share leasing method. The primary objective of this study is to analyze the profitability of hay and corn production at the DAC and leased farms. Two years of data were collected and the profitability of hay and corn for each farm was calculated separately, using several farm-specific enterprise budgets. This poster will illustrate the yields, profits, and strengths and weaknesses of each farm. The research will contribute to a deeper understanding of the economic sustainability and viability of hay and corn production at the DAC, thereby informing better decision-making and optimization of agricultural enterprises on the farm.

Drone Technology On The Farm: Derrickson Agricultural Complex, Morehead State University (Msu)

P-24

Austin Canaday*. Dr. Amy Collick, mentor, **Department of Agricultural Sciences, College of Science**

Agriculture is constantly evolving to improve the efficiency and productivity of cropped fields. Unmanned aerial vehicles (UAVs) have emerged as a leading technological innovation. Emerging in the 1960s, drones have evolved with high-tech applications (automation, GPS-tracking, and multi-spectral cameras) and are used to map crop fields, spray amendments, and scout crops. Drones can now scan and survey fields autonomously, saving the farmers an impressive amount of time and effort (Villanueva, 2023). Multispectral cameras and other remote sensors aid in developing crop field and pasture health maps, elevation imagery, and aerial footage of farm activities. At the Derrickson Agricultural Complex at MSU, we have expanded our capabilities in drone technology. Since 2023, we have expanded Agricultural Sciences students' capabilities with drones by developing flight procedure documentation, testing piloting skills, and conducting crop field evaluations. It began with developing flight setup and take-off procedures, then progressed to flying the drone to scout for damaged or diseased crops. The final step involves downloading GPS data from the drone's internal storage for individual flights and uploading it to mapping software to be able to tie photos and clips from the video to exact positions on the drone's flight path. This allows the data and images to be easily shared and viewed by the farm manager who can evaluate the data to make any adjustments to field management and to review the health status of growing crops. Continued expansion of drone usage and application will continue into future semesters at MSU.

Safety Of Nebulization Of Allogenic Alpha 2 Macroglobulin In Horses

P-25

Annabel Phipps*. Dr. Pedro DePedro, mentor, **Department of Agricultural Sciences, College of Science**

Horses with recurrent airway obstruction (RAO) exhibit airway inflammation and increased respiratory efforts at rest. The clinical signs of RAO can be reversed through administration of corticosteroids, bronchodilators, or changing the environment. This study was conducted to test the safety and effectiveness of nebulized alpha-2 macroglobulin (α2M) in treating airway obstruction and inflammation. The α2M molecule has been shown to be an anti-inflammatory agent in horse's joints and soft tissue using the Alpha2EQ treatment by Astaria. In this study, six horses received nebulizer treatments seven times each, being assessed prior to each treatment and one hour after each treatment. These assessments included rectal temperature, heart rate, respiratory rate, presence or absence of coughing, and results of auscultation of the lungs. Other assessments could be made at the discretion of the principal investigator. The α2M came from one of two donor horses who fit certain inclusion criteria. The first six treatments happened 48 hours apart and the last treatment occurred 20 days after the sixth. Blood was drawn periodically to check the horse's complete blood count (CBC), serum chemistry, and fibrinogen. The horses received no additional treatments during the course of the study.

Triplett Creek Watershed: Comparison Between 2009 And 2023 Escherichia Coli And Coliform Bacteria Levels

P-26

Emily Morgan*, Heavenly Mays*. Dr. Geoffrey Gearner, mentor, Department of Biology and Chemistry, College of Science

Since 2009-2010, the Triplett Creek Watershed has continually produced samples that are inadequate for their designated uses according to the Kentucky Division of Water. The purpose of this study was to assess and compare the density of various bacteria in 14 different sample sites, specifically Escherichia coli, using both 2009 and 2023 data. This study occurred over 5 months with 6 different sampling events that took place from August to October 2023. By using and following the proper protocol for the IDEXX Quanti-Tray 2000, we were able to identify the total coliform and total E. coli (CFU/100 mL – MPN) present in each sample site. According to the standards set by KDOW, sites throughout the watershed that exceed 130 E. coli CFU/100 mL (a geometric mean of five samples collected within 30 days) and/or 240 E. coli CFU/100 mL (in 20% or more of all single sample counts) are unsafe for primary contact recreation. In the fall of 2009, sites exceeding 130 E. coli CFU/100 mL were BB-0.23 (130.2), CC-0.37 (176.1), DC-0.27 (136.3), and TC-0.74 (180.2). In the fall of 2023, sites exceeding 130 E. coli CFU/100 mL were TC-0.74 (136.1) and TC-14.99 (135.2). This data indicates that there has been a significant improvement of impairment in the Triplett Creek Watershed. This study is supported in part by the MSU Undergraduate Research Fellowship program.

Reproductive Cycle Of The Highland Shiner (Notropis Micropteryx) In The Rockcastle River, Kentucky

P-27

Zoe Baker*, Caitlyn Senters. Dr. David Eisenhour, mentor, Department of Biology and Chemistry, College of Science

The Highland Shiner, Notropis micropteryx, is a minnow species common in the Green, Cumberland, and Tennessee river drainages. Despite the Highland Shiner's prevalence in this area, little published information exists describing the life history of this minnow species. In this study we determine the reproductive cycle of the Highland Shiner as part of a larger work documenting its life history. Specimens were collected from May 2022 – May 2023 and taken into the lab where gonad examination and gonadosomatic indices (GSI) were utilized to determine reproductive timing. Data suggests the breeding season for the Highland Shiner begins in April and ends in early June. At age 1 (11-12 months) large (>45 mm SL) individuals reach sexual maturity; by age 2 (23-24 months) all individuals are mature. Females grow faster than males . The reproductive cycle of the Highland Shiner is similar to that of its close relative, N. rubellus, the Rosyface Shiner, and other Notropis minnows. Knowledge of reproductive timing can help conservation managers identify seasons of increased vulnerability to disturbances (i.e., during spawning), and explain patterns of population fluctuation. Live animal activities approved under IACUC 21-12-09R1.

Predicting The Reactions Of Cs2, Ocs, And Co2 With Group Iv And Group Vi Transition Metal Oxides

P-28

Marissa Blair*. Dr. Zachary Lee, Dr. David Dixon, mentors, **Department of Biology and Chemistry, College of Science**

Building on a recent serious of high level electronic structure studies of Lewis acid gas reactions with metal oxide sorbents, DFT (B3LYP and ωB97X-D) and CCSD(T) methods are being used to predict the Lewis acid-base addition (physisorption) and formation of metal oxide carbonate/thiocarbonate formation (chemisorption) reactions of CS_2, OCS, and CO_2 of CS_2, OCS, and CO_2 with Group IV $(MO_2)_n$ and Group VI $(MO_3)_n$ (n = 1 - 3) nanoclusters. For the Group IV oxides, chemisorption to form terminal carbonates and thiocarbonates is predicted to be the most favored, with thiocarbonate ligand binding energies slightly more exothermic than their carbonate analogues, consistent with the small differences in the CS_2 C=S (105 kcal/mol) and CO_2 C=O (127 kcal/mol) bond energies. For Group VI, only weak physisorption (< 10 kcal/mol exothermic) is predicted to occur for CO_2, CS_2, and OCS. These results are consistent with our previous studies of CO_2, NO_2, SO_2, and H_2O adsorption to Group IV and Group VI metal oxide clusters. The results of this work could have implications for the sequestration of CS_2 from high-sulfur areas of arctic permafrost and also provides mechanistic insights into the possible reactions and products of OCS- and CS_2-induced TiO_2 degradation during the Claus Process.

Predicting The Mechanisms Of Ocs Capture By Nh3 And Water – An Exemplar Benchmark Study

P-29

Brayden Clevenger*. Dr. Zachary Lee, Dr. David Dixon, mentors, **Department of Biology and Chemistry, College of Science**

Carbonyl Sulfide (OCS) is a toxic gas produced during the refinement of oil, use of diesel engines, and as a byproduct of natural gas. Excess exposure can cause severe skin burns as well as breathing difficulties. Two approaches are available to remove this toxic chemical from the air: (1) to isolate the gas after it has been produced and released into the atmosphere or (2) to remove the gas as it is being produced during combustion. Potential energy surfaces (PES) for a series of OCS capture reactions by NH_3 in the presence of H_2O were calculated at the MP2/a(D+d) level in the gas phase. G3(MP2) calculations are in progress. The polar nature of OCS leads to two possible proton transfer scenarios: (1) to the oxygen atom and (2) to the sulfur atom. The results have significant implications regarding the thermodynamic nature of the mechanisms by which OCS can be efficiently and practically captured. Future research will focus on capturing OCS by additional amines and water in both gaseous and aqueous phases.

Monitoring The Neurophysiological Responses Of Earthworms

P-30

Brycen Allen*, Ragan Adkins*. Dr. Michael Fultz, mentor, **Department of Biology and Chemistry, College of Science**

Invertebrates, specifically lumbricina, can serve as a model system for science education when studying neuron viability and the impact of various drugs on conduction velocity within the nervous system. Earthworms prove to be ideal candidates due to their easily stimulated and measurable large axon bundles. Earthworms are also inexpensive, noncontroversial, and easily sedated, making them suitable for STEM learning. Each earthworm underwent a standardized anesthetization procedure with an ethanol and water mixture before being placed on a nerve bath. They were then stimulated by an electrode to gather a control action potential. By measuring the speed at which action potentials propagate along the three giant neurons of the earthworm nerve chord, we were able to monitor the neurophysiological response of earthworms to different drugs. This data was then used to understand the effects of said drugs on invertebrates and applied to our existing knowledge of drug interactions within the human central nervous system. We visualized the effects of specific drugs, including ethyl alcohol, nicotine, and epinephrine. Because of the simplicity of invertebrate nervous systems, these lab experiments can be easily replicable in various levels of STEM education.

Life History Of A Minnow: Reproductive Season Of The Popeye Shiner (Notropis Ariommus) In The Rockcastle River, Kentucky.

P-31

Jared Vise*, Shelbie Black. Dr. David Eisenhour, mentor, **Department of Biology and Chemistry, College of Science**

The Popeye Shiner (Notropis ariommus) is a jeopardized minnow species with a spotty distribution, in the Ohio River basin, where it occupies clear, rocky, undisturbed streams. The Popeye Shiner has declined or been extirpated in several states. This study's main objective is to determine the breeding season of this fish using specimens captured from May 2022 to July 2023. Individuals of this species have the highest ratio of gonad mass to somatic body weight in collections made in mid-to-late spring, with a gradual decline in size as they approach mid-summer. Because fishes increase the size of their gonads as they approach their spawning period, it can be concluded N. ariommus will be reproducing prior to the months of June or July. This spawning period is similar to that of most Notropis speces. Live animal activities approved under IACUC 21-12-09R1.

Life History Of A Minnow: Growth Of The Popeye Shiner (Notropis Ariommus) In The Rockcastle River, Kentucky.

P-32

Shelbie Black*, Jared Vise. Dr. David Eisenhour, mentor, **Department of Biology and Chemistry, College of Science**

The Popeye Shiner (Notropis ariommus) is a jeopardized minnow species with a spotty distribution, mostly in clear, undisturbed streams of the Ohio River basin. The Popeye Shiner has declined or been extirpated in several states. The objectives of this study are to determine the age and growth of the Popeye Shiner in the Rockcastle River, Kentucky. Scale annuli and length frequency analysis were used to age specimens captured in monthly sampling from May 2022-October 2023. Popeye Shiners averaged 52 mm SL at one year, grow about 10 mm SL in their second year, and live to at least 36 months. Despite its large size, the Popeye Shiner is a short-lived species, maturing at Age 1 or 2, similar to other Notropis minnows. Live animal activities approved under IACUC 21-12-09R1.

Ivermectin Toxicity In Border Collies

P-33

Rachel Bell*. Dr. Smita Joshi, mentor, **Department of Biology and Chemistry, College of Science**

This review explores the ivermectin sensitivity in Border Collies, a genetic predisposition that limits their use of some heartworm preventives. Ivermectin, commonly used for parasite control in dogs and cats, can be lethal for Collies with a mutation in the MDR1 gene (specifically ABCB1-1delta). While ivermectin offers broad-spectrum parasite protection, safer alternatives like Interceptor are necessary for Collies.

The mechanism behind this sensitivity is linked to the MDR1 gene mutation, which affects how drugs are processed by the body. Past studies involving blood samples and gene expression analysis in Collies with varying MDR1 genotypes revealed loperamide, a common ingredient in some heartworm medications, as a potential trigger. Loperamide appears to induce changes in gene expression pathways associated with cell death, survival, and development, potentially leading to toxicity in Collies with the MDR1 mutation.

This review highlights the importance of genetic screening for MDR1 mutations before administering certain medications to Border Collies. It emphasizes the need for alternative parasite control options specifically tailored for dogs with this genetic predisposition.

Development Of A DNA Barcoding Protocol To Identify Previously Unknown Populations Of Forelius, A Difficult To Identify Ant Genus, In Kentucky.

P-34

Josiah Kilburn*, Danika Da Fieno*, Jonah Gibson*, Jack McFarland*. Dr. David Peyton, mentor, **Department of Biology and Chemistry, College of Science**

Forelius is a genus of minuscule, heat-loving ants found in sandy areas in the Americas. Members of this genus have not been reported in Kentucky, but several putative specimens were collected from various locations in Rowan County in 2023. As part of the Kentucky Ant Project's initiative to report all species of ants occurring in the state of Kentucky, we have begun to develop a protocol to identify ant taxa at the species level using a combination of morphological observations and DNA barcodes from the cytochrome-c oxidase I (COI) gene.

Comparison Of Nicotine Quantification In E Liquids Using Volume Based Sample Preparation Versus Mass Based Sample Preparation.

P-35

Serenity Baughman*, Alyssa Roark*. Dr. Emmalou Schmittzehe-Skarbek, mentor, **Department of Biology and Chemistry, College of Science**

Questions are surrounding the accuracy of the reported levels of nicotine contained in e-liquids. Many of the studies show significant inconsistencies in the amount of nicotine reported on e-liquid products and the amount detected in the e-liquids. The current methods rely on preparing e-liquids for analysis by performing dilutions based on volume. , but due to the viscosity of the liquids, this preparation technique is prone to method errors. This project aims to compare the nicotine content in samples prepared by volume to those prepared by mass. This was done by first measuring the densities of several e-liquids. Those densities were used to convert the volume-based preparation into a mass-based preparation. Nicotine content in samples prepared by mass and volume was then measured by high-performance liquid chromatography (HPLC).

Comparison Of Efficacy Of Antibody Drug Conjugates In Cancer Treatment

P-36

Rebecca Bailey*. Dr. Smita Joshi, mentor, **Department of Biology and Chemistry, College of Science**

This study explores the potential of antibody-drug conjugates (ADCs) for targeted cancer therapy. ADCs combine monoclonal antibodies, which recognize specific antigens on cancer cells, with cytotoxic drugs. This targeted approach aims to deliver cell-killing drugs directly to cancer cells, minimizing side effects associated with traditional chemotherapy. A literature review will be conducted to examine existing data on ADC design, efficacy in cell lines and animal models, and potential limitations. The review will focus on understanding the factors influencing ADC stability and targeting specificity. This research will contribute to a broader understanding of ADCs and their potential role in cancer treatment.

Characterizing Interaction Domains Between Ddr R And KZA74 19365

P-37

Ethan Newsom*. Dr. Janelle Hare, Dr. Deborah Cook, mentors, **Department of Biology and Chemistry, College of Science**

Introduction:

Acinetobacter baumannii's response to DNA damage provides this antibiotic-resistant, opportunistic pathogen with increased mutagenesis opportunities. Instead of a LexA repressor, coregulators UmuDAb and DdrR repress its mutagenic polymerases. UmuDAb and LexA each bind DNA to repress these polymerases, while DdrR, a protein unique to Acinetobacter, binds UmuDAb to provide additional repression. Identifying other proteins that DdrR interacts with could provide new drug targets for this pathogen the CDC calls "an urgent public threat." We previously screened a bacterial (BATCH) two-hybrid library system and found that our DdrR bait interacted with a library insert encoding just 17 residues of KZA74_19365, whose function is unknown.

Objective:

We will verify this finding by constructing a new plasmid encoding the entire KZA74_19365 for two-hybrid assay analyses. We also aim to identify specifically where in the 184 residue KZA74_19365 protein DdrR interacts by creating additional plasmids encoding different forms of truncated KZA74_19365 proteins.

Methods and Results:

An I-TASSER model predicted that the 17-amino acid positive library insert corresponds to a long helix region of KZA74_19365. Protein sequence alignments show KZA74_19365 lacks components needed for self-cleavage. We designed primers to clone the full-length protein into the pUT18c plasmid.

Discussion:

From the I-TASSER results we predict DdrR will interact with the long helical-region of KZA74_19365. KZA74_19365's lack of self-cleavage motifs suggests a different mechanism of action than UmuDAb. If interaction between KZA74_19365 and DdrR is confirmed, further testing will be conducted to determine its role in the pathogen.

Grant Support:

Can Dogs Sniff Out Covid 19? A Review Of Canine Scent Detection

P-38 *Savannah Reed*. Dr. Smita Joshi, mentor,* **Department of Biology and Chemistry, College of Science**

The purpose of this research is to explore if scent-trained canines are an effective way to screen for SARS-CoV-2, specifically, in high traffic areas. This method is being explored due to the canine's remarkable olfactory capabilities to identify individuals infected with SARS-CoV-2. This project provides a comprehensive review of past and ongoing research on canine scent detection for COVID-19 screening. The review synthesizes data from existing studies to assess the viability and reliability of this approach. Two research studies will be examined. The first study utilized six detection canines and 177 individuals (95 symptomatic COVID-19 positive and 82 asymptomatic COVID-19 negative individuals). This study utilized sweat samples from participants' armpits. The success rate for detection ranged from 76%-100%, varying by canine (Grandjean et al., 2020). In the second study, eight detection canines were trained for a week using saliva and/or tracheobronchial secretions of SARS-CoV-2 infected patients. Among the eight canines, there was a 94% (±3.4%) success rate for identifying/rejecting participants (Jendrny et al., 2021). Using this information, canines would most likely be an effective way to screen for COVID-19 if they were trained solely for COVID-19 detection for a more effective time-period.

Can Circular Chromosome Undergo Meiosis?

P-39 *Devan Herald*. Dr. Melissa Mefford, mentor,* **Department of Biology and Chemistry, College of Science**

Prokaryotic and eukaryotic chromosome structure differs. Generally, prokaryotes have a single circular chromosome, while eukaryotes have multiple linear chromosomes. It is widely hypothesized that linear eukaryotic chromosomes evolved and arose from circular prokaryotic chromosomes and were a prerequisite for sexual reproduction in eukaryotes. This switch to sexual reproduction and linear chromosomes allows for the advantageous shuffling of genetic information in offspring. Our goal is to experimentally test this hypothesis by using genetically engineered circularized chromosome strains in the budding yeast Saccharomyces cerevisiae. S. cerevisiae is a single-celled eukaryote with 16 linear chromosomes, which can divide asexually as either haploid or diploid cells. Furthermore, diploid cells can undergo meiosis to produce 4 haploid progeny called spores. We have mated haploid cells with circularized chromosomes to wildtype haploid cells, creating diploid cells that are heterozygous for a single chromosome architecture. These diploid cells, containing a single circular/linear chromosome pair, were then starved to trigger meiosis, also called sporulation in yeast, which results in four haploid cells, known as tetrads. Using a specialized microscope apparatus, we dissected tetrads and assayed the viability of the progeny spores. Our preliminary results demonstrate reduced spore viability, consistent with the hypothesis that circular chromosomes are incompatible with sexual reproduction. Together our research will help to understand the origins of linear chromosomes and how overall architecture affects chromosome segregation during sexual reproduction.

Biogeographic Distribution Patterns Of Lichens In Carter Caves State Resort Park, Carter County, Kentucky

P-40

Darion Ball*. Dr. Allen Risk, mentor, **Department of Biology and Chemistry, College of Science**

Lichens are composite organisms resulting from a symbiotic relationship between fungi and algae. Biogeography is the study of the geographical distribution of living things and how their evolution has been affected by their patterns in the landscape. The study of the distribution of life can play a critical role in targeting species for further research ranging from biodiversity, conservation, ecological changes, and identifying biogeographically significant species. The specimens in this study were collected in Carter Caves State Resort Park and Tygarts State Forest in Carter County, Kentucky. Biogeographic data was collected from the Consortium of Lichen Herbaria website. Fifty-three percent (93 species) of lichens exhibit the East-Temperate biogeographic distribution type, followed by 28% (50 species) Pan-Temperate, then 16% (28 species) Appalachian-Great Lakes, and finally 3% (5 species) Coastal Plain. This research allows the comparison of species based on growth form category, topographic, and historical data leading to the conclusion of evolutionary and historical mechanisms resulting in species distribution patterns. This research was supported by a Morehead State University Undergraduate Research Fellowship and a grant from the Department of Biology and Chemistry Faculty Endowment Fund.

Age And Growth Of The Highland Shiner (Notropis Micropteryx) In The Rockcastle River, Kentucky

P-41

Caitlyn Senters*, Zoe Baker. Dr. David Eisenhour, mentor, **Department of Biology and Chemistry, College of Science**

The Highland Shiner (Notropis micropteryx) is a minnow species common to the Cumberland, Tennessee, and upper Green River drainages typically inhabiting rocky riffles of streams. Along with other shiners, their population represents an important metric for gauging ecological disturbance, but little research has been done to document its life history. The objective of this study is to determine the age and growth of Highland Shiners from monthly samples from May 2022 to November 2023 from Rockcastle River in Rockcastle, Kentucky. We assessed ages of fish using length frequency analysis, corroborated with examination of scale annuli. Our results suggest N. micropteryx has a lifespan of about two years. Highland shiners reach an average standard length (SL) of 39.8 mm, 47.2 mm, and 54.2 mm at ages 0, 1, and 2 respectively. More information on their age and growth can help conservation managers identify seasons of most vulnerability to disturbances (i.e. during spawning) and explain patterns of population fluctuation. Live animal activities approved under IACUC 21-12-09-R1.

Withaferin A And Alzheimer's Disease: A Review

P-42

Donovan Justice*. Dr. Smita Joshi, mentor, **Department of Biology and Chemistry, College of Science**

This review explores the potential of Withaferin A, a compound derived from Ashwagandha, for treating Alzheimer's disease. Amyloid-beta (Aβ) protein accumulation disrupts brain function in Alzheimer's patients. Literature suggests Withaferin A may target Aβ, potentially improving cognitive function. Existing research focuses on Aβ's interaction with acetylcholinesterase, an enzyme that breaks down acetylcholine, a key neurotransmitter. Studies often employ methods like light emission tests to assess choline levels or measure blood cholinesterase activity. Additionally, researchers may inject Withaferin A into mice and analyze brain tissue for Aβ and synaptic protein levels. Comparing Withaferin A to existing medications like cholinesterase inhibitors and NMDA receptor antagonists helps assess its efficacy. Analyzing plasma and brain tissue markers for Aβ activity could elucidate the link between Aβ and Alzheimer's. Challenges include obtaining research animals and isolating specific Aβ proteins. This review highlights the need for further investigation into Withaferin A's potential to modulate Aβ pathways, paving the way for novel Alzheimer's therapies.

The Mystery Of Seresto Collars

P-43

Kathryne Argueta*. Dr. Smita Joshi, mentor, **Department of Biology and Chemistry, College of Science**

Elanco Animal Health's (EAH) Seresto collars are used to protect canines and felines from common Ixodids (ticks) and Siphonaptera (fleas). They work by slowly releasing the active ingredients onto the pet's skin throughout eight months. Recently, the Environmental Protection Agency (EPA) has revealed there have been a total of 100,000 incidents, 2,700 deaths in canines and felines, and 894 cases of harm to humans due to the use of Seresto collars. However, the link between these incidents and Seresto collars remains unclear. This literature review investigates the potential harm of Seresto collars. It compares the effects of major active ingredients, Flumethrin (a pyrethroid) and Imidacloprid (a neonicotinoid), to existing data on their potential toxicity in pets and humans. The study will analyze published research and surveys to assess if reported health effects (skin irritation, neurological problems, lethargy, seizures, death) are linked to Seresto collars or caused by counterfeit products.

Preliminary Terrestrial Palynological Re Investigation Of The Type Coon Creek Lagerstätte, Tennessee, USA

P-44 *Keira Patton*, Ethan Lung*, Asher Jack*. Dr. Jennifer O'Keefe, Dr. Erdoo Mongol, mentors,* **Department of Engineering Sciences, College of Science**

The type locality for the Campanian Coon Creek Formation, located in McNairy County, Tennessee, is a well-known lagerstätte, with exceptionally preserved marine invertebrate and vertebrate remains in shallow shelf sediments. At the time of deposition, the type locality was located in an embayment proximal to the eastern margin of the Appalachia province that experienced alternately cool- and warm-water conditions, likely due to currents from both the Western Interior Seaway and Tethys. While marine in their entirety, the sediments contain significant quantities of terrestrial palynomorphs, especially near the top of the section and thus provide a snapshot of adjacent upper Cretaceous terrestrial ecosystems which are not otherwise preserved in this region. A recently completed biostratigraphic study of rangefinder samples through the section suggested that the increase in terrestrial input up-section may be the result of increased fluvial input, as total marine microfossil abundances remain largely unchanged. The biostratigraphic study suggested that more detailed examination of the terrestrial palynomorphs preserved in the section was warranted. In July 2022, the team of co-authors collected 27 fresh samples from the type locality. In this study we present the preliminary results of new biostratigraphic and paleoecological investigations of terrestrial palynomorphs such as an abundance of dinoflagellates, pollens, and some fungi recovered from the site.

Predicting The Statistical Precision Of Jet Analyses At The Electron Ion Collider

P-45 *Ivan Hargesheimer*. Dr. James Adkins, mentor,* **Department of Engineering Sciences, College of Science**

The Electron Ion Collider (EIC) project is a particle collider that will be constructed at Brookhaven National Laboratory to study various nuclear phenomena. We have been working to create software to analyze jets, which are streams of particles that can result from high energy electron-proton collisions. Specifically, we have been developing software to process simulation data and create graphical representations of our analysis. Ultimately, our goal is to estimate the statistical precision that the EIC will provide when it is fully operational. In this presentation, we will present a status report of this work.

Meteorology Misconceptions Held By Students In An Earth Science College Course For Preservice K 5 Teachers

P-46 *Ivy Litton*. Dr. Wilson Gonzalez-Espada, Dr. Md Golam Kibria, Dr. Jen O'Keefe, mentors,* **Department of Engineering Sciences, College of Science**

When planning to enter the field of education, future teachers must have a thorough understanding of the content they are preparing to teach. In meteorology, in particular, previous studies have shown that teachers often have misconceptions regarding weather patterns and terminology. With the implementation of weather-related elementary KY Science Standards (K-ESS2-1; K-ESS3-2, 3-ESS2-1; 3-ESS2-2; 3-ESS3-1, and 5-ESS2-1), future teachers must give their students a solid foundational understanding of weather conditions vital to their daily lives.

This study identified to what extent weather misconceptions persisted after 22 college students completed ESS 112, a course for future K-5 science educators, as measured by their performance on a recently created Survey of Meteorology Concepts (SMC), completed as a pre- and post-test. By examining participant data using psychometric statistics, survey data will also be used to validate the SMC.

The researchers found that the participants perceived the SMC as quite difficult (Diffpre = 0.29, Diffpost = 0.28, $t = 0.37$, $p = 0.716$), and only about 15% of them answered the items correctly and with high confidence. The survey revealed significant decreases in both Lucky Guesses (19% to 11%, $t = 4.69$, $p < 0.0001$) and Unlucky Guesses (57% to 40%, $t = 8.28$, $p < 0.0001$) and a significant but modest increase in Knowledge (10% to 17%, $t = 3.53$, $p = 0.001$). Surprisingly, responses with Misconceptions more than duplicated (14% to 32%, $t = 9.68$, $p < 0.0001$). The researchers will discuss the top misconceptions and recommendations to improve the SMC.

Miocene Fungal Spores From The Agbada Formation, Niger Delta: Preliminary Interpretations

P-47

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The Fungi in a Warmer World (FiaWW) project is identifying global fungal guild changes associated with climate-driven environmental changes and establishing fungi as paleoclimate proxies. Africa is the last continent to be examined, and unlike other studied regions, published studies of fungi across the MCO do not exist. This omission is due in part to the scarcity of sediments and rocks of the correct age, thus limiting our ability to extend reconstructions of fungal guilds on a global scale. Abundant and diverse fungal fossils occur in the middle Miocene Agbada Formation in in the Niger Delta, Nigeria. Originally noted in a doctoral thesis and several associated publications the 1990's, these occurrences were used in the establishment of palynological zonations and delineation of depositional environments in the middle Niger Delta. Fungi were especially common in near-shore settings indicative of lagoonal, salt marsh, and possibly mangrove systems. However, the signal they provided was not examined in detail at that time due to reliance on form-generic names, which precluded utilization of the fungal remains as proxies for paleoecology or paleoclimate studies. This re-study of legacy slides uses methods outlined by FiaWW to identify significant portions of the fungal assemblage to extant taxa. Many of these taxa are similar or identical to those found in near-shore and mangrove settings in the middle Miocene of Peru. Here, we present a preliminary overview of fungal spore groupings present in core samples taken from the Kolo Creek oilfield in the central Niger Delta, Nigeria.

Meteorology Misconceptions Held By Students In A General Education Earth Science College Course

P-48

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One goal of K-12 science education is to help future citizens become scientifically literate. They should be able to understand science concepts and how science creates evidence, assess its significance, and make informed decisions using this information. Since weather is a the natural event people are constantly exposed to, meteorology literacy is of critical importance. However, researchers have noted that the public has a limited understanding of it. To promote weather literacy, one crucial step is to assess the meteorology knowledge of college students completing general education earth science courses.

This study identified to what extent weather misconceptions persisted after 38 college students completed ESS 102 (Dangerous Planet), measured by their performance on the Survey of Meteorology Concepts (SMC), completed as a pre- and post-test. By examining participant data using psychometric statistics, survey data will be used to validate the SMC.

The researchers found that participants perceived the SMC as somewhat difficult (Diffpre = 0.31, Diffpost = 0.40, t = 6.06, p < 0.0001), and only about 20% of them answered the items correctly with high confidence. The survey revealed significant decreases in Lucky Guesses (18% to 15%, t = 2.37, p = 0.022) and Unlucky Guesses (54% to 41%, t = 8.27, p < 0.0001) and a modest increase in Knowledge (14% to 25%, t = 7.21, p < 0.0001). Surprisingly, responses with Misconceptions increased (14% to 19%, t = 4.03, p = 0.0002). The researchers will discuss the top misconceptions and recommendations to improve the SMC.

Measuring The Blazhko Effect In Rr Lyrae Variable Stars

P-49

Gianna Federico*. Dr. Jennifer Birriel, Dr. Ronald Wilhelm, mentors, **Department of Engineering Sciences, College of Science**

Pulsating variable stars are stars that physically grow and shrink, causing them to periodically change in brightness in the night sky. In most cases, this change occurs very regularly, however some stars exhibit the Blazhko Effect (BE), which causes a gradual increase and decrease in the magnitude and time between brightness peaks. In some stars, this gradual change can itself vary in period and amplitude, which is known as a modulated BE. The cause of the BE is unknown. This research project aims to identify stars with a modulated BE, which may provide clues into its cause. We used the Weighted Wavelet-Z (WWZ) analysis to detect changes in the frequency and amplitude of the brightnesses of stars observed by NASA's Transiting Exoplanet Survey Satellite (TESS). The WWZ analysis has been scarcely utilized in this specific area of variable star research, and this project shows its usefulness in identifying changes in frequency and amplitude for stars with limited data sets.

Martian Aerial Drone

P-50

Jaden Yates*, Jacobo Matallana*. Mr. Michael Combs, mentor, **Department of Engineering Sciences, College of Science**

The purpose of this project is to construct the design and development of a specialized drone created for Martian atmospheric data collection. This will be done by integrating advanced structural and electronic components to withstand the challenging environment on Mars. The structural part of the drone prioritizes lightweight yet durable materials. Through in-depth design and simulation, the structural integrity of the drone was optimized to ensure the most reliable performance. In tandem with structural considerations, the electrical part of the drone prioritizes sensor calibration to provide accurate and reliable data collection for scientific analysis as well as stabilization software for the drone itself while flying. Algorithms and code were meticulously developed to enable the drone to stay horizontal as well as allow the motors to operate in unison while collecting data through the sensors. It is able to function autonomously and has an SD card that would be retrieved manually for data collection once an astronaut lands on the planet. The capability it has to fly in the specified atmosphere was tested mathematically because we had no access to a testing chamber that could simulate Martian atmosphere.

Implementation Of A Flexible Simulated Manufacturing System

P-51

Olli Uusikartano*. Mr. Tyler Ward, Dr. Jorge Ortega-Moody, Dr. Kouroush Jenab, mentors, **Department of Engineering Sciences, College of Science**

This research project centers on the implementation of a flexible simulated manufacturing system. The basis of this system was an existing scaled-down assembly line designed to simulate a quality assurance process. The first stage of this research was the incorporation of two universal robots into this system, which were controlled via a programmable logic controller (PLC). From there, we developed a machine vision program to detect faults in custom 3D printed parts using an industrial Cognex camera. We then designed a novel human-machine interface (HMI) that displayed the quality assurance information from the camera. At the start of this project, the system was only capable of identifying faults in rectangular 3D-printed parts. Once the robot, machine vision, and HMI system were put in place, we designed and printed new cylindrical parts and updated the system to detect faults in these parts as well. A major component of this was the incorporation of barcode scanners capable of identifying the type of part that was traveling down the assembly line. We anticipate that our system will be used for education and training purposes.

How Dark Does The Sky Get During A Total Solar Eclipse?

P-52

Brayden Schwegman*. Dr. Jennifer Birriel, mentor, **Department of Engineering Sciences, College of Science**

During a total solar eclipse, the moon covers the entire disk of the sun. However, it does not cover the Sun's atmosphere, known as the solar corona. During the August 2017 total solar eclipse, several groups used specialized astronomical cameras and light detectors to measure the brightness of the sky during the course of the eclipse. These studies help us better understand the light scattering properties of our atmosphere as well as eclipse phenomenon. We took observations of the total solar eclipse on April 8, 2024 at two different locations along the line of totality. At each site, we used a set of four Sky Quality Meters, each fitted with a different color filter: clear, red, green, and blue. These filters allow us to observe the amount of light scattered as a function of wavelength. We compare our results to previous studies from the 2017 total solar eclipse.

Geoscience Archivism – Saving Morehead State's Collections One Rock At A Time

P-53

Miles Terry*, Shelby Turner*, Zachary Strait*, Hayden Elmore*. Dr. Jen O'Keefe, mentor, **Department of Engineering Sciences, College of Science**

Geoscience Collections at Morehead State University have not properly been organized or sorted since the Lappin Hall renovations in the mid-1990's. The collections were initiated by John C. Philley in 1960, James Chaplin 1961 and the collections card catalog developed by Jules DuBar when he arrived in 1967. Maintenance of the catalog appears to have ceased in 1981 when DuBar left the university. Specimens collected between 1981 and 1992 often have card-stock labels, but don't appear in the collection catalog. In recent decades, many of our cataloged samples have been lost and/or damaged because of improper storage. The majority of the in-place collection is not recorded in the catalog, thus, much of the collection goes unaccounted for. If specimens aren't properly cataloged, they're often missing information, such as locality or collection date, that reduces their usefulness. Since 2018, student archivists have been engaged in collection maintenance. This effort has progressed from general tidying to organization and cross-checking cataloged information with existing specimens. This permits damaged and decomposed specimens to be discarded, specimens with information to be accessioned into the catalog, some information-less but exceptional specimens to be cataloged and retained as teaching specimens, and the location of cataloged samples to be recorded. Cataloged samples are in the process of being assigned QR codes through SESAR and form the backbone of a system of loanable specimens of scientific value. Then, specimens are being packed for removal to a new science building, after which time the SESAR database will become publicly available.

Fungi In A Warmer World: Preliminary Findings On The Zhangpu Biota Of Southeastern China

P-54

Margaret Alden*. Dr. Erdoo Mongol, Dr. Jen O'Keefe, Dr. Limi Mao, mentors, **Department of Engineering Sciences, College of Science**

Fungi play a crucial ecological role in all terrestrial biomes, so it is critical to understand how they may respond to changing climates. One way to do this is by studying fossil fungal assemblages (fungas), using the nearest living relative method for paleoclimate and paleoecological interpretation. The Miocene Climate Optimum (~18-13 Ma) is analogous to the projected repercussions of anthropogenic global warming. The middle Miocene (~14.7 Ma) Zhangpu Biota from the Fotan Formation of Southeastern China records a series of transitions from subtropical evergreen to tropical evergreen forests to tropical rainforests followed by re-emergence of drought-tolerant subtropical forests. Here we present a preliminary record of fungas recovered from Fotan Formation sediments. These contain primarily ubiquitous subtropical to tropical forest-associated saprophytic fungi, with overall high taxonomic diversity. Of note, Arecophila sp., a saprotroph associated with palms and humid subtropical to tropical rainforest conditions is present in the middle part of the section. To date, our results are in agreement with pollen-indicated paleoclimate reconstructions.

Exploring Spatial Relationships Between Long Term Groundwater Monitoring And Climatic Data Of Kentucky

P-55   *June Lennex-Stone*, Christopher Marsh. Dr. Md Golam Kibria, mentor,* **Department of Engineering Sciences, College of Science**

Climate change introduces significant water resource supply and management dynamics uncertainties. The Intergovernmental Panel on Climate Change (IPCC) assesses that the global mean surface temperature has increased by 0.6 ± 0.2 °C since 1861, with a projected further increase of 2 to 4 °C within the next century. This rise in temperature has led to gradual increases in surface temperatures and notable variations in global precipitation patterns. The heightened variability in rainfall suggests a potential for more frequent and prolonged periods of high and low groundwater levels. To investigate these phenomena, water table data from over 1000 wells in Kentucky spanning 40 years (1980 to 2020) were collected. Historical climatic data, including precipitation and temperature records from 1950 to the present, were also analyzed. Linear regression analyses were conducted on groundwater levels for both wet and dry seasons. Spatial distribution visualization and statistical analyses were achieved using ArcGIS Pro software. The findings revealed a declining trend in groundwater levels influenced by aquifer characteristics and topography. This decline seems to be associated with changes in precipitation patterns, where increased rainfall during the wet season annually does not significantly contribute to groundwater recharge, while reduced rainfall in the dry season leads to declining groundwater levels. Moreover, distinct correlations between changing temperature and precipitation patterns were observed in certain areas. The research also highlighted the impact of climate change on groundwater flow velocity, providing valuable insights into the long-term effects of climate change on groundwater dynamics.

Enabling Smart Agriculture With Computer Vision

P-56   *Landon Fitch*. Mr. Tyler Ward, Dr. Kouroush Jenab, Dr. Jorge Ortega-Moody, mentors,* **Department of Engineering Sciences, College of Science**

This research project focuses on the development of a computer vision application to detect diseases in four of the most commonly exported crops in Kentucky: soybeans, corn, wheat, and tobacco. Using the state-of-the-art YOLOv8 object detection algorithm, we aim to create a robust and versatile tool for disease detection and classification. To facilitate this, we curated and annotated a comprehensive image dataset composed of various disease states and healthy samples for each crop. Our long-term objective is to adapt this application for deployment on drones, which can fly over farms, capture images, and enable rapid and widespread disease detection, offering farmers the opportunity to respond promptly to potential threats. This research presents an important contribution to precision agriculture and crop management, addressing the need for efficient disease detection methods in a rapidly evolving agricultural landscape. The integration of computer vision and drone technology has the potential to revolutionize crop monitoring, improve yield predictions, and enhance overall farm productivity, thereby ensuring food security and economic sustainability in Kentucky and beyond.

Development Of Remote Monitoring Software For CNC Machines

P-57   *Gunnar Gross*, Olli Uusikartano, Isaac Vanderpool. Mr. Tyler Ward, Dr. Jorge Ortega-Moody, Dr. Kouroush Jenab, mentors,* **Department of Engineering Sciences, College of Science**

CNC machines play an important role in the modern manufacturing sector, achieving high precision and repeatability in the manufacturing of parts. Given the importance of these machines in industry, the ability to monitor their performance is vital. It is an existing problem that the performance of these machines is typically performed manually by human operators. This can present an issue, as real-time performance monitoring requires a human operator to be present by the machine at all times. This is inefficient and costs an organization money. In this research project, we developed remote monitoring software for various types of CNC machines using a programmable logic controller (PLC), an Open Platform Communications (OPC) server, Ignition software, Ethernet, and the Python programming language. Our software is capable of displaying critical information from the machines, such as the machine coordinates, the revolutions per minute (RPM) of the spindle, the level of coolant in the machine, whether the door of the machine is open or closed, how long the machine has been powered on, and the total lifetime of the machine. The major benefit of our software is that it can be accessed anywhere on any type of device, be it a desktop computer or a mobile phone, facilitating valuable real-time analysis of the condition of the machine.

Detecting The Level Of Scrap Metal Discard From CNC Machines Using Capacitive Sensors

P-58   *Isaac Vanderpool*, Gunnar Gross, Olli Uusikartano. Mr. Tyler Ward, Dr. Kouroush Jenab, Dr. Jorge Ortega-Moody, mentors,* **Department of Engineering Sciences, College of Science**

Computer numerical control (CNC) machines are commonly employed in manufacturing to produce a product out of a solid material of a different shapes. Lathes and mills especially work frequently with different types of metal, and as such, there are large amounts of scrap metal that ends up being discarded by the machine. This discard is often collected in a bin below the CNC machine. In order to reduce the workload of human workers, the task of detecting the level of scrap metal that has been collected can be automated. This research project presents a framework to detect the level of scrap metal discard from CNC machines using capacitive sensors, which are a type of sensor capable of detecting solid or liquid targets without physical contact by using an electrical field emitted from the sensor. Targets are detected based on their interruption of the electric field. This project discusses the implementation of these sensors into several lathes and mills, as well as the design process of holders for these sensors.

Design And Development Of An Energy Efficient Heat Exchange System

P-59

Ethan Hernandez*. Mr. Tyler Ward, Dr. Jorge Ortega-Moody, Dr. Kouroush Jenab, mentors, **Department of Engineering Sciences, College of Science**

This project presents an innovative solution for harnessing the wasted heat generated by the exhaust air system of a residential dryer to efficiently heat the interior rooms of a home, reducing energy consumption, and minimizing the reliance on conventional HVAC systems. By redirecting the hot exhaust air from a dryer through a carefully designed heat exchange system, this technology enhances energy efficiency while providing a sustainable and cost-effective heating solution for homes. This system relies on the capture and utilization of the otherwise discarded thermal energy from the dryer. We designed a heat exchange system using an array of copper tubes that facilitates the transfer of heat from the exhaust air system to the surrounding environment. A fan is integrated into the system to expel the heated air into a room, effectively increasing the room's temperature. The integration of this system into the room's infrastructure is seamless and user-friendly. A notable feature of this system is the ability to operate passively during the dryer's cycle, requiring little user input. By harnessing the heat generated during drying, it significantly reduces the need for additional heating sources, particularly gas-based systems. To assess its effectiveness, we conducted experiments to measure the temperature delta between the ambient laundry room temperature before, during, and after the heat exchange process. The results demonstrated a noticeable increase in temperature, highlighting the system's efficiency in providing a comfortable and energy-efficient heating solution.

Utilizing 3 D Lithologic Modeling And The Drastic Method For Aquifer Characterization In Northeastern Kentucky

P-60

Chris Marsh*. Dr. Md. Golam Kibria, mentor, **Department of Engineering Sciences, College of Science**

This study aimed to comprehensively understand aquifer characteristics in four counties within Northeastern Kentucky. Remote sensing, spatial analysis, and three-dimensional (3-D) lithologic modeling techniques were used to evaluate groundwater potential in the specified region. The 3-D lithologic modeling techniques, commonly utilized for detailed characterization and modeling of shallow to intermediate aquifers, incorporated lithology data from approximately 250 wells to construct the model using ArcGIS software. The derived 3-D lithologic model unveiled a complex shallow to intermediate aquifer system featuring diverse lithologic categories such as clay, clay and sand, shale, sand, sand and gravel, gravel, sandstone, and limestone. This system exhibited a range of hydraulic conductivities, which varied spatially and influenced groundwater flow. The spatial heterogeneity of the aquifer system was distinct, with varying hydraulic conductivities in different directions. Hydraulic continuity was depicted through inter-fingering and the connection of sandy materials and fractures in limestone within the aquifer system. A groundwater vulnerability map was generated by integrating the 3-D model with GIS and DRASTIC models, considering seven hydrogeological factors. Generalized GIS-based hydrogeologic maps were extracted from diverse datasets, including satellite imagery, digital elevation models, soil data, lithological data, and rainfall data. Borehole data validated the results. The resulting groundwater potential map categorized areas into five ranks (Very Low, Low, Moderate, High, and Very High potential) based on availability. The study effectively compared and integrated the 3-D aquifer model and DRASTIC models, providing crucial insights for groundwater development and management.

Testing Of Multiple Floor Isolated Model Buildings Under Earthquake Conditions

P-61

Ryan Justice*, Hunter Cook*. Dr. Tathagata Ray, mentor, **Department of Engineering Sciences, College of Science**

In the face of earthquakes, occupants of various types of buildings are at risk of injury or even death, even with the current gold standard for earthquake protection in place. This current gold standard is referred to as base isolation– it serves to separate the superstructure of a building from its foundation using isolators. This allows for the building to rock back and forth independent of the foundation. This is capable of protecting the building from structural damage, but damage to non structural components of the building is still very common. This can lead to grave injuries or even death to occupants, especially to occupants of hospitals. In the event of an earthquake, equipment throughout a hospital is capable of rolling or sliding fast enough to break bones or cause brain damage. The goal of our research is to investigate a new method of preventing both structural and nonstructural damage to buildings. This method is referred to as floor isolation. In addition to placing the isolators only between the foundation and superstructure, they are instead placed between each of the lateral load bearing elements of the building. We are researching this method using a shaker and various model buildings, including one small scale model of our local hospital, St. Claire. In one round of our testing, accelerations were reduced by an average of 60% in the floor isolated building compared to the base isolated building.

Review Of Adverse Effects Of Sunscreens On Coral Health

P-62

Lillian Crumback*. Dr. Smita Joshi, mentor, **Department of Kinesiology, Health and Imaging Sciences, College of Science**

This study examines the potential negative effects of sunscreen on coral health, specifically the vital symbiotic algae zooxanthellae. Coral reefs play a critical role in marine ecosystems and regulate atmospheric CO_2. Studies suggest various sunscreen ingredients can harm zooxanthellae and trigger coral bleaching, even at low concentrations. Our analysis of prior research shows the susceptibility of quality of coral samples (anemones and mushroom corals) to sunscreen exposure. To estimate realistic sunscreen levels in seawater, volunteers applied sunscreen and submerged their hands in seawater for certain time periods. Resulting concentrations were then used to test coral susceptibility. The researchers used change in color of the algae as a readout of damage. The review highlights findings that any sunscreen exposure may induce coral mucus release, a stress response. Additionally, complete bleaching can occur within 96 hours, with faster rates at higher temperatures. These findings emphasize the need for further research on sunscreen components and their impact on coral health.

Implementing Play Therapy For School Age Children With Sensory Modulation Disorder

P-63

Karis Applegate*. Ms. Michaela Wilson, mentor, **Department of Kinesiology, Health and Imaging Sciences, College of Science**

Studies show that 5%-13% of children aged 4-6 years old suffer social and emotional consequences due to sensory processing issues (Passarello et al., 2022). Sensory processing is how our brain reads sensory input from outside stimuli in our environment. Altered cerebellar white matter in the brain leads to complex sensory behavior (Narayan et al., 2020). This alteration causes an individual to have a sensory processing disorder (SPD). This review will focus on school-age children who show signs of a specific sensory processing disorder. There are three subgroups of sensory processing disorders. The three subgroups include: sensory modulation disorder (SMD), sensory-based motor disorder (SBMD) and sensory discrimination disorder (SDD). Sensory modulation disorder affects the central nervous system and creates difficulty for children to control emotions and behaviors.
Play therapy and the implementation of Snoezelen® rooms are commonly used strategies that allow children to express themselves while aiding the regulation of sensory processes. To see progressive results, an intervention must be made to examine the intensity of the disorder. In this abstract, the focus will be on sensory over-responsivity in children and the advantages and disadvantages of implementing play therapy into their routine.

The Effects Of Beet Elite On Physical Endurance Measured Through Lactic Acid Levels

P-64

Tobias Cook*. Dr. Philip Krummrich, mentor, **Department of Kinesiology, Health and Imaging Sciences, College of Science**

The objective of this study is to see how the supplementation of BeetElite will affect a person's endurance through blood lactate, VO2, and blood oxygen saturation measurements. The subjects will do two lactate threshold treadmill tests. Participants will begin by running at 70% of their predicted 5k race pace. Studies have shown that this is the ideal pace to make sure subjects do not reach anaerobic threshold during the first increment. Every three minutes the subjects will stop running for 30 seconds while their fingertip is pricked and a lactate measuring device takes a sample. For the next increment, speed will be increased 7.5%. After six increments, or if exhaustion is reached sooner, the subject will be done with the test. In one of the tests, they will take BeetElite supplement and in the other they will take a 0-calorie water placebo. The test order for which participants drink each drink will be randomized. This is a double-blind study, where both participants and researchers do not know the test conditions. One researcher will keep track of what test and the other will take measurements. During the test, participants will wear a mask to measure VO2 levels and a pulse oximeter to measure oxygen saturation. The subjects will also be required to keep a food log the three days leading up to their trial and repeat it for the second trial. The test will be exactly one week apart.

A Brief Review Of A Regional Healthcare Clinical Practice Protocol: The ABCDEF Bundle

P-65

Joelle Craft*. Dr. Michelle McClave, mentor, **Department of Nursing, College of Science**

A brief review of a clinical practice protocol was performed with two purposes: to critically evaluate a clinical protocol in use to determine if it supports scholarly practice, and to address opportunities for change in practice to meet current guidelines. The Society of Critical Care Medicine originated the intensive care unit (ICU) Liberation Bundle. The bundle was part of the Clinical Practice Guidelines for the Prevention and Management of Pain, Agitation/Sedation, Delirium, Immobility, and Sleep Disruption (PADIS) in Adult Patients in the ICU. Its purpose is to reduce the occurrence of delirium and weakness in adults during their stay and includes awakening and breathing trials for mechanically ventilated adult patients. This bundle was then adopted by a regional healthcare facility and rolled into their ABDCEF Bundle.

The review began with an interview of the facility's Associate Chief Nursing Officer, who assisted in the creation of the ABCDEF bundle. The purpose of this interview was to gain insight related to the development of a clinical practice protocol within an organization. The evaluation process included a comparison of current evidence-based practice for currency and accuracy. The AGREE GRS rating scale was then used to determine the validity of the current protocol. Evaluation results indicated evidence met the needs of patients, but the protocol needed to be updated to meet current guidelines; these results were provided to the organization. The lesson gained from this review was that policies should be investigated for currency, accuracy, and validity before taking at face value.

Significance Of Bedside Reporting: A Quality Improvement Project

P-66

Briana Sharps*, Laci Johnson*, Abigail Schultz*, Audrey Newman*, Noah Hicks*, Danielle Schindler*, Katalina White*. Dr. Suzi White, mentor, **Department of Nursing, College of Science**

Bedside reporting is an integral component of nursing care. A recent study indicated that 58% of nurses surveyed agreed that bedside reporting improves patient safety and quality of care. While participating in a nursing clinical rotation at a large, urban teaching hospital, it was discovered that some nurses did not participate in bedside reporting. Upon completion of a thorough literature review on the topic of bedside reporting the following themes emerged: barriers, patient outcomes, safety, assessment, patient privacy, nurse satisfaction, time management, and teamwork.

Safe Nurse To Patient Ratios For Both Patient Outcomes And Nurse Mental Health: A Quality Improvement Project.

P-67

Chelsea Green*, Jodi Perkins*, Danielle Willis*, Brooklyn Lemaster*, Abigail Blackburn*, Kelsey Carrier*, Alexandra Stacy*, Madelynn McKittrick*. Dr. Suzie White, mentor, Department of Nursing, College of Science

Statement: Most certainly, nurse-to-patient ratios have a direct impact on nurse-sensitive patient outcomes (NSPOs). Across various healthcare settings, better staffing ratios result in safer patient environment, nurse workplace satisfaction, and improved economic results. The American Nurses Association (ANA) states 89% of nurses reported short-staffing at their facilities. During clinicals at a large urban teaching hospital it was observed that staff members were taking breaks simultaneously. A literature review was conducted on the topic of safe staffing and examined sixty-four different studies with the main topic of safe staffing and eight sub-themes. Sub-themes that were researched included patient outcomes, facility outcomes, nurse burnout, economic effects, break systems, ratios for specific patient populations, and supportive staff. Another theme that emerged from the literature review indicated that an increased number of patients per registered nurses (RN) is directly related to poorer patient outcomes. Furthermore, nurses reported worse mental health and higher rates of burnout with higher ratios. The literature reveals that additional support staff such as licensed practical nurses (LPNs) and certified nurse aids (CNAs) and adequate resources improve patient outcomes by decreasing RN workload.

Opioid Safe Handing And Administration

P-68

Tracy Caird*, Shayln West*, Brooklyn Phipps*, Keana Meriwether*, Caleb Williams*, Madison White*, Catherine Cox*. Dr. Suzi White, mentor, Department of Nursing, College of Science

Since 1999 drug overdoses have taken the lives of over 1 million people, with more than 75% in 2021 being a death related to an opioid overdose. The drug epidemic is an uprising problem across America affecting millions of lives daily. Out of the 23.5 million Americans needing substance abuse treatment, only 11% sought out help. While attending clinicals at a large, urban teaching hospital, several nurses were observed inappropriately handling opioids. A literature review was conducted, and the following subtopics related to opioids were identified: medication error, overdose warning signs, patient outcomes, education, safe handling, thorough assessment of patients, and addiction. A majority of nurses spend every shift administering more than 50 medications which accounts for 40% of their time on the unit.

Maintaining Sterile Field: A Quality Improvement Project

P-69   *Emma Moudy*, Sydney Grayson*, Macy Lewis*, MaKenna Rose*, Caleb Spears*. Dr. Suzi White, mentor,* **Department of Nursing, College of Science**

A sterile field is an area that is to remain uncontaminated. It is for the protection of patients and healthcare workers. Maintaining a sterile field can positively improve patient outcomes and decrease risk and number of infections. Most healthcare workers are trained to properly maintain sterile field. However, some healthcare workers' attitudes and mindsets toward sterile field can decrease their compliance with maintaining sterility. At the large, urban teaching hospital where we are clinical students, there is not a protocol pertaining to sterile fields on their website or in their orientation handbook. Maintaining a sterile field is crucial when it comes to patient outcomes and infection rates.

Does Nursing Bias Affect Patient Care?

P-70   *Zoe Koop*, Abbey Hannah*, Carissa Wilson*, Martin Helms*, Katherine Barker*, Mara Wallace*. Dr. Suzi White, mentor,* **Department of Nursing, College of Science**

This quality improvement project aims to explore implicit bias from nurses and other healthcare providers, the negative implications of implicit biases by healthcare providers, existing solutions, and development of a new protocol to counteract implicit bias. A fishbone diagram was created to illustrate components of the project topic. The diagram included brief descriptions of the topic, the health care providers who are the subject of project, the process by which implicit bias forms, the lack of resources and education that results in implicit bias, how implicit bias can be controlled, the role of management in the existence and tolerance of implicit bias, and how the work environment can contribute to the issue. A literature review was conducted and forty studies were appraised. Categories of patients experiencing implicit bias from healthcare providers include racial minorities, members of the LGBTQ+ community, severely obese patients, those suffering with drug addiction, and any patient who may be unfairly stereotyped by those providing care. Current practices in place to impede implicit bias by health workers include educational courses. However, it is unclear what content is precisely covered in these courses, how interactive they demand participants to be, and how effective and lasting this education is in the work setting. A new protocol was developed after implicit bias was observed in clinical at a large, urban teaching hospital. It highlights ways to educate providers on identifying implicit bias and how to overcome it to better care for patients.

Diabetic Patients And Insulin Use

P-71 *Emily Cobb*, Annalee Combess*, Kailey Ansell*, Dylan Fraley*, Emily Byrd*, Amanda Isle*, Tess Ruehrmund*. Dr. Mary White, mentor,* **Department of Nursing, College of Science**

Insulin, naturally produced in the human body, is used in the treatment of diabetic patients. It is often given incorrectly resulting in a medication error. Around one-third of medication errors resulting in death within 48 hours involve insulin therapy. Due to short staffing, nurses often take short cuts, including not having another nurse double check the dosage. Insulin is expensive and many patients cannot afford the insulin they need which results in underdosing. Improper administration of insulin was observed during a clinical rotation at a large, urban teaching hospital. There is a need for evidence-based research to identify methods of improved insulin use. A thorough literature review was conducted on the topic of insulin administration. Common themes that emerged included: safe administration of insulin, barriers to appropriate administration, patient teaching, cost of insulin, types of insulin, pumps versus injection, and types of diabetes. A flier with insulin administration information will be developed and shared with hospital staff nurses.

Decreasing Distractions For Medication Safety: A Quality Improvement Project

P-72 *Arielle deBloois*. Dr. Michelle McClave, mentor,* **Department of Nursing, College of Science**

The purpose of this project was to identify a problematic patient outcome that could be addressed by nursing. Medication errors are defined as a failure in drug therapy that causes harmful effects to patients. These errors tend to occur with patients who have multiple co-morbidities and require multiple medications. Those taking high-risk medications are also at greater risk. Medication errors were noted to be a concern on a telemetry unit in a local medical facility. Using the Model for Improvement, this problematic patient outcome was investigated. Through use of quality improvement tools, including a fishbone diagram and process flowchart, the distraction of nurses during medication administration was found to be a root cause. Our quality improvement question became: In patients who are admitted to the telemetry unit, does an evidence-based limitation of distractions to the nurse administering medications, compared to the usual medication administration practice, lead to a decrease in medication errors? We researched evidence-based solutions to this problem, selected one evidence-based solution, planned a quality improvement initiative, and proposed the evidence-based solution to the facility's management, intending to decrease medication errors on the telemetry unit. Through this project, we learned the importance of the facility's education staff, as well as the nursing staff and management. It was also noted that real-life distractions are common occurrences encountered on the telemetry unit, which must be prioritized to provide safe, quality health care.

A Protocol To Reduce Falls Associated With Setting Bed Alarms: A Quality Improvement Project

P-73   *Autumn Cole*, Alyndra Meade*, Ella White*, Jaylyn Whaley*, Kristina Vaughn*. Dr. Suzi White, mentor,* **Department of Nursing, College of Science**

Nurses rely heavily on bed alarms to maintain awareness of the patient's status and wellbeing. Maintaining situation awareness can be challenging for nurses with a heavy workload who are delivering care that strays them away from the bedside to other locations on the unit. Studies have shown that nurses' response rate to alarms depends on reliability, and these auditory alarms help draw attention to potential warnings. Nurses reported bed alarms were effective in maintaining situation awareness and improving patient safety.

2023 2024 Brain Drawing Contest

P-74   *Emma Brock*, Nicholas Finch, Timo Klausnitzer, Caroline Caudill, Jonah Gibson, Grace Stubblefield, Madison Woosley, Megan Shirley. Dr. Wesley White, Dr. Ilsun White, mentors,* **Department of Psychology, College of Science**

The annual Brain Drawing Contest is one of the Neuroscience Outreach Programs (2002-Present) at Morehead State University. This Program aims to enhance students' (K-12) interest in brain health and behavior. This year, more than 650 students in kindergarten to middle school participated in the Brain Drawing Contest. Students were from six counties in Eastern Kentucky. Students have learned the anatomy and functions of the brain appropriate for each grade as well as the importance of brain health. Through this program, students from kindergarten to middle school, parents/guardians and teachers, school administrators, and the community within MSU worked together. This collaboration reflects the interests of the community in our region and their support for the Brain Awareness Program. Our outreach program has increased public awareness about brain health and allows us to further promote the importance of brain research and, hopefully, inspire new interests from our Eastern Kentucky region.

Understanding The Diverse Needs Of Caregivers In Eastern Kentucky

P-75

Madison Begley*. Dr. Ilsun White, mentor, **Department of Psychology, College of Science**

In long-term caregiving situations, caregivers face major challenges, including emotional distress, social isolation, financial strain, physical strain, and lack of support and resources in addition to providing care. Such balancing acts and the burden of caregiving impacts caregivers' quality of life significantly, increasing their risk of developing mental and physical health issues. Using the survey and interview methods, the present study examined the needs of caregivers, focusing on characteristics of emotional distress, psycho-social needs, and needs for financial assistance and resources. A diverse group of caregivers under various caregiving conditions served as subjects. Caregivers experienced emotional distress including anxiety, depression, and panic attacks; expressed psycho-social challenges, including feelings of isolation, stress, burnout, guilt, frustration, and sleep disturbances. For better caregiving conditions, caregivers expressed the need for financial assistance for daily essentials such as groceries, bills, and medications, as well as flexible work arrangements and remote work options. Our study underscores the imperative need for support frameworks that address diverse characteristics of caregiver needs in Eastern Kentucky. Effective interventions focusing on the well-being of caregivers can enhance the quality of caregiving and well-being of care recipients.

The Effect Of Colored Noise On Accuracy

P-76

Madison Cornelius*, Grace Stubblefield, Jaden Yates, Megan Leonard, Johnna Brown, Cassandra Westwood. Dr. Gregory M. Corso, mentor, **Department of Psychology, College of Science**

A spectrum of colored noises (White, Brown, Pink) on recall accuracy for non-ADHD populations was investigated. It was hypothesized that recall accuracy would be greater for the White-Noise, Brown-Noise, and Pink-Noise conditions than for the No-Noise condition. It was also hypothesized that differences in frequency would result in differences in recall accuracy across the colored noise conditions. Participants underwent an exposure session to become familiar with the colored noises and completed a pre-survey pertaining to the colored noises. Then participants were assigned to one of four noise conditions (White-Noise, Brown-Noise, Pink-Noise, or No-Noise). Noise condition was a between subject variable. Three separate tasks were used in the study and each participant completed all tasks in a random order; thus task completion was a within subject variable. The tasks required participants to study and recall an image-number combination (Task A), a noun-color combination (Task B), or a shape-color combination (Task C). The overall design was a 3 (task) by 4 (noise-condition) mixed design. Undergraduate students (n = 79) participated for class credit. Recall accuracy for each task was calculated. Analysis resulted in no significant differences between colored noise conditions and the no noise condition. Likewise, there was no significant difference between the three colored noise conditions. Our initial hypotheses suggesting that colored noise has effects on accuracy were not supported. Personal preference and the specific task may play a role in the effectiveness of colored noise. Further investigation of individual differences and more diverse tasks may be beneficial.

Successful Memory Requires Simultaneous Activation Of Nicotinic And Muscarinic Receptors

P-77

Megan Shirley*, Christopher Mock, Savannah Merriman. Dr. Ilsun White, Dr. Wesley White, mentors, **Department of Psychology, College of Science**

Involvement of the cholinergic system in learning and memory is well-known. However, two cholinergic receptors, muscarinic and nicotinic, may subserve different functions. For example, blocking muscarinic, but not nicotinic, receptors reliably disrupts learning and memory in behavioral tasks. Previously, we reported that a moderate dose of glutamate/NMDA receptor antagonist partially reversed impairment induced by muscarinic antagonist. The present study examined the interaction between muscarinic and nicotinic receptors in a learning task. Scopolamine, a direct antagonist of muscarinic receptors, impairs memory and is commonly used in animal models of Alzheimer's disease. Nicotine, a direct agonist of nicotinic receptors, enhances attention and arousal. Wistar rats were trained on a fixed ratio 20, which required 20 lever-presses for a food-pellet reward. Upon reaching a behavioral criterion of 60-rewards for 2 consecutive sessions, the drug phase began. Response latency and task completion were measured under different treatment conditions. Drugs were administered intraperitoneally 2-3 minutes prior to testing. Compared to saline-control, scopolamine reliably impaired performance by increasing response latency and decreasing responses that earned rewards. Nicotine partially reversed scopolamine-induced deficits, whereas nicotine-alone did not affect performance, suggesting that successful learning and memory requires activation of both muscarinic and nicotinic receptors. Given that a direct NMDA antagonist partially reversed scopolamine-induced deficits, reversal by nicotine is likely by increasing cholinergic activation while decreasing NMDA receptor activation. Taken together, scopolamine-induced deficits are mediated by multiple receptors and successful performance in learning tasks may require reduced NMDA receptor activation and simultaneous activation of nicotinic and muscarinic receptors.

Sexuality And Mental Health Part Two

P-78

Elizabeth Arnold*, Sophia Day. Dr. Gregory Corso, Dr. Rachel Rogers, mentors, **Department of Psychology, College of Science**

Previous research (Arnold et al., 2023) has indicated an association among mental health disorders, sexual orientation, romantic orientation, and gender identity. However, these studies have examined the relationships in the context of the overall LGBTQIA+ community without considering specific mental health disorders. Therefore, the objective of this research was to expand on these findings by investigating the relationships among different sexual orientations, identities, and specific mental health disorders. To explore these relationships, a comprehensive 100-question survey was designed. The survey included questions about demographics, mental health, sexual orientation, sexual identity, discrimination, and catch questions used for data validation. The survey was administered using Survey Monkey and distributed through Prolific.com. Participants were required to be, 18 years or older, US citizens, and proficient in English. Out of 1045 registered participants, data from 999 individuals who completed the survey and provided consent were analyzed. The preliminary data analysis resulted in significant correlations among sexual orientation, romantic orientation, gender identity, and various categories of mental health disorders. Among specific significant correlations ($p. = < .01$) identified were those between (A) schizophrenia diagnoses and transgender male identity, (B) non-binary identity and trauma/stressor-related disorders, and (C) questioning of sexuality and institutionalization for mental health disorders. This research results in a better understanding of the relationships between mental health disorders and LGBTQIA+ affiliation. However, more research into the links between specific mental health issues and specific sexual orientation should be performed.

Parents Approach To Their Emotions And Adolescent Adjustment

P-80

Makayla Adams*, Hope Meyers*, Alexander Urs. Dr. Shari Kidwell, mentor, **Department of Psychology, College of Science**

Mindful parenting posits that parents' socialization of children's emotions and behavior depends on the parents' present-moment awareness and non-judgmental acceptance. This, in turn, is thought to lead to better child adjustment (Duncan et al. 2009; Gouveia et al., 2018). While this concept has growing empirical support, researchers tend to rely on mindful parenting questionnaires. The current study examines parents' mindful approach toward their sadness and anger, assessed via interview, in association with their adolescents' psychological symptoms. Twenty-one families participated in this phase of our longitudinal Eastern Kentucky study. Most families were Caucasian, had parents with some college education, and had teens who were 16 years old. Parents were interviewed about their experiences with sadness and anger. Interviews were coded for accepting and adaptive attitudes toward these emotions, using a series of 5-point scales. Teen symptoms were rated utilizing the Child Behavior Checklist (CBCL, Achenbach & Rescorla, 2001), completed by both the parent and adolescent. Internalizing symptoms reflect anxiety and depression, while externalizing symptoms involve rule-breaking behavior. Analyses are forthcoming, but we predict that parents with high awareness, acceptance, and adaptive regulation of emotions will tend to have children with fewer symptoms. If true, these findings will support an important contention of mindful parenting. This research was funded by MSU's RCPC, URF, and GA programs, as well as KY EPSCoR.

Parental Sensitivity: Associations With Attachment Strategy In Preschoolers

P-81

Taylor Corbin*, Annabelle McNeal*, Abby Chaney. Ms. Shari Kidwell, mentor, **Department of Psychology, College of Science**

Meta-analyses have shown parental sensitivity to be a key factor in the development of a child's attachment strategy (De Wolff & van Ijzendoorn, 1997; Nievar & Becker, 2008). Sensitivity is defined as the caregiver's ability to respond to their children's signals promptly and appropriately (Mesman & Rosanneke, 2013). Attachment is developed from repeated parent-child interactions, and it impacts a child's later ability to communicate in future relationships and to regulate emotions (Flaherty & Sadler, 2012). In our present study, we hypothesize that parental sensitivity will relate to the attachment strategies of children. Forty-eight parent-child dyads were observed playing a game of ring toss, and we rated parental sensitivity using the Toddler Care Index 15-point scale (Crittenden, 2007). Lower scores reflect decreased parental sensitivity, which includes withdrawn and hostile behaviors. Children's attachment strategies were measured using the Strange Situation separation and reunion procedure (Ainsworth et al., 1978). Coding of parental sensitivity remains ongoing, but based on findings from other studies, we believe we will find an association between attachment security and parental sensitivity. If true, our methods for assessing parental sensitivity could be utilized in risk assessment for early intervention. This project has received support from KY NSF and MSU RCPC grants, as well as from Graduate Assistantship and URF programs.

Parental Emotional Support And Teen Self Compassion

P-82

Brandi Stone*, Andrew Russell*. Dr. Shari Kidwell, mentor, **Department of Psychology, College of Science**

Positive parenting qualities have been associated with self-esteem throughout adolescence (Boudreault-Bouchard, 2013). However, there is a lack of research on the association between parental emotional support and adolescent self-compassion. Self-compassion has been shown to be highly associated with adolescent mental health (Marsh, Char, & MacBeth, 2018). Teens with high self-compassion are understanding towards themselves, perceive humans as inevitably imperfect, and are balanced in their responses when things 'go wrong' (Neff, 2009). While research has suggested that self-compassion is related to parenting, most research relies on parents' self-report of parenting. We examined evidence of parent's support based on responses during an adolescent emotion interview completed with 21 families in Eastern Kentucky. Parent's support of their teen was rated on a 5-point scale, and ratings were based on our perception of support, rather than whether the teen seemed 'satisfied' with the parents' response . The scale ranged from complete disapproval/dismissal of emotions to emotion coaching. Adolescent self-compassion was assessed via self-report on the Self-Compassion Scale (Neff, 2003). Analyses are forthcoming, but we hypothesize that decreased teen self-compassion will be associated with lower rates of parental emotional support. If true, this suggests that adolescent mental health might be positively impacted by interventions that increase parental emotional support strategies, which in turn may increase teen self-compassion.

Parental Depression And Emotional Support Of The Adolescent

P-83

Ashlee Lewis*, Sammi Conley*. Dr. Shari Kidwell, mentor, **Department of Psychology, College of Science**

Research suggests that parental emotional socialization influences how adolescents express their emotions, both at home and at school (Eisenberg & Fabes, 1994). Parental depression is thought to inhibit a parent's ability to effectively identify and react to negative emotions, creating negative emotional socialization behaviors (Godleski et al., 2020). The current study examines parents' approach and support towards their adolescent's experiences with sadness and anger in association with their own depressive symptoms. Twenty-one families participated in this phase of our longitudinal Eastern Kentucky study. Most families were Caucasian, had parents with some college education, and had teens who were 16 years old. Parents were interviewed about their experiences with sadness and anger as well as their adolescent experiences with sadness and anger. Interviews are coded for support for their teen's emotional experiences, using a 5-point scale. Parental depressive symptoms were rated using self-report questionnaire data on the Center for Epidemiological Scale-Depression (Radloff, 1977), along with observed signs of depression during four Strange Situation separation-reunion episodes. Analyses are forthcoming, but we predict that parents with high depressive symptoms will tend to be less supportive of their adolescent's emotional experiences. If true, these findings will support findings of how parental mental health influences parental awareness of and sensitivity towards their teen's emotions. This research was funded by MSU's RCPC, GA, & URF programs, as well as KY NSF.

Parental Adverse Childhood Experiences Associated With Child And Parent View Of Parents' Emotions

P-84

Trinity Pangallo*, Taelin Jones*, McKenzie Burton*, Jacob Winkler. Dr. Shari Kidwell, mentor, Department of Psychology, College of Science

Adverse Childhood Experiences (ACEs) has become an increasingly influential approach in understanding exposure to trauma. ACEs include exposure, by age 17 years, to parental mental health and substance problems, divorce, neglect, and abuse. ACEs have been found to be related to increased risk for substance use, depression, school dropout, health difficulties, and other negative outcomes (CDC, 2023). We will explore the association between Adverse Childhood Experiences (ACEs) and self-reported and teen-reported parental emotions. As part of a larger, longitudinal study, 21 parents in Eastern Kentucky participated with their adolescents. Most families were Caucasian, had parents with some college education, and had teens who were 16 years old. Parental ACEs were measured via questionnaire, while parents' most frequently reported emotions were identified through interviews with both the parent and teen. The top three most frequent parental emotions are being categorized as having either a a positive or negative valence. Analyses are forthcoming, but we expect that greater parental ACEs scores will be associated with more frequent negative emotions being reported. If our hypothesis is supported, this may have implications for parental mental health and for the intergenerational impacts of ACEs.

Gut Brain Axis, Anorexia Nervosa And Depression

P-85

Danielle Justiniano*. Dr. Ilsun White, mentor, Department of Psychology, College of Science

Previous research showed that there is a close link between anorexia nervosa (AN) and changes in brain morphology. Similar brain abnormalities have been seen in individuals with depression, which is often present in AN. Recent studies suggested that abnormal changes in gut microbiota may affect brain morphology in AN and symptoms of depression. The aim of this study was two-fold: to review a link between the gut-brain axis and AN, and to link gut microbiota and depression. Brain morphology of those with AN and those with depression had abnormalities in brain structure, mainly in the limbic system, and a decrease in volume which may lead to changes in mood and affect. Such morphological changes and depletion of microbiota were closely linked to symptoms associated with both AN and depression. Moreover, serotonin-producing gut microbiota were substantially low in AN, compared to controls. Given that gut microbiota is critical for serotonin production and regulation within the body, depletion of gut microbiota in AN may lead to a decrease in serotonin synthesis, causing depressive symptoms and affecting morphological changes in the brain. Understanding the link between the gut-brain axis and mechanisms would improve our understanding of AN and depression as well as future treatment goals.

Divergent Creative Problem Solving In The Context Of Working Memory And Field Dependence/Independence

P-86 *Johnna Brown*, Grace Stubblefield, Jaden Yates, Madison Cornelius, Megan Leonard, Cassandra Westwood. Dr. Gregory M. Corso, mentor,* **Department of Psychology, College of Science**

Previous research suggests a relationship between working memory capacity (WMC), field dependence/independence (FDI), and problem-solving performance. The current study investigated problem-solving using divergent thinking tasks. A divergent thinking task has multiple solutions and is not restricted by response expectations. The research on working memory and field independence lacks investigations relevant to divergent thinking tasks. This investigation incorporated WMC (Operation Span or OSPAN) and FDI (Embedded Figures Test or EFT) measures. It was hypothesized that larger WMC and greater field independence (FI) should be related to improved performance on divergent thinking tasks. Additionally, a positive relationship between WMC and FI was hypothesized. Participants (n=54) completed the OSPAN and EFT. Participants were randomly assigned to one of two divergent thinking tasks, the Alternative Use Task (AUT) or the Figural Interpretation Quest (FIQ). The AUT requires the identification of alternative uses for everyday objects. The FIQ requires interpretations of an ambiguous figure illustration. Results showed a significant positive correlation between OSPAN and EFT scores, r (53) = .461, p = <.001. Additional results showed a significant positive correlation between scores from the AUT and OPSAN, r (26) = .46, p =.016, and scores from the FIQ and OSPAN, r (26) = .46, p =.016. The EFT was only significantly correlated with the FIQ, r (26) = .433, p = .024. This study suggests that individuals with larger WMC and greater field independence may perform divergent thinking tasks better.

Convergent Creative Problem Solving In The Context Of Working Memory And Field Dependence/Independence

P-87 *Grace Stubblefield*, Johnna Brown, Madison Cornelius, Jaden Yates, Megan Leonard, Cassandra Westwood. Dr. Gregory M. Corso, mentor,* **Department of Psychology, College of Science**

Relationships between working memory capacity (WMC), field dependence/independence (FDI), and convergent thinking creative problem-solving tasks were investigated. A positive relationship between WMC and FDI has been postulated but seldom measured in previous research. Individuals with greater WMC and FI should perform better on convergent thinking tasks; these require an individual to arrive at one ideal solution when presented with a problem. Previous research has found positive correlations between these three constructs. The current study looked specifically at creative problem-solving tasks. The OSPAN and EFT were administered to measure WMC and FDI, respectively. The Visual Remote Association Task (vRAT), Candle Problem (CP), and Two String Problem (TSP) were used as convergent creative thinking tasks. Participants were randomly assigned to perform CP/TSP tasks or vRAT. Data from undergraduates (n=54) were analyzed. A significant positive correlation between OSPAN and EFT scores, r (53) = .461, p < .001 was observed, supporting the hypothesis that larger working memory capacity is related to greater field independence. A significant correlation was observed between vRAT and EFT scores, r (26) = .411, p = .033. This finding partially supports the hypothesis that more field-independent individuals would perform better on convergent creative problem-solving tasks. Implications suggest that individuals with greater WMC and FI have advanced convergent thinking capabilities and creative problem-solving abilities. These findings could be used to identify individuals with solution-seeking tendencies.

Changes In Anatomical And Functional Connectivity In Major Depressive Disorder

P-88

Timo Klausnitzer*. Dr. Ilsun White, mentor, **Department of Psychology, College of Science**

Major depressive disorder (MDD) affects more than 280 million worldwide. Recent neuroimaging studies have linked MDD to aberrant activity in brain networks, suggesting that disruptions in these networks may contribute to emotional and behavioral deficits seen in MDD. The present study reviewed abnormal changes in key brain networks - the default mode network (DMN), central executive network (CEN), and salience network (SN) - associated with resting-state consciousness, executive functioning and detection and response to salient emotional and sensory stimuli, respectively. Hypothesis was that dysregulation of these networks may reflect core depressive symptoms. In addition, effectiveness of pharmacological treatment and brain stimulation on network modulation was examined. Increased functional connectivity (FC) within the DMN was closely linked to MDD and symptoms such as excessive rumination, negative self-focus, and anhedonia. Disruptions in FC between the DMN, CEN and SN was associated with impaired emotional regulation and heightened emotional reactivity. Overall, pharmacological treatment and brain stimulation showed some degree of effectiveness in normalizing anatomical and functional connectivity in MDD to the level comparable to that of controls. Brain stimulation was particularly effective in normalizing FC between CEN and DMN. Pharmacological treatment normalized connectivity within DMN and across networks. Taken together, altered connectivity in key networks plays significant role in MDD. Future treatment should aim for a personalized approach, focusing on modulation of specific network connectivity.

Attitudes About Colored Noise

P-89

Megan Leonard*, Johnna Brown, Madison Cornelius, Grace Stubblefield, Cassandra Westwood*, Jaden Yates. Dr. Gregory M. Corso, mentor, **Department of Psychology, College of Science**

Various sources suggest that different color noises, defined by differences in the frequency spectrum of the sound, benefit people in many different areas. Participant attitudes about colored noise after task completion were analyzed. It was hypothesized that participants who reported having prior effective use of colored noise in a pre-survey would rate the noises presented in this study as lower in annoyance and higher in helpfulness in a post-survey than participants without previous experience with the noises. Additionally, it was expected that helpfulness and annoyance levels would be different for the different color noises. Participants (n = 73) were randomly assigned to one of four noise conditions: White-Noise, Brown-Noise, Pink-Noise, and No-Noise. All participants completed an exposure task where they listened to the three colored noises and were asked to identify each as they were presented. Participants then completed a self-report survey to determine prior use of colored noises and if the noise was effective. Three different memory tasks were within-subject variables. A self-report post-task survey asking about helpfulness and annoyance was administered to participants (n = 57) only in the three noise groups. There was a significant negative correlation between Helpfulness ratings and Annoyance ratings. [r (55) =-0.51, p < .001]. No significant correlations existed between Reported Previous Use Effectiveness and Helpfulness/Annoyance ratings, so we suggest that prior use of colored noise does not affect future uses. The overall finding of this study is if colored noise is annoying, helpfulness decreases.

Challenging Gender Stereotypes: Addressing Misconceptions In Women's Sports

P-90 *Angel Daugherty*. Dr. Steve Chen, mentor,* **Craft Academy for Excellence in Science and Mathematics**

Misconceptions and gender-specific stere pes have been prevalent for ages and still persist today. To be more precise, in the domain of sports, gender equality can seem daunting due to the chauvinist ideologies and excessive masculinity present. This presentation aimed to shed light on the traditional public perception and valuation of women's sports by reminding readers of the danger of being ignorant of gender-related misconception and biases. This project reviewed over 70 published articles and literature in the last 30 years related to the public's perception about female sports, administrators, and athletes by searching two scholarly database search engines (Google Scholar and EBSCOhost) with specific keywords. Findings concluded that a persistent pattern of devaluation, under-appreciation, and sexual objectification were directed toward female sports and athletes. These problems stemmed from four distinct factors: (1) inaccurate assumptions about gender roles, portraying women as weak, fragile, disorganized, less competitive, and uninterested in sports; (2) biased and double standards in evaluating performance, suggesting women lack talent, productivity, or coaching success; (3) inadequate and inappropriate media representations, associating women's sports primarily with sexual appeal rather than popularity; and (4) unfair compensation practices, justifying lower pay as women's sports being less popular or profitable. To overcome these discrepancies and alter the gender stereotypes, the researchers fervently recommend promoting gender equality through education and leveraging media to increase female participation and enhance their overall experience.

The Padawan Program Special Project

P-91 *Kiara Little*. Mr. Jose Garcia, mentor,* **Craft Academy for Excellence in Science and Mathematics**

The Padawan Program Special Project is a special project that originally stemmed from a program in the Space Science Center called the Padawan Program. Focused on on developing professional skills, knowledge, and experiences, students who participate in the Padawan Program Special Project have the opportunity to collaborate with professors in a designated field of study in the Space Science Center while following an outlined activities and skill track. The purpose of the track is for students to have a visual timeline of activities that they will be collaborating on, all the while seeing the skills that will be learned along the way. The focus of this special project is to take knowledge that students possess from classes and provide the tools for them to apply their knowledge in a series of hands on projects that are reinforced through concepts in STEM education. As a result, self efficacy is positively impacted along with the development of communication, leadership, and an array of applicable skills in the student's designated field of study. The ultimate goal of the Padawan Program Special Project is to provide students with the opportunity to work with a series of projects and assignments in the Space Science Center to aid in developing important skills that will set students apart in the future workplace.

Meteorology Misconceptions Held By Air Force Cadets After An Aviation Weather Course

P-92   *Matthew Mynk*. Dr. Wilson Gonzalez-Espada, Mr. Louis Cascino, Maj, USAF, Dr. Kimberly de La Harpe, Mr. Nathaniel George, SMSgt, USAF, Mr. Christopher Francis, Maj, USAF, Dr. Daniel O'Keefe, Maj, USAF, mentors,* **Craft Academy for Excellence in Science and Mathematics**

Interactions with the weather are aspects of life that all people experience daily, however, many have misconceived notions about the systems that control our lower atmosphere. Reports indicate these misconceptions, or deviations from conceptions defined by members of a given field, are born from previous experiences and incorrect teachings from childhood. These untrue assumptions can become further entrenched when they are encountered often and through multiple means. U.S. Air Force Academy (USAFA) cadets need to have correct knowledge about weather systems, as they will eventually work with airborne technologies.

This study identified to what extent weather misconceptions persisted after 41 USAFA cadets completed Meteor 320 (Introduction to Meteorology and Aviation Weather), as measured by their performance on a recently created Survey of Meteorology Concepts (SMC), completed as a pre- and post-test. By examining participant data using psychometric statistics, survey data will also be used to validate the SMC.

The researchers found that the participants did not perceive the SMC as difficult (Diffpre=0.40, Diffpost=0.56, $t=5.82$, $p < 0.0001$), and about 34% of them answered the items correctly and with high confidence. The survey revealed significant decreases in both Lucky Guesses (20% to 8%, $t=8.15$, $p < 0.0001$) and Unlucky Guesses (42% to 15%, $t=9.32$, $p < 0.0001$) and a significant increase in Knowledge (20% to 48%, $t=8.15$, $p < 0.0001$). Surprisingly, responses with Misconceptions increased (18% to 30%, $t=7.94$, $p < 0.0001$). The researchers will discuss the top misconceptions and recommendations to improve the SMC.

Leadership Initiatives Public Health Campaign

P-93 *Jeremyah Cabrera, Aime Ensenat-Pena*, Paisley Cooke*, Brooklyn Adams*, Jennifer Nguyen, Rox Lockard, Landon Prichett*, Lisa Brempomaa Abrampah*, Abigail Mills. Dr. Rachel Rogers, Ms. Rox Lockard, mentors,* **Craft Academy for Excellence in Science and Mathematics**

Leadership Initiatives is an international youth development non-profit organization that leads the International Public Health Internship Program. This nine-month global health program targets populations living in sub-Saharan Africa. Interns work together to develop and implement public health campaigns that address major health concerns prevalent in the region, such as water safety, hunger, tropical diseases, and more. Our mission with the Leadership Initiatives Public Health Internship was to establish an educational public health campaign addressing the chosen issue of menstrual hygiene in the community of Bauchi State, Nigeria. By establishing proper healthcare practices within this community, we worked to educate and prevent misconceptions about menstrual hygiene. As stated by the National Library of Medicine, roughly 1.9 billion people go through the biological cycle of menstruation, yet the challenges of neglect and stigma still remain. By establishing proper healthcare practices within this community, we worked to educate and prevent misconceptions about menstrual hygiene. Within our campaign and workshop, we hoped to cause a domino effect in the region by making the dangers of menstrual hygiene more well-known, which will affect entire communities and generations to come. Our work will not only have affected the small group participating in the campaign but also their family and friends, additionally at risk from the dangers of menstrual hygiene. This will lead to the campaign spreading not only within Bauchi State, but throughout the entire country of Nigeria.

Hazel Green Academy Revitalization Project

P-94 *Dakota Murphy*, Casey Hovis*, Sarah Lakes*, Josie Traver, Jennifer Nguyen, Jaxson Brewer, Ashlee Foxworth, Natalie Wall, India Young, Emma Laney. Dr. Rachel Rogers, mentor,* **Craft Academy for Excellence in Science and Mathematics**

The Hazel Green Academy Revitalization Project is a community service-based project focused on restoring and repurposing the Hazel Green Academy (HGA). HGA was a private, college preparatory high school in Wolfe County, KY, that opened in 1880. At its height, HGA served not only as a school but also as a source of education and community events. However, HGA closed in 1983 due to a rise in public schools in the area.

The HGA Revitalization Project has three strategic priorities: create a community engagement event called Music on the Green; place all campus buildings on the National Register of Historic Places; and use the administration building for educational outreach by holding college courses on HGA's campus.

These strategic priorities will serve the community socially, academically, and holistically as HGA once did. Service-learning projects have been conducted to achieve the three strategic priorities. Students from the Craft Academy at Morehead State University have taken service-learning trips to HGA to maintain campus upkeep. This special project offers students the opportunity to engage in STEM education as well as serve the community. It is the hope of the HGA Revitalization Project to share this innovative project with other STEM-focused students throughout the state of Kentucky and beyond.

FIRST Tech Challenge Craft Coalition

P-95 *Graeme Miracle*, Justin Triplett*, Aiden Vieu*, Tiffany Zhang*, Ethan Moulton*, Jonah Clements-Mattingly. Dr. Rachel Rogers, mentor,* **Craft Academy for Excellence in Science and Mathematics**

Participation in FIRST Technical Robotics (FTC) at Craft Academy for Excellence in Science & Mathematics has significantly increased students' interest in STEM careers. FTC, an internationally recognized competition, challenges students to design, build, and program robots, fostering critical thinking, problem-solving, and collaboration skills. The hands-on nature of robotics allows students to apply theoretical knowledge to real-world challenges, enhancing their understanding of STEM concepts and showcasing their relevance. Collaboration within the team promotes teamwork and communication skills, creating a supportive atmosphere conducive to STEM career exploration. Interactions with industry professionals and mentors through FTC provide students with insights into diverse STEM careers, offering valuable guidance and tangible role models. Additionally, the competitive nature of FTC drives excitement and innovation, pushing students to think creatively and problem-solve effectively. Craft Academy students' participation in FTC has positively influenced their STEM career aspirations by providing practical experience, fostering collaboration, offering exposure to professionals, and promoting competition. Such programs effectively inspire and cultivate the next generation of STEM professionals.

Experimental Comparison Of Simulated Decay Curves Using Dice And Centicubes

P-96 *Alexandria Black*. Dr. Wilson Gonzalez-Espada, mentor,* **Craft Academy for Excellence in Science and Mathematics**

Radioactive decay is taught in Kentucky high schools (NGSS HS-PS1-8), where students learn about nuclear properties and radiometric dating. Given that materials and experimental radiation equipment can be expensive, many analogical hands-on radioactive decay experiences have been proposed and described in the literature.

Centicubes have been a common manipulative in elementary and middle school classrooms. Due to their availability, simplicity, and low cost, we propose a novel way to use centicubes to illustrate radioactive decay rates. However, by having unconventional surface features, it is not clear whether centicubes will simulate randomness like dice do.

The study statistically examined the use of centicubes as a simpler, low-cost alternative to dice to teach radioactivity lessons in Kentucky. The researchers implemented a carefully controlled set of 20 trials each modeling radioactive decays with short, medium, and long half-lives with both centicubes and dice. A Chi-square goodness-of-fit test compared their various exponential best-fit curves to empirically demonstrate the extent of their similarity.

We found that, for the medium and short half-life trials, dice and centicube curves were statistically similar from a 13-cm release height. These curves were significantly different for long half-life trials at the original height but were statistically similar from a 26-cm release height.

Detecting The Undetectable: A Study On The Simulation Of Particle Collisions At The LHC

P-97

Oliver Guthrie *, Wren Cragle *. Dr. John Waite, mentor, **Craft Academy for Excellence in Science and Mathematics**

The ForwArd Search ExpeRiment (FASER) is a relatively inexpensive detector placed 480m downstream from the ATLAS Interaction Point at the Large Hadron Collider (LHC). Previous studies have shown that FASER shows significant potential for discovering new weakly interacting particles. The goal of this study is to see what particles have the potential to decay within the FASER detector. Through the utilization of a Monte Carlo event generator (Pythia8), we generate a large amount of collisions and record $\pi 0$ mesons and photons that decay within the FASER detector. Through these means, we can explore the effects of new weakly interacting particles to extend the Standard Model (SM).

Athletic Recruitment Analysis In Higher Education

P-98

Landon Palmer*. Dr. Steve Chen, mentor, **School of Business Administration, Smith College of Business**

Since athletic programs are often viewed as the front porch of the higher education institutions, recruiting talented student-athletes is vital and challenging task under the unreasonable demand of high performance, limited and decreasing budget, and dwindling student enrollment. Additionally, the increasing use of Name, Image, and Likeness (NIL) deals and transfer portal across the nation have made administrators and coaches worried about their effect on recruitment and program retention. These practices make the recruiting process even more competitive. Through the responses of 106 student-athletes of a regional state university in Eastern Kentucky, the researchers identified respondents' perception concerning these newly introduced practices, and key elements for searching an ideal institution and deciding to enroll. More than 60% of the respondents selected their destination from three to four choices. Over 94% of individuals were satisfied with their enrollment decision. Although the NIL deals might be an enticing factor to impact respondents' enrollment decision, financial affordability, relationship with the university's coaching staff, and location were still more important determinants for making enrollment choices. Respondents' understanding of institution's information were heavily relied on word-of-mouth communication and internet search. The findings of the project have direct implications on how athletic departments should focus on relationship-building and online advertising to interact with potential recruits. These practices may attract a lot of media attention, they should not drastically change the recruiting landscape and fundamental practices of recruiting.

What's In A Name? A Case Study Of NIL Opportunities As A Form Of Marketing Promotion

P-99

Peighton Isley*. Dr. Lucas Lunt, mentor, **School of Business Administration, Smith College of Business**

This undergraduate research project is a case study that describes a marketing promotion opportunity involving Dale Sebastian, the Chief Marketing Officer at a large law firm in Texas. The three opportunities he is presented with primarily include sponsorship of college football athletes at a Power 5 university in Texas through usage of the recently passed Name, Image, and Likeness (NIL) laws in collegiate athletics. A background of this transition to the NIL era of collegiate athletics, including the evolving legal landscape, major public NIL deals, and implications of this transition are provided. The reader (student) is asked to formulate recommendations for Dale about the marketing promotion opportunities that account for the resource outlay required and expected benefits received from each opportunity. The suggested audience for this case study will be upper-level undergraduate and graduate students.

Prevention Of Bank Failure And The Role Of Social Media In Banking Services

P-100

Alexis Duncan*, Galvin Sparks*, America Adams*, Josh Stapleton*. Dr. Steve Chen, Dr. Christy Trent, mentors, **School of Business Administration, Smith College of Business**

The recent collapse of the Silicon Valley Bank in California was the second-largest bank failure in U.S. history. While most commercial banks are insured by the FDIC, bank failures still occur due to inappropriate financial management and fluctuation of federal interest rates. The collapse of banks can cause stock values to drop and customers to panic. This case illustrated that preventive measures are necessary to combat bank failures. Community banks, as the backbone of economic development in vulnerable rural communities, have no luxury to entertain financial crises.

To address this issue, a study collected the opinions of two Eastern Kentucky regional community banks' administrators. Each bank administrator provided information on the following elements: bank service type, customer portfolios, asset and liability management practices, expected regulatory changes, policies for mitigating risk, and utilization of social media in improving customer and banking services.

The researchers analyzed the collected information to address how banks should diversify their funds and income, engage in asset and liability management, prepare a contingency funding plan, and champion regulatory change. They also discussed existing and future practices among surveyed banks for using social media to communicate effectively with customers about risk and financial status and offer more business opportunities for driving profitability.

The issue of bank closure may seem mysterious to the public, but it is vital to understand how bank institutions operate to ensure a healthy economy within rural communities. This topic should be of great interest to students who majored in finance, economics, and general business.

Coming Together To Hurt Our Rivals: Schadenfreude's Impact On Brand Communities

P-101

Maggie Fegenbush*. Dr. Lucas Lunt, mentor, **School of Business Administration, Smith College of Business**

This undergraduate research is an exploratory research project examining behavior that uses the "like" button on social media to induce negative emotions in out-groups while bringing joy to the user – in other words, schadenfreude. "Liking" on social media has always been associated with positive affect; however, evidence on various social media platforms shows an increasing usage of "likes" on these platforms to induce negative emotions for an outgroup. The first study of this project will illustrate this negative "liking" behavior online by using collected posts on X, formerly known as Twitter, announcing when a sports team has lost a competition. Throughout our research project, social media activity for four NFL teams - the New Orleans Saints, Atlanta Falcons, Seattle Seahawks, and San Fransisco 49ers - throughout the 2023 season was collected. The interactions on X were studied to understand how these engagements differed depending on the outcome of the teams' games, specifically focusing on the impact of game outcome and situational factors, such as rivalries and non-conference matchups (AFC v NFC). This systematic approach facilitated a thorough and insightful examination of the relationship between team performance and social media engagement. Through this research, I was able to gain valuable insights into the dynamics of fan engagement and team performance on social media, providing a deeper understanding of the relationship between sports outcomes and online interactions.

Fall 2023 Business Plan Development: Seeking The Right Retail Mix

P-102

Mak Livingood*, Erica Hickman*. Dr. Janet Ratliff, mentor, **School of Business Administration, Smith College of Business**

As part of the Appalachian Collegiate Research Initiative and its respective grant funding from the Appalachian Regional Commission, students in Dr. Ratliff's Fall 2023 Level UP section of the Business Plan Development Course worked on a service-learning project entitled "Seeking the Right Retail Mix" while partnering with Downtown Morehead, Inc.

The purpose of the project was to solve the problem of what viable choices of businesses could fill vacant building spaces created as part of a new construction project (Fairfield Marriott) within Morehead's downtown area. Modern development practices have changed the small business landscape; what once was a downtown core with neighborhoods built around it has fallen victim to the population surge forcing homes and businesses to be spread throughout a community; thereby, making it difficult for certain businesses to maintain viability in a downtown area.

The class was split into five teams tasked to create business plans to fill these spaces. Students created five different businesses from five different industries: Club 606, an upscale restaurant and bourbon bar; Eagle's Nest Apparel, an apparel business with embroidered customization; Bluegrass Serenity Spa, a massage spa and nail salon; CC Cigars, a cigar shop and lounge; Crisp & Clean, a dry-cleaning, tailoring, and professional apparel shop. By creating a plan for these businesses, undergraduate students learned the research processes necessary to create a business. Through collaboration and communication, undergraduate students enhanced their teamwork skills, experienced the difficulties in business development, and acquired a deeper understanding of the history and hardships of the Appalachian region.

The Cosmic X Ray Background Nanosatellite 3 (CXBN-3): Toward An Improved Understanding Of Diffuse Emission Produced By High Redshift Active Galactic Nuclei

P-103

Breno Pontes*, Paul Delaney*, Brannon Jones. Dr. Thomas Pannuti, Mr. Jose Garcia, Dr. Benjamin Malphrus, mentors, Space Science Center

The Cosmic X-ray Background (CXB) is the diffuse emission of hard X-rays (3-300 keV) that is observed across the whole sky. The general consensus for the origin of the CXB (particularly at higher energies) is emission from obscured active galactic nuclei (AGN) located at a moderate redshift. To explore the properties of the CXB further (such as whether flux variations are present at different angular scales), the Space Science Center at Morehead State University is developing CXBN-3 (Cosmic X-ray Background Nanosatellite 3), a nanosatellite designed to measure the intensity of the CXB within the energy range of 20-50 keV with an uncertainty of less than 5%. The CXB peaks with an intensity of ~30 keV, and by resolving this peak we can better constrain current models of the obscured AGN population and develop an accurate understanding of the temporal evolution of AGNs over a large fraction of the age of the Universe.
This presentation will summarize the work being done by the students for the CXBN-3 mission, including science research, detector calibration and characterization, and command & data handling. This work is crucial not only in the development of CXBN-3 (as it will establish the requirements for its subsystems and instrumentation), but also for advancing these observations by improving the error in energy measurements as a function of frequency conducted at X-ray energies.

The Cosmic X Ray Background Nanosatellite 3: A Student-Led Cube Sat Mission

P-104

Ian Warford*, Brannon Jones, Jaden Yates. Dr. Benjamin Malphrus, mentor, Space Science Center

The Cosmic X-ray Background Nanosatellite 3 (CXBN-3) is a student-led mission at the Space Science Center that will be the continuation of previous satellites in the CXBN series. CXBN-3 is a 2U CubeSat. A CubeSat is a small version of conventional satellites. The base standard is a 10 x 10 x 10 cm cube that is called a 1U. CXBN-3 is a 10 x 10 x 20 cm (2U) satellite. The intended goal of the mission is to measure the Cosmic X-ray Background (CXB) within an uncertainty of 5 percent or less. To meet this requirement a team of students are building a satellite with multiple integrated subsystems including structures, mechanisms, thermal control, command and data handling, payload (X-ray detector), electrical power system, attitude determination and control subsystem, and communication systems. These subsystems are used in missions like the James Webb Space Telescope and IM-1. Each subsystem has their own unique needs that will be accommodated by applying the Space Systems Engineering curriculum taught here at Morehead State University and emphasizing systems engineering in a real-life application. By using both commercial off-the-shelf products and making parts in-house the team of students is designing and creating CXBN-3. The team of students has also written code to meet the flight software and data handling requirements of the mission. This mission will not only gather important scientific data but will also be a successful proof of concept in the utilization, development, and advancement of nanosat technologies and instrumentation in the X-ray spectrum.

Automation Of The G/T Characterization Measurements For DSS 17

P-105

Mila Layne Shearer*. Ms. Emily Walter**, Ms. Emily Ballantyne**, mentors, **Space Science Center**

Gain over System Noise Temperature (G/T) is a metric commonly used in radio frequency (RF) engineering to measure the performance of an antenna against the noise contributing to the receiver's signal caused by its internal hardware. While the gain of an antenna is typically inferred geometrically by comparing signal strength of a given antenna to that of an isotropic antenna, system noise temperature is found experimentally by calibrating the antenna to a black body radiator (such as the moon) and comparing the measured power on the black body to that when the antenna is aimed at cold sky. This comparison is measured several times and followed by a sweep in elevation to generate a tip curve, yielding a measurement of atmospheric contribution to the signal. From here, G/T is calculated. The traditional process of measuring system noise temperature introduces room for user error. Writing software which automates the G/T measurement procedure produced more accurate data and reduced the possibility of procedure error. After using Systems Tool Kit to model Morehead State University's 21-meter deep space antenna, (DSS-17), a privately-owned affiliated node on NASA's Deep Space Network[1], as well as Python programming to generate pointing predicts[2], this student- and staff-developed automation commanded DSS-17 to point on and off the moon without a user manually inputting commands. The program also writes measurements to output files for later analysis, and functions for the X-band and S-band frequency feeds utilized on the antenna, enabling key performance measurements and supporting MSU's deep space tracking services.

Wildfire Spread: A Level Up Experience In Math 442 Advanced Mathematical Modeling

P-106

Ismael Zeidan*, Hadley Cytron*. Dr. William Tidwell, Dr. Joshua Qualls, mentors, **Department of Mathematics, College of Science**

Wildfires present a significant threat globally, necessitating a comprehensive understanding of their spread dynamics for effective mitigation. This project employs mathematical modeling to delve into wildfire diffusion mechanisms. Through the lens of mathematical models, this research aims to unravel the underlying principles driving the spread of wildfires. This poster investigates the relationship between mathematics and fire propagation, offering a perspective of how mathematical principles unveil the order within the seemingly random spread of wildfires. By fostering a deeper understanding of these mathematical intricacies, this research contributes to the understanding of precision and reliability of wild fire predictions, providing valuable insights for individuals and communities in order to mitigate life and property loss.

Acid Rain: A Level Up Experience In Math 442 Advanced Mathematical Modeling

P-107

Grant Amshoff*, Emily Blevins*, Hannah Phirman*. Dr. William Tidwell, Dr. Joshua Qualls, mentors, **Department of Mathematics, College of Science**

This poster presentation delves into the fascinating world of weather mathematics, shedding light on the intricate patterns that govern our weather, especially the creation and precipitation of acid rain. Through the lens of mathematical models, this research aims to unravel the underlying principles shaping acid rain from Earth's atmosphere. This poster investigates the relationship between mathematics and weather, offering a perspective of how mathematical principles collaboratively unveil the order within the seemingly chaotic nature of weather systems. By fostering a deeper understanding of these mathematical intricacies, this research contributes to the understanding of precision and reliability of acid rain predictions, providing valuable insights for individuals and communities navigating the unpredictable nature of dangerous precipitation.

2023 - 2024

Recipients of Undergraduate Research Fellowships

Morehead State University supports the initiative for students to engage in research, scholarship, performance activities and creative works. Listed below are the 2017-2018 awardees and their mentors.

CAUDILL COLLEGE OF ARTS, HUMANITIES AND SOCIAL SCIENCES

Student URF	Class	Department	Mentor(s)
Alaina Cantrell*	SO	MUTD	Julie Baker
Arwen Sergent*	SO	HGPL	Alana Scott
Ashley Routt*	JR	CMAD	Robyn Moore
Brady Lawson*	JR	HGPL	Douglas Mock
Brianna Dorsey*	JR	MUTD	Eric Brown
Bridgett Craig*	SR	CMAD	Donell Murray
Canaan Thacker*	JR	HGPL	Douglas Mock
Canaan Thacker*	JR	HGPL	James Masterson
Carter Abshire*	JR	HGPL	Alana Scott
Danielle Vigil*	JR	CMAD	Michael Bowen
Emily Russell*	SO	ENML	Philip Krummrich
Emma Crouch*	JR	HGPL	Alana Scott
Hadley Pierce*	JR	MUTD	Octavia Biggs
Heather Parks*	FR	CMAD	Ann Andaloro
Zander Mack*	FR	CMAD	Ann Andaloro
Jason White*	SR	SSWC	Deirdra Robinson
Matthew Fitch	JR	SSWC	Elizabeth Perkins Suzanne Tallichet
Megan Akers*	SR	SSWC	Bernadette Barton
Nicholas Robbins*	JR	MUTD	Michele Paise
Olivia Adams*	SO	CMAD	Elizabeth Mesa-Gaido Jacob Lee Joel Knueven
Stephanie Perry*	SR	SSWC	Bernadette Barton Constance Hardesty
Violet Updike*	SO	MUTD	Jesse Wells

COLLEGE OF SCIENCE

Student URF	Class	Department	Mentor(s)
Aliya Frisby*	JR	BIOL/CHEM	Allen Risk
Alyson Simpson*	SR	BIOL/CHEM	Allen Risk
Serenity Baughman*	FR	BIOL/CHEM	Emmalou Schmittzehe-Skarbek
Emily Cobb*	JR	NURS	Mary White
Andrew Russell*	SR	PSY	Shari Kidwell

Annabel Phipps*	SO	AGR	Pedro DePedro
Austin Canaday*	SR	AGR	Amy Collick
Benjamin Meyer*	SR	MATH	Rachel Barber
			Ted Dobson
Brayden Schwegman*	SO	ENSI	Jennifer Birriel
Brycen Allen*	JR	BIOL/CHEM	Michael Fultz
Caitlyn Senters	JR	BIOL/CHEM	David Eisenhour
Zoe Baker*	SR	BIOL/CHEM	David Eisenhour
Caroline Adkins*	JR	AGR	Vijay Subramaniam
Luke Millay*	JR	AGR	Vijay Subramaniam
Emma Brock*	SR	PSY	Ilsun White
			Wesley White
Megan Shirley	SO	PSY	Ilsun White
			Wesley White
Jaden Yates	SR	PSY	Gregory M. Corso
Johnna Brown*	SR	PSY	Gregory M. Corso
Madison Cornelius*	SR	PSY	Gregory M. Corso
Grace Stubblefield*	JR	PSY	Gregory M. Corso
Liberty Smallwood*	SR	ENSI	Diana Ochoa
			Erdoo Mongol
			Jennifer O'Keefe
			Juan-Filipe Montenegro
			Matthew Pound
Chris Marsh*	SR	ENSI	Md. Golam Kibria
June Lennex-Stone*	SO	ENSI	Md Golam Kibria
Megan Shirley *	FR	PSY	Ilsun White
			Wesley White
Dalton Hensley*	SR	ENSI	Heba Elgazzar
Darion Ball*	SR	BIOL/CHEM	Allen Risk
Donovan Justice*	JR	BIOL/CHEM	Smita Joshi
Emily Morgan*	JR	BIOL/CHEM	Geoffrey Gearner
Heavenly Mays*	FR	BIOL/CHEM	Geoffrey Gearner
Ethan Newsom*	SO	BIOL/CHEM	Deborah Cook
			Janelle Hare
Gianna Federico*	JR	ENSI	Jennifer Birriel
			Ronald Wilhelm
Zachary Strait*	SR	ENSI	Jen O'Keefe
Ryan Justice*	JR	ENSI	Tathagata Ray
Ivan Hargesheimer*	SR	ENSI	James Adkins
Ivy Litton*	FR	ENSI	Jen O'Keefe
			Md Golam Kibria
			Wilson Gonzalez-Espada
Jaden Yates*	SR	ENSI	Michael Combs
Jared Vise	JR	BIOL/CHEM	David Eisenhour
Shelbie Black*	SR	BIOL/CHEM	David Eisenhour
Jeremyah Cabrera*	SO	ENSI	Erdoo Mongol
			Francisca Oboh-

Student URF	Class	Department	Mentor(s)
			Ikuenobe
			Jennifer O'Keefe
Julia Fitzpatrick*	SR	BIOL/CHEM	Allen Risk
Kaitlyn Nelson*	FR	ENSI	Jen O'Keefe
			Md Golam Kibria
			Wilson Gonzalez-Espada
Karis Applegate*	SR	KHIS	Michaela Wilson
Kathryne Argueta*	JR	BIOL/CHEM	Smita Joshi
Kristin Thacker*	SR	MATH	William Tidwell
Landon Fitch*	SR	ENSI	Jorge Ortega-Moody
			Kouroush Jenab
			Tyler Ward
Larry Johnson*	SR	ENSI	Sherif Rashad
Lindy Kuhn*	SR	KHIS	Jennifer Clark
Mara Stout*	SR	BIOL/CHEM	Melissa Mefford
Margaret Alden*	SO	ENSI	Erdoo Mongol
			Jen O'Keefe
			Limi Mao
Marissa Blair*	JR	BIOL/CHEM	David Dixon
			Zachary Lee
Rachel Bell*	JR	BIOL/CHEM	Smita Joshi
Rebecca Bailey*	JR	BIOL/CHEM	Melissa Mefford
Savannah Reed*	JR	BIOL/CHEM	Smita Joshi
Timo Klausnitzer*	JR	PSY	Ilsun White
Tobias Cook*	SR	KHIS	Philip Krummrich
Tyler Hall*	JR	ENSI	Anindita Paul

SMITH COLLEGE OF BUSINESS

Student URF	Class	Department	Mentor(s)
Cynthia Corona*	SO	SBA	Connie Grimes
Landon Palmer	SR	SBA	Steve Chen
Peighton Isley*	SR	SBA	Lucas Lunt

SPACE SCIENCE CENTER

Student URF	Class	Department	Mentor(s)
Breno Pontes*	SR	SSC	Benjamin Malphrus
			Jose Garcia
			Thomas Pannuti
Mila Layne Shearer*	SO	SSC	Emily Ballantyne
			Emily Walter

VOLGENAU COLLEGE OF EDUCATION

Student URF	Class	Department	Mentor(s)

Gwendolyn Akers*	SO	ECESE	Rebecca Roach
Caroline Caudill*	SO	FGSE	Jeannie Justice
Kiersten Pannell*	JR	MGSE	Robin Blankenship
Sarah Miller*	JR	ECESE	Kim Nettleton

*presenting at the 2024 Celebration of Student Scholarship

2024 Posters-at-the-Capitol Participants

Morehead State University is one of nine universities in the state of Kentucky that participates in Posters-at-the-Capitol. The event is meant to showcase the importance of undergraduate research to state legislators. This year, MSU had 15 students with 14 faculty mentors present 12 posters on diverse topics.

Student	Class	Department	Mentor(s)
Landon Fitch**	SR	ENSI	Tyler Ward, Dr. Kouroush Jenab, & Dr. Jorge Ortega-Moody
Alexandria Black*	FR	CRAFT	Dr. Wilson Gonzalez-Espada
Meg Akers*	SR	SSWC	Dr. Bernadette Barton
Stepanie Perry*	SR		
Nicholas Robbins*	JR	MUTD	Dr. Michele Paynter Paise
Dalton Hensley*	SR	ENSI	Dr. Heba Elgazzar
Marissa Blair*	JR	BIOC	Dr. Zahcary Lee & Dr. David Dixon
Grace Stubblefield*	JR	PSY	Dr. Greg Corso
Johnna Brown*	SR	PSY	
Jaden Yates*	SR	PSY	
Madison Cornelius	SR	PSY	
Megan Leonard	SR	PSY	
Sam Derbyshire*	FR	CRAFT	Dr. Timothy Hare
Jaxson Brewer	FR	CRAFT	
Sarah Lakes*	SO	CRAFT	Dr. Rachel Rogers
Dakota Murphy*	SO		
Madison Beam*	SR	SSWC	Lisa Shannon, PhD, MSW
Landon Palmer*	SR	SCBA	Dr. Steve Chen
Jason White*	SR	SSWC	Deirdra Robinson

*presenting at the 2024 Posters-at-the-Capitol

**represented MSU during the Lightning Talks at Posters-at-the-Capitol

2023 - 2024

Recipients of Undergraduate Engagement Fellowships

Morehead State University supports the initiative for students to engage in community and civic engagement, as well as service learning. Listed below are the 2023-2024 awardees and their mentors.

CAUDILL COLLEGE OF ARTS, HUMANITIES AND SOCIAL SCIENCES

Student URF	Class	Department	Mentor(s)
Kennedy Little	JR	HPGL	Christopher Nunley

VOLGENAU COLLEGE OF EDUCATION

Student URF	Class	Department	Mentor(s)
Kiah Randall	FR	TEP	Myiah Clemons Amanda Maynard

Student Participants