

Program and Abstracts
Celebration of Student Scholarship



MOREHEAD STATE
UNIVERSITY

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

April 19, 2023

Celebration of Student Scholarship

April 19, 2023 | Program Overview

- 7:45 - 8:30 a.m.** Registration for all Student Presenters, Mentors and Judges:
3rd Floor ADUC – Outside Ballrooms
Oral presenters: Go to your presentation room and load PowerPoint
Poster presenters: Set up posters in ADUC Ballrooms
- 8:45 – 1:15 p.m.** Oral Presentations |
ADUC 320, 321, and 322
- 11:45 – 1:00 p.m.** Registration for Poster Presenters, Mentors and Judges |
3rd Floor ADUC - Outside Ballrooms
Poster presenters: Set up posters in ADUC Ballrooms
- 1:15 – 3:00 p.m.** Poster Presentations | **ADUC Ballrooms**
- 3:00 – 4:00 p.m.** Poster removal | **ADUC Ballrooms**
- 4:00 – 5:00 p.m.** Award Ceremony: Gallaher Memorial Music Performance, Molly McBride Award, Experiential Education Awards, Student Presenter Awards | **ADUC Theater**
Gifts for student presenters will be distributed at the end of the awards ceremony

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Celebration of Student Scholarship Planning Committee

Megan Boone Katy Carlson Greg Corso
Janet Cline Shannon Harr Andrew Sexton

Concurrent Session Moderators

Laurie Couch Sylvia Henneberg Philip Krummrich
James Masterson Wayne Miller Karen Taylor

Judges

Courtney Andrews Rachel Barber Mark Blankenbuehler Stephen Brigham
Eric Brown Katy Carlson Doug Chatham Steve Chen
Jennifer Grace Clark Alex Cox David Eisenhower Skyler Hamilton
Connie Hardesty Jeffrey Hill Eric Jerde Shari Kidwell
Levita Larson Zachary Lee Adrian Mandzy Melissa Mefford
April Miller Johnathan Nelson Kim Nettleton Tony Norman
Jen O'Keefe Michele Paise Anindita Paul Manuel Probst
Josh Qualls Janet Ratliff Tathagata Ray Emmalou Schmittzehe
Andrew Sexton Lisa Shannon Joyce Stubbs Fajuan Tan
Lisa Wallace 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 superior 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.

Now in its fifteenth year, our 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. Tony Norman, Provost and Vice President for Academic Affairs:

Welcome to the Spring 2023 Celebration of Student Scholarship event. I look forward to walking the building and seeing the variety of scholarly and creative works of our students and their faculty mentors. Although as a university we are committed to quality instruction to provide the foundational knowledge students need to succeed in their chosen field, student participation in research and creative production activities provides the opportunity for students to transition from knowledge consumers to knowledge producers and artistic creators.

As such, this annual Celebration event exemplifies the ideal learning environment Morehead State University strives to create in which scholarship, teaching, and service come together. My many thanks to faculty mentors who have dedicated their time and talents to guide our students' intellectual and creative development. I know you are proud of their accomplishments, but I encourage you to share in that pride because of the support structures you provided to ensure their success. I close with a heartfelt "congratulations" to all of our student scholars for your accomplishments. May these represent the first of many steps on your journey 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, Smith College of Business and Technology



Undergraduate research experiences provide an opportunity for our students to grow their understanding of and apply the knowledge they are gaining in their courses. It also helps students develop their 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 learning experiences that are supported by professional relationships with faculty, that allow students to apply knowledge. The Celebration of Student Scholarship allows us to celebrate the efforts of faculty and students involved in undergraduate research and to showcase the excellent and creative work accomplished through these collaborations.

Dr. Wayne C. Miller, Dean, College of Science

The Celebration of Student Scholarship provides a wonderful opportunity to recognize and celebrate student scholarship and creative accomplishments. The relationship among faculty mentors and student scholars is enhanced when they work together to discover and disseminate new knowledge or express themselves through various forms of creativity. Student research and creative activity is an essential component of undergraduate education. Students working with faculty in scholarly activities not only experience the excitement of discovering new knowledge and solving challenging problems, but also learn important life skills that are necessary to thrive today's ever-changing world.



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: Allyson Robinson

Allyson Robinson is a junior at Morehead State University from Ashland, KY, a Bachelor of Arts in Music major with a minor in Appalachian Studies. Her primary instrument is flute, and has been playing for 10 years. She teaches flute privately. Additionally, she is a first-generation college student and an alum of the Upward Bound Program at Morehead State University. At MSU, she has been involved with CNAfME, Symphonic Winds, Marching Band, Flute Club, Flute Choir, and Sigma Alpha Iota. She also plays in the Bluegrass Wind Ensemble and the Cave Run Symphony Orchestra. When not playing music, she loves writing, being with friends, and exploring nature when the weather is nice. She loves everything that Morehead State has given her, and is extremely grateful for what it continues to do for her passion and education.

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 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 2023 Molly C. McBride Tutoring Excellence Award recipient is **Emily McCreary**. Emily is a junior elementary education major from Catlettsburg, Kentucky. Emily began tutoring for the Tutoring and Learning Center in the Fall of 2022 and has served the TLC in many facets. She has been embedded in English and mathematics courses, has led various study groups, and even served on the peer interview committee. In the words of an MSU student, "She goes above and beyond to make sure she is doing her job, from taking time to have meetings when she is not scheduled on tutor trac, to sending me emails to remind me of our appointments when they are not through tutor track. I really do appreciate this and see a big difference in my grades since I have got help from her. She will also be the tutor I stick with as long as my classes align."

In addition to her work as a tutor, Emily has served as the MSU Choir President, the Tau Sigma Honor Society Treasurer, and the Treasurer for the National Association for Music Education. While doing all of this, she has maintained a 3.8 GPA.

EXPERIENTIAL EDUCATION AWARDS

Presented by the Center for Career Development and Experiential Education

2022 Student Intern of the Year

The Morehead State University 2022 Student Intern of the Year Award is granted to **Jordan Hensley**, a Veterinary Technology major in the College of Science for her internship as a vet assistant at Noah's Ark in Florence, Kentucky. Noah's Ark Animal Clinics are located in four full-service, state-of-the-art clinics, which care for over 50,000 dogs and cats in Greater Cincinnati each year. As an intern, Jordan learned how to successfully gather patient's history, assist the veterinarian with multiple tasks, work directly with clients, and she volunteered to cover shifts in all areas of the clinic. According to her site supervisor, Jordan deserved this award because "not only is she goal oriented and makes sure she is performing 100% of her duties as a tech but she goes above and beyond to learn all areas of the clinic." Jordan grew tremendously throughout her time as an intern at Noah's Ark and her work ethic and professionalism made a profound impact on all those around her.

2022 Faculty Supervisor of the Year

The Morehead State University 2022 Faculty Supervisor of the Year award is granted to **Dr. Leeann Akers** for her outstanding support of students engaging in internships at Morehead State Public Radio (MSPR). MSPR's flagship station, WMKY, can be heard at 90.3 FM, and serves more than 20 counties in Eastern Kentucky. MSPR provides educational, entertaining, and informative programming through the efforts of students, staff, and community volunteers. According to Paul Hitchcock, the General Manager, Dr. Akers "learns the (interns) strengths while encouraging them to explore their inner talents to better prepare them for the workplace." Dr. Akers has been instrumental in nurturing student engagement in the internship opportunities at MSPR, many of whom become employed as student MSPR work studies and go on to accept jobs in the field. Dr. Akers' personal and professional commitment to the value of internships profoundly impacts MSU students' educational experiences.

2022 Employer of the Year

The Morehead State University 2022 Employer of the Year Award is granted to the **St. Claire HealthCare Foundation**, the philanthropic arm for St. Claire HealthCare, which secures the financial resources necessary to support St. Claire HealthCare's mission. This award recognizes Mindy Highly, the Executive Director of Community Engagement & Philanthropy for her impact on student internships at the foundation. Alexa Deaton, an MSU student enrolled in an internship at the St. Claire HealthCare Foundation in the fall of 2022 and shared that "Mindy has prepared me for a future in this field by expanding my knowledge, giving me responsibilities to sharpen my career skills, and has opened doors for me to work with others in the hospital to create connections." Furthermore, Alexa shared that "on top of it all, Mindy has always made sure I am doing well, not only as an intern, but also as a student, and as a person." Internship experiences like this are instrumental for the personal professional growth of MSU students and it is organizations like St. Claire HealthCare Foundation and the mentorship of people like Mindy Highly that make these opportunities possible.

2022-2023 Community and Civic Engagement Award: Faculty

The Award is granted to **Dr. Jeannie Justice**, an Associate Professor of Education Technology in the Ernst & Sara Lane Volgenau College of Education. Dr. Justice was selected for her engagement with the Haldeman Hayes Crossing Community Center which was remodeled from the Haldeman School that was originally built in 1937 by the WPA. Dr. Justice's involvement with the Center started from an MSU Teach course that required students to engage in educational field experience; this short-term engagement turned into a long-term partnership as Dr. Justice was appointed to the Center's board because of her interest and support of their mission. Students from all majors have volunteered at the Center to teach and help attending children. Dr. Justice was selected because of the historical depth and continued engagement with the Haldeman Hayes Crossing Community Center and the value that it brings to the community of Morehead and Rowan County.

2022-2023 Community and Civic Engagement Award: Staff

The staff recipient is **Mr. Paul Hitchcock**, the General Manager of Morehead State Public Radio. MSPR's flagship station, WMKY, can be listened to at 90.3 FM, serving more than 20 counties in Eastern Kentucky. MSPR provides educational, entertaining, and informative programming through the efforts of students, staff, and community volunteers. Mr. Hitchcock began a new initiative in collaboration with Dr. Zavala-Garrett to expand MSPR's programs to serve the Spanish Language Community in the region. Dr. Leeann Akers writes that "NPR recently took up a similar action at the national level, but Paul first started working with students at MSU, majoring in Spanish, to assist in translation of news stories for individuals to read online." Mr. Hitchcock also facilitated print materials to alert the community about the availability of programming. Mr. Hitchcock was chosen because of his efforts to meet a regional need while providing students an opportunity to obtain real-world, hands-on experience related to their major.

2022-2023 Community and Civic Engagement Award: Students

The student recipients for the Morehead State University 2022-2023 Community and Civic Engagement Award is granted to a team of students: Gabriel Barcus, Abigail Cooper, Alexa Deaton, Maddie Dodrill, and Brittany Graziani. This team of students worked together as part of Dr. Janet Ratliff's Level Up BBA 350-700SL course; this course allowed students to complete a service learning project while developing the career skill of teamwork. Their multi-pronged project was part of the Appalachian Teaching Project "Building for the Exchange," funded by a \$5,000 grant from the Appalachian Regional Commission. Under Dr. Ratliff's guidance, these student leaders paved the way for entrepreneurship and business development in the City of Morehead as they researched and completed a business plan for Fresh Start, LLC to offer healthy food options through partnerships with local farmers. Barcus, Cooper, Deaton, Dodrill, and Graziani represented Morehead State University in Washington D.C. to present their research on the project; they also spoke with the board members of Downtown Morehead, Inc. This team of students was selected for their collaboration with one another and entrepreneurial engagement with the City of Morehead.

Concurrent Oral Presentations

Session 1 | ADUC 320

Moderator: Karen Taylor

8:45 - 9:00 a.m.

The Development Of The Rapid Programming Language And Its Pedagogical Merit In Teaching Middle School Students Computer Programming

CS-17

***Dalton Hensley**. Dr. Heba Elgazzar, mentor, School of Engineering and Computer Science, Smith College of Business and Technology**

With every passing year, there appears to be an increasing and insatiable demand for software engineers. Indeed, our research is predicated on this particular market trend, as it is our primary goal to study the efficacy of teaching young students (that are in middle school) fundamental programming skills using our experimental programming language, Rapid. Though to remain completely transparent, it should be noted that this work has been bifurcated into two stages: language development, followed by utilization of the language in teaching programming topics. Current work is focused on the former, so a disproportionate amount of our efforts will be concentrated on the design of Rapid. There are a few essential ideas to consider when designing a programming language: its syntax (i.e., how words, punctuation, or similar language structures produce form); its semantics (i.e., its unambiguous syntactical construction, via a tree representation, from which meaning is derived); and its error reporting (helpful and concise communication between Rapid and the user in the event of a programming mistake, such as a typo). Rapid's syntax takes heavy inspiration from the C language dialects while also borrowing some modern ideas from other languages such as Python and Rust. Fundamentally, the Rapid grammar strives to ensure that every possible Rapid program is unambiguous, allowing very precise and reproducible effects via its semantics. Finally, we conclude that these qualities (combined with Rapid's robust error reporting system) offer a clear path towards educating tomorrow's software engineers.

9:00 - 9:15 a.m.

Machine Learning Based Pedestrian Detection And Tracking For Autonomous Vehicles

CS-18

***Tyler Ward**. Dr. Sherif Rashad, Dr. Heba Elgazzar, mentors, School of Engineering and Computer Science, Smith College of Business and Technology**

Human activity recognition and prediction systems are crucial to the safety of autonomous vehicles. Specifically, a challenge that has been the subject of much research is the ability to differentiate between adult and child pedestrians. Failure to correctly identify the type of pedestrian can cause accidents. We propose a novel multiple object tracking system for autonomous vehicles that is designed to overcome the challenges associated with differentiating between adult and child pedestrians. Our system uses modern machine learning based object detection and tracking methods to identify the type of pedestrian and measure various characteristics about their behavior, such as their speed and trajectory. Results from experiments to evaluate the effectiveness of our proposed framework show that our system is able to correctly differentiate between adult and child pedestrians and can provide useful information about their movements to the autonomous vehicle. Overall, our research demonstrates the potential of our multiple object tracking system to improve the safety and performance of autonomous vehicles.

9:15 - 9:30 a.m.

Classification Of Road Objects Using Convolutional Neural Networks

CS-19

***Mann Patel**, *Dr. Heba Elgazzar*, mentor, School of Engineering and Computer Science, Smith College of Business and Technology**

Driving is the primary means of transportation for many people around the world. Whether the use is to assist human drivers or create autonomous driving, the use of machine learning can create safer road conditions. Drivers must consider other objects on the road, most commonly other vehicles, and pedestrians. These three components, road signs, pedestrians, and vehicles make up a large majority of objects that a driver will encounter when on the road. This research applies machine learning algorithms, specifically Convolutional Neural Networks (CNN), to classify these road objects. The goal is to create a classification model that can reliably classify road objects and classify the different road signs into individual classes. The results showed high accuracy in classifying the objects, even at lower resolutions and poor conditions. An accuracy of 99.13% was achieved on the test set of all classes and an accuracy of 97.45% on the German Traffic Sign Recognition Benchmark competition dataset from the 2011 International Joint Conference on Neural Networks (IJCNN).

9:30 - 9:45 a.m.

Innovative Method For Translation Of American Sign Language Into Spoken English Using Leap Motion Sensor And Machine Learning

CS-20

***Jon Jenkins**, *Dr. Sherif Rashad*, mentor, School of Engineering and Computer Science, Smith College of Business and Technology**

The development of a real-time American Sign Language (ASL) translation system has been a long-standing challenge due to issues such as accuracy, portability, and ease of use. This research project presents an innovative solution that combines the high-speed hand tracking of the Leap Motion sensor with powerful machine learning algorithms to overcome these challenges. Our system uses an adaptive machine learning approach that learns how an individual signs each word within its vocabulary to achieve a high level of accuracy. It then utilizes a Natural Language Processing (NLP) model to translate full ASL sentences into standard English grammar. Experimental results have demonstrated high levels of accuracy and speed while maintaining the inherent portability and ease of use of the sensor. The proposed system can greatly benefit the deaf and hard-of-hearing communities by providing an efficient and accessible means of communication. The research also has potential applications in various fields, including education, healthcare, and entertainment. In conclusion, the combination of Leap Motion sensor and machine learning algorithms provides a promising solution for real-time ASL translation. Our research aims to contribute to the ongoing efforts towards creating an inclusive and accessible society.

9:45 - 10:00 a.m. Continuous Authentication Of Smartphones Using A Cnn Model

CS-21

John Reichenbach*, Dr. Sherif Rashad, mentor, School of Engineering and Computer Science, Smith College of Business and Technology

Current smartphone security is not up to par with current smartphones. The main technology of today is single authentication, meaning that once the smartphone is unlocked it is prone to attacks such as smudging where hackers can steal the password information of the smartphone. To deal with this issue, researchers have come up with the idea of continuous authentication, which can authenticate the user while they are using the smartphone. The most common way is to use biometrics of the user such as their walking pattern, hand movement, orientation, and grasp. Sensors built into the smartphone including the accelerometer, gyroscope, and magnetometer capture data readings for the smartphone which are then sent to an authentication algorithm to confirm the identity of the user. The algorithm is run in the background of the smartphone and that cannot be detected by the user. In this project, the researchers focus on Convolutional Neural Networks, which are known for learning the important features of a dataset and are proven to be much more efficient than traditional machine learning methods such as K-Nearest-Neighbor. Results for this project were compared with similar convolutional neural networks to show that a higher accuracy can be achieved using the proposed method, along with a much simpler design that allows for greater efficiency. Results additionally show that the proposed methodology has strong potential to be implemented in smartphones for continuous authentication.

Moderator: Sylvia Henneberg

10:30 - 10:45 a.m. The Cosmic X Ray Background Nanosatellite 3 (Cxbn 3): Toward An Improved Understanding Of Diffuse Emission Produced By High Redshift Active Galactic Nuclei

CS-22

Breno Pontes*, Brannon Jones. Dr. Thomas Pannuti, mentor, Department of Physics, Earth Science and Space Systems Engineering, College of Science

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 sources of the CXB (particularly at higher energies) are heavily obscured active galactic nuclei 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), the successor to the nanosatellites CXBN-1 and CXBN-2, both of which had a very similar objective: to measure the intensity of the CXB within the energy range of 30-50 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 previous work done on this subject, analyze the data obtained by past missions, and relate this previous work to the CXBN-3 mission objective. 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 the technology of resolution of astronomical observations conducted at X-ray energies.

10:45 - 11:00 a.m. **An Analysis Of A Chandra Observation Of The Galactic Supernova Remnant Kes 27 (G327.4+0.4)**

CS-23 ***Tim Wright**, *Dr. Thomas Pannuti*, *mentor*, Department of Physics, Earth Science and Space Systems Engineering, College of Science**

We present an analysis of an archival pointed observation made of the Galactic supernova remnant (SNR) Kes 27(G327.4+0.4). X-ray observations of SNRs reveal crucial properties of the X-ray emitting plasmas associated with these sources, such as the particle number density of the X-ray emitting plasma and its elemental abundances. The unsurpassed angular resolution of Chandra is essential for performing a spatially resolved spectroscopic analysis of Kes 27. We have extracted and analyzed spectra from concentric regions centered on the central peak emission of the X-ray-emitting plasma and searched for radial variations in the spectral properties (such as temperature, ionization time particularly in our search for radial variations in the spectral properties of the X-ray emitting plasma. We present the results of our work.

11:00 - 11:15 a.m. **Searching For Supernova Remnants In The Nearby Galaxies Ngc 247, Ngc 3184, And Ngc 6744**

CS-24 ***Grant Switzer**, *Dr. Thomas Pannuti***, *Dr. Eric Schlegel***, *mentors*, Department of Physics, Earth Science and Space Systems Engineering**, College of Science, Department of Physics and Astronomy**, University of Texas-San Antonio**

Observations of Galactic supernova remnants (SNRs) are severely impacted by such observational challenges as massive extinction along Galactic lines of sight and significant uncertainties in distances to these sources. These challenges can be addressed by observing SNRs in nearby galaxies located at high Galactic latitudes and with face-on orientations, thus minimizing the effects of extinction along lines of sight. Furthermore, SNRs located in a particular galaxy may be considered to be equidistant, therefore reducing uncertainties in distances to individual sources to uncertainties in the distance to the host galaxy. To increase the number of known extragalactic SNRs with the intent of generating a statistically-significant sample of sources, we have conducted a search in the X-ray and radio for SNRs in three nearby spiral galaxies: NGC 247, NGC 3184, and NGC 6744. For NGC 247 and NGC 6744, we have relied on both published and newly reprocessed images of these galaxies to identify SNRs. For NGC 3184, we have conducted our own analysis of archival X-ray observations of this galaxy as made with the Chandra X-ray Observatory to identify candidate X-ray SNRs. We then compared the positions of the X-ray detected SNRs with candidate radio SNRs identified by an unpublished radio survey of discrete sources in this galaxy as conducted with the Very Large Array (VLA). Initial results will be presented and discussed.

11:15 - 11:30 a.m. Latest Results From The Eastern Ky Light At Night Program

CS-25 *Abigail Fagan**. *Dr. Jennifer Birriel, Dr. Kevin Adkins, mentors, Department of Physics, Earth Science and Space Systems Engineering, College of Science*

The Eastern KY Light at Night program is a weeklong, exploration-based curriculum for middle and high school students in eastern and central Kentucky. These explorations focus on the three types of light pollution, the physics of light pollution, and mitigation methods. Participating students complete an identical diagnostic survey before and after completing the curriculum activities. We will present an overview of the curriculum implementation and statistics from the diagnostic survey for the six groups that have participated since the first implementation during the spring of 2022.

11:30 - 11:45 a.m. All Sky Photography With Raspberry Pi Hd Camera

CS-26 *Hannah Phirman**. *Dr. Kevin Adkins, mentor, Department of Physics, Earth Science and Space Systems Engineering, College of Science*

In addition to providing beautiful sights, lunar eclipses are interesting data collection opportunities. Night sky brightness curves collected during lunar eclipses can be used for multiple studies and class activities. The Unihedron Sky Quality Meter (SQM) provides an efficient and affordable way to collect sky brightness data, however weather conditions, like cloud cover, are not captured by the SQM. Contemporaneous all-sky imaging and weather data are essential for full understanding of the sky brightness curves. A rudimentary implementation of a Raspberry Pi controlled all-sky camera was the focus of a previous senior research project. In this talk we present hardware and software upgrades to the camera and future directions to clear up the image at zenith.

Moderator: Sylvia Henneberg

12:00 - 12:15 p.m. Modeling The Financial And Ecological Perspectives Of Beavers Parachuting Into The Wilderness

CS-27 *Christian Miller**. *Dr. William Tidwell, mentor, Department of Mathematics, College of Science*

In 1948, the Idaho Fish and Game Department relocated 76 beavers from Payette Lake to the Chamberlain Basin to help with a post-World War II housing boom. They decided to relocate these beavers --- with a unique strategy using World War II surplus items --- by parachuting them into this new remote region. Shortly after that, this practice of parachuting beavers stopped and has not been replicated since. We set out to model the financial aspects of this strategy to see if it was fiscally responsible to resume this practice. We compared costs after inflation with current estimates in today's economy to determine whether this practice would be a cost-efficient way of relocating beavers. Additionally, we wanted to look at the population dynamics of these beavers. To do so, we created a probabilistic model incorporating random variables to model the population dynamics over time. In this session, we will discuss these two models and perspectives of this historical event where beavers parachuted into the wilderness.

12:15 - 12:30 p.m.

Investigating Combat Encounter Difficulty In Dungeons And Dragons

CS-28

*Silas Thomas**. *Dr. William Tidwell, mentor, Department of Mathematics, College of Science*

Critical Role, Dimension 20, Stranger Things, and many other influences have placed the tabletop role-playing game Dungeons & Dragons into mainstream culture. Dungeons & Dragons is a mechanically complex game with many moving parts and customizations. This game has shown to be a great way for individuals to express creativity, solve problems, and build social skills, all while having a good time. In the game, you can choose to play as many different kinds of characters to interact with townspeople, steal rare treasures, and fight vicious creatures. One could choose to be a spellcaster, a healer, a warrior, or even a stealthy trickster. With a group of adventurers, there are a number of ways that we could construct a party with these character classes. Our focus on this project is, “Does this party makeup matter when going into combat?” To answer this question, we created an agent-based model to simulate combat encounters and to evaluate the outcome. We then compared this distribution of simulated outcomes with the official difficulty rating provided by the rulebooks for the most recent edition of Dungeons & Dragons. In this session, we will discuss our model and findings for how the simulations compared to the rulebook's.

12:30 - 12:45 p.m.

Investigating The Impacts Of Mathematical Modeling On Future Elementary Teachers’ Perceptions And Communication Of Mathematics

CS-29

*Ryleigh Napier**. *Dr. Will Tidwell, mentor, Department of Mathematics, College of Science*

Research shows that a teacher’s viewpoint and emotions towards mathematics affect the quality and quantity of mathematics instruction they provide. These viewpoints have been tied to student outcomes in the classroom. About half of all Americans --- including teachers --- have unfavorable, negative viewpoints and emotions towards math class, partly due to the perception that mathematics is abstract and lacks applications – spawning questions like “When will we ever use this?”. Mathematical modeling is the process in which students consider and make sense of everyday situations that are analyzed using mathematics to understand, explain, or predict something. When used in the classroom, it provides students with an opportunity to see the real world and the mathematics interwoven within it. This research aims to investigate the application of mathematical modeling in a classroom and understand how it affects a student’s attitude toward mathematics and their communication of mathematics. To do this, students in a preservice teacher course responded to a questionnaire at the beginning and end of a learning module so that we could analyze the individual’s perceptions and communication of mathematics. In this presentation, we will discuss how students’ perceptions changed and their improvements in reasoning and communication after engaging in mathematical modeling. IRB Protocol Number is 22-10-41.

**12:45 - 1:00
p.m.**

**A Statistical Analysis On Whether Or Not Kentucky Universities Have
An Impact On The Crime Rates In Their Counties.**

CS-30

***Andrew Wright**. *Dr. Kathryn Lewis, mentor, Department of Mathematics,
College of Science***

Obtaining an education is something that nearly every child is told they should be aiming for as they grow up. In most cases, the best way to get said education is to attend a university, which is why we will notice a relative abundance of them in every state. This leads us to a question: While each of these universities creates a beneficial situation for the students that attend them, do they also generate an unfortunate impact on the counties they reside in? More specifically, this project will look at some of the significant universities in Kentucky and compare their crime rate against other similar locations to determine if there is a statistical significance that might indicate a correlation between the presence of a university and the crime in that given county. The process for checking to see if the university's presence will cause a noticeable impact will be reviewed utilizing multiple-linear regression and correlation analysis to verify statistical significance.

1:00 to 1:15 p.m.

**Adverse Childhood Events, Safety, And Comfort: Associations
With Adolescent Symptoms.**

CS-31

***Cael Skaggs**, *Madison Howard, Trinity Pangallo. Dr. Shari
Kidwell, mentor, Department of Psychology, College of Science***

Cumulative exposure to adverse childhood experiences (ACEs) has been associated with increased risk for a wide range of psychological and health difficulties (Hays-Grudo & Wilson, 2020). The ACEs approach has provided a paradigm shift in the study of and conceptualization of childhood trauma; however, ACEs are measured rather simplistically. Either the ACE occurred or it did not. Crittenden, Landini, and Spieker (2021) propose that a greater understanding of an ACE's impact may come from knowing the child's developmental capacity to adapt to the ACE, along with the availability of adult protection or comfort. We examined ACEs/psychological dangers in a sample of 21 families with teenagers (average teenage 16.6 years), specifically in relation to adolescent symptoms. Psychological danger was rated using Crittenden's 10-point danger scale, applied to events described in the adolescents' hour-long attachment interviews (TAAI: Crittenden, 2020). Symptoms were rated utilizing the Child Behavior Checklist (CBCL, Achenbach & Rescorla, 2001), which was completed by both the parent and the teen. Analyses are forthcoming, but we expect that higher scores on the ACEs/ danger scale will be associated with greater teen internalizing (i.e., sadness/anxiety) and externalizing (i.e., defiant) behavior. This research was funded by MSU's RCPC & URF programs, as well as KY EPSCoR. IRB Protocol 15-09-11.

Concurrent Oral Presentations

Session 2 | ADUC 321

Moderator: James Masterson

8:45 - 9:00 a.m. **Women In Appalachian Traditional Music: Standing By Herself, Not Her Man**

CS-1 ***Isabella Sailors**. Dr. Ann Andaloro, mentor, School of English, Communication, Media and Languages, Caudill College of Arts, Humanities and Social Sciences**

My research project is in the form of a video documentary, which is 12 minutes and 5 seconds long. I originally had 33 minutes of research and performances in documentary form, which I cut down for this event. Each participant was asked about the history of women in traditional music and their personal experiences. I have been working on this and adding interviews since September of 2022, and I am proud of the result. I included women in multiple generations to get various perspectives and backgrounds. I found that, as time has passed, traditional music has become much more inclusive for women, even though they have always played a major role in the art form. Women in traditional music may have different experiences and the musical environment they grew up in may look different, but traditional music has empowered women more and more over time to stand by themselves apart from their men. Here is the link to my video:
<https://www.youtube.com/watch?v=5kLssbOuQiQ>

9:00 - 9:15 a.m. **Vergangenheitsbewältigung: Germany And Memory**

CS-2 ***Quaydenn Fleming**. Dr. Alana Scott, mentor, School of Humanities and Social Sciences, Caudill College of Arts, Humanities and Social Sciences**

Collective guilt for the atrocities of the Second World War had become an established theme in German life by the 1980s. During this decade the German people struggled to work through their past (Vergangenheitsbewältigung) and made a conscious, collective decision about how they would allow it to affect their future. This paper explores the Historikerstreit, the counter-memorial projects, student movements, and life in Berlin at the time using primary sources including an account from an American student who was directly involved. The research provides links between German attitudes and the constantly-evolving concept of Vergangenheitsbewältigung, including a brief reflection of how the concept has ultimately come to be implemented in a post-reunification Germany.

9:15 - 9:30 a.m.

From Monarchical Dynasty To Islamic Republic: The Role Of Religion In The 1979 Iranian Revolution

CS-3

***Thomas Roberts**, *Dr. Alana Scott, mentor*, School of Humanities and Social Sciences, Caudill College of Arts, Humanities and Social Sciences**

Although the Iranian Revolution of 1979 was called the Islamic Revolution, further examination reveals that religion was only one factor in the event. This project aims to identify the actual causes behind the revolution, and how the religious outcome was a byproduct instead of the catalyst for revolution.

9:30 - 9:45 a.m.

Specters Of Secession: The Rise Of Popular Spiritualism After The American Civil War

CS-4

***Nathan Walden**, *Dr. Benjamin Fitzpatrick, mentor*, School of Humanities and Social Sciences, Caudill College of Arts, Humanities and Social Sciences**

The American Civil War was the deadliest conflict in the nation's history. This utter destruction not only had a profound effect on the soldiers who fought in the conflict, those who were exposed to its violence, and the slaves that found freedom in it, but on the psyche of the nation as a whole. In its wake, many found solace in the idea that those who had perished were still present in some way, shape, or form and as such a myriad of folk stories that claimed the dead were still present in this world began to accumulate. This combined with improved communications technology allowed for the rise of a sort of 'popular spiritualism'. Followed by the rise of sensationalized 'mediums' or other such individuals who claimed they could converse or otherwise carry messages between the dead and the living. This sensationalization continued through the rest of the 19th and well into the 20th century, with elements of it still present in the 21st century. As such Specters of Secession will attempt to chart the cultural, religious, and social factors that lead to the rise of the wave of post-Civil War popular spiritualism, and why it has continued to remain present in American culture well into the modern era. In addition it will chart the development and evolution of this non-religious and acultural set of beliefs. This phenomena will be examined at length through analysis of stories themselves, materials produced for and about the rise of individuals within the movement.

9:45 - 10:00 a.m.

Pro Se Divorce Clinic

CS-5

***Kennedy Little**, *Dr. Laken Albrink ***, *Ms. Melinda Jennings ***,
mentors, School of Humanities and Social Sciences**, Caudill
College of Arts, Humanities and Social Sciences, Caudill College of
Arts, Humanities and Social Sciences**, Morehead State University**

Morehead State University's Legal Studies program has partnered with Legal Aid of the Bluegrass to provide individuals who cannot afford an attorney file for divorce pro se (representing themselves). Under the supervision of a licensed attorney, students assist clients complete the paperwork to obtain an uncontested divorce. Students learn the barriers to access to justice, trauma-informed legal advocacy, and explore ethical considerations relating to the practice of law. Through the clinic, students develop an appreciation for the importance of equitable access to justice for clients and the many barriers clients in the Morehead State service region face when trying to utilize court systems for seemingly simple legal issues. This presentation provides an overview of the clinic with a focus on this year's clinic improvements and case statistics.

10:00 - 10:15 a.m.

**Awe. Cup; An Innovative Menstrual Cup Designed To Promote
Affordability, Wellness, And Empowerment (Awe.)**

CS-6

***Savannah Reed**, *Andrew Dorn**, *Malley Taylor**, *Dr. Rachel Rogers*,
mentor, Craft Academy for Excellence in Science and Mathematics,
Craft Academy for Excellence in Science and Mathematics**

Purpose:

AWE. Cup combats issues of cost, health, and esteem (in Eastern Kentucky) by donating a menstrual cup and sterilization container to the homeless and impoverished every time a unit is purchased on the market.

Innovation:

The AWE. Cup is reusable for up to 10 years, holds as much blood as four tampons, and almost eliminates the risk of toxic shock syndrome.

Existing menstrual cups are painful because they do not accommodate variance in cervix height. AWE. Cup has rims that users can cut to fit their cervix, then folded inside out, providing a smooth surface.

For some users, removing a menstrual cup is difficult and may even result in passing out. AWE. Cup has a tab that can be pulled to break the seal, allowing it to slide out.

Conclusion:

The estimated materials cost is \$0.32 per unit. Including insurance and packaging, the cost is \$11.42, and the donated sterilization container cost is \$2.59. To account for the donated menstrual cup and sterilization container, they will be sold for \$22 online, resulting in a profit margin of \$10.58.

Distributors include the Wolfe County Health Center and Community Center.

Our business provides menstrual cups that offer affordability, wellness, and empowerment to the homeless and impoverished.

Moderator: Philip Krummrich

10:30 - 10:45 a.m. **Translating Contemporary Latin American Poetry**

CS-7 ***Holly Hendrix**. Dr. Philip Krummrich, mentor, School of English, Communication, Media and Languages, Caudill College of Arts, Humanities and Social Sciences**

I am doing a two-year-long project to identify fresh voices in Latin American poetry and to make some of their work available in English. I will publish a bilingual anthology of the poets' original works in Spanish with my translated versions in English by the end of the Spring 2023 semester (ideally by the time of the conference.)

During the conference, I will showcase three of the poems from my collection: Te canto América (I Sing to You, America) by Emanuel Fiorentini from Argentina; Libertad (Liberty) by Rossana Estrada B. from Guatemala; and Atrapasueños (Dreamcatcher) by Moisés Cárdenas from Venezuela. I will read the original version in Spanish and my version in English, then offer brief commentary on some of the challenges I faced in developing the English version.

10:45 - 11:00 a.m. **Jupiter Speaks!: The Amphitryon Theme On Stage**

CS-8 ***Emily Russell**. Dr. Philip Krummrich, mentor, School of English, Communication, Media and Languages, Caudill College of Arts, Humanities and Social Sciences**

My undergraduate research mentor and I have embarked on a major project on the Amphitryon theme in Western Literature. As we began working, we encountered a puzzling phenomenon: the Amphitryon theme has been very popular on stage, in plays, operas and ballets, but almost never shows up in painting or sculpture. We wondered why, and our research so far has led us to suspect that the explanation has to do with another curious fact: the Amphitryon story is one of only three myths in which Jupiter pursues sexual adventures in human form, and actually speaks with the women who are his targets.

11:00 - 11:15 a.m.

The Study Of Diffusion Of Responsibility In Classroom Groupwork

CS-9

***Corissa Riegler**, Dr. Donell Murray, mentor, School of English, Communication, Media and Languages, Caudill College of Arts, Humanities and Social Sciences**

This research takes a closer look at group work in the classroom and whether this method is as beneficial as many instructors believe. Group work has been used in the classroom for decades and many students and instructors view it as a necessary task to help develop social skills and learn to work well with others. However, the theory of diffusion of responsibility suggests group work might be less effective for the collective whole and even prevent these individuals from reaching their fullest potential. In this study, we evaluated current students' opinions and experiences with group work in the classroom setting and whether diffusion of responsibility may have been a factor in some of their shortcomings when it came to group assignments. The method used was a focus group consisting of five individuals and one moderator. The moderator was randomly selected through a random number generator. Each participant was assigned a number to maintain anonymity. Other factors looked at besides diffusion of responsibility include group size effect and risk-taking from previous research.

11:15 - 11:30 a.m.

Illustrations For Language Learning

CS-10

***Abby Hall**, Dr. Karen Taylor, Mr. Willie Carver, mentors, School of English, Communication, Media and Languages, Caudill College of Arts, Humanities and Social Sciences**

Purchasing required expensive textbooks for courses is something every university student is familiar with. The textbooks used in college courses are not only priced extremely high, but are often filled with impressive scholastic vocabulary, tables, graphs, and diagrams that can be very hard to comprehend for a student learning the curriculum for the first time. Dr. Taylor and Mr. Carver have decided to write their own textbook for the French classes they instruct. Their goal is to write a textbook that is easier to read and visually more appealing to make learning in their classes easier for their students. By writing their own textbook they will have all the materials for their class and will not require their students to purchase a textbook on their own. The main issue Dr. Taylor and Mr. Carver have run into when writing this textbook is that their options for illustrations are limited to free clipart online. Free clipart can be fun to use sometimes but it has multiple restrictions and does not always convey the necessary message to students in language classes. I have been invited to work on this project to create the illustrations for them. The goal of my contributions is to make the textbook more cohesive and easier to understand for their students.

11:30 - 11:45 a.m.

**Partnering With Mspr To Translation Local And Regional News
For The Latin Community**

CS-11

***Syria Hines**. Dr. Itza Zavala-Garrett, mentor, School of Creative
Arts, Caudill College of Arts, Humanities and Social Sciences**

Spanish is the second-most spoken language within the United States, but many members of the Latin American Community reside in rural areas with fewer bilingual resources and supportive services. One such resource is local news that can impact one's engagement with the community in which they reside through the announcement of events, political updates, and other relevant information. Partnering with Morehead State Public Radio (MSPR) has allowed for more members of this community to read local news translated into their primary language, providing an opportunity for increased engagement in the region at large and overall awareness of the area.

The general purpose of the partnering with MSPR (Morehead State Public Radio) news is for SPA 440-701SL (Level Up program) students to help the MSPR news be able to reach the Latin community by translating the local news into Spanish, so that more people within the Latin community know what is happening in the city of Morehead and/or Rowan County.

The overall results from the MSPR news translations are that many people within the Latin community can access the news and are better informed about what is happening within the city of Morehead.

In conclusions, we have learned during this experience is that we as Spanish translators is that it is important to make sure that we use the correct terminology and/or to make sure that the sentence is not only grammar correct but also that we relate the message from as clear and informative as possible.

Concurrent Oral Presentations

Session 3 | ADUC 322

Moderator: Wayne Miller

8:45 - 9:00 a.m. **Using Mentor Texts To Engage High School Writers In Genre**

CS-12 *Jacob Ferris**, *Harley Spradlin**. *Dr. Alison Hruby, mentor, School of English, Communication, Media and Languages, Caudill College of Arts, Humanities and Social Sciences*

This is a presentation of results of a teacher-action research project with multiple data gathering, including a literature review, field experience, Socratic Seminar inquiry, and pre-service teaching. Results will be shared in answer to the question, how do mentor texts (i.e., published examples of written texts) affect the way high school writers draft and revise in specific genres?

9:00 - 9:15 a.m. **The Relationship Of Teaching Grammar And Quality Of Student Writing**

CS-13 *Elizabeth Colyer**, *Annabelle Griffiths**, *Virginia Roberts**. *Dr. Alison Hruby, mentor, School of English, Communication, Media and Languages, Caudill College of Arts, Humanities and Social Sciences*

This is a presentation of results of a teacher-action research project with multiple data gathering, including a literature review, field experience, Socratic Seminar inquiry, and pre-service teaching. Results will be shared in answer to the question, does direct instruction in grammar lead to better student writing at the high school level (and if so, under what conditions)?

9:15 - 9:30 a.m. **Methods For Teaching Argument And Debate In High School English In An Era Of Formulaic School Writing**

CS-14 *Hannah Ousley**, *Reese Humble**, *Amelia Meritt**. *Dr. Alison Hruby, mentor, School of English, Communication, Media and Languages, Caudill College of Arts, Humanities and Social Sciences*

This is a presentation of results of a teacher-action research project with multiple data gathering, including a literature review, field experience, Socratic Seminar inquiry, and pre-service teaching. Results will be shared in answer to the question: How can high school English teachers guide students -- and provide them meaningful feedback -- on complex topics for writing, when they face pressure to teach easy-to-assess formulas for expressing ideas?

9:30 - 9:45 a.m.

Growing Up Gifted: What Makes An Honors Student

CS-15

***Kaitlyn Buttrey**, *Dr. Kimberely Nettleton, mentor*, Department of Early Childhood, Elementary and Special Education, Volgenau College of Education**

On the surface, gifted students appear to be provided with the tools for success. A large number fail to reach their expected potential and others exceed all expectations. Where in lies the difference? Demographic differences, educational experiences, psychological and emotional well-being can all impact the gifted student's trajectory in life. This study will examine common environmental, social, and educational experiences shared by Honors students. While Survey Data, collected analytically through a nationwide survey of college honors students, provides the basis of the study, individual interviews also provide more detailed data. The findings have the potential to point gifted education into a successful direction and help inspire gifted students. The study provides data supporting change in gifted services that may prevent social, emotional, and psychological issues that stem from being gifted. While being gifted does not ensure success, society can ensure a positive environment to help gifted children grow into their full potential.

9:45 - 10:00 a.m.

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

CS-16

***Madison Woosley**, *Caroline Caudill, Regan Massie**, *Ms. Jeannie Justice, mentor*, Department of Foundational and Graduate Studies in Education, Volgenau College of Education**

Essentially this will be a two-fold action research project. Each MSU student will be working on a specific type of lesson and will gather data on how their lesson worked on this population. They will research lessons, research the population, and create a lesson. The lessons will then take place at an after-school program for k-6 garde students. They will gather data on how that lesson went. They will draw conclusions from the results of the data. Dr. Justice will help them along the way so that they learn that they are doing an action research project and that this is something that they can do on their own when they become teachers. Dr. Justice is planning to collect their data longitudinally to see if over time, she can find overlapping characteristics of these lessons, both the successes and fails, to determine if she can find a set of characters about lessons for this population. 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.

10:00 – 10:15 a.m. Beating the Odds: A Study about the Changing Perceptions of Single Motherhood

CS-42 Xandi Jent*. Dr. Philip Krummrich, mentor, School of Business Administration, Smith College of Business and Technology.

In recent years, there has been a surge in the number of single-parent families, especially those led by single mothers. A strong stigma normally surrounded these women, often painting them as villains to society, faulting them for the rising crime rates and school dropout rates. Their image and identity were automatically tainted because a man was absent from the household. However, as the 21st century progresses and more feminist and women empowerment movements start to gain traction within the next generations, there is the suggestion that these negative ideas of single motherhood do not match the current reality. This study aimed to evaluate the perception of single motherhood across several age groups of women and identify the diversity that exists among all women who are single mothers. From the initial research and presentation of this study at the Kentucky Honors Round Table, the research focus was extended to investigate perceptions of single fatherhood. Using the gathered data, a comparison was made between the single motherhood and single fatherhood, both in real and fictional portrayals. Therefore, this study will also briefly identify contrasting experiences of single mothers versus single fathers and examine differing themes of these two parenting statuses in various media and pop culture. IRB Protocol 22-08-12.

Moderator: Laurie Couch

10:30 - 10:45 a.m. Genetically Engineering S. Cerevisiae With A Circular Chromosome II

CS-37 Austin Lytle*. Dr. Melissa Mefford, mentor, Department of Biology and Chemistry, College of Science

While prokaryotes contain circular chromosomes, eukaryotes contain multiple linear chromosomes. Eukaryotic linear chromosomes require telomeres at their ends to protect from degradation; however, they cannot be fully copied during DNA replication. To solve this problem, eukaryotes require telomerase to maintain telomere length. However, telomeres still shorten with age. Our lab is interested in why linear chromosomes evolved in the first place. To test this question, we developed a genetic engineering approach to circularize each of the 16 *Saccharomyces cerevisiae* yeast chromosomes. We use PCR to create DNA cassettes to insert into the right and left arms of a chromosome. Each cassette contains a unique selectable marker (HIS3 or LEU2), one half of the URA3 gene with a region of overlapping homology, and homology to the telomeric region of the target chromosome arm. The cassette DNA is transformed into haploid yeast cells, and integration is selected for by growth on media lacking histidine and leucine. To verify integration into the expected location, we perform PCR across the integration junctions. Once double integrants are confirmed, recombination between the two URA3 halves results in circularization of the chromosome, which is selected for on media lacking uracil. Using this approach, I have successfully confirmed the circularization of Ch. II. Initial phenotypic characterizations of the circularized Ch. II strain revealed no major defects, suggesting the telomeres and linear architecture of this chromosome are dispensable for growth. In the future, these experiments will help determine how circular versus linear chromosome architecture impacts a eukaryotic species.

10:45 - 11:00 a.m.

**Circularization Of Chromosome Xv In The Eukaryote
Saccharomyces Cerevisiae To Study Telomere Evolution.**

CS-38

***Caleb Clark**, Dr. Melissa Mefford, mentor, Department of Biology
and Chemistry, College of Science**

Prokaryotes have circular chromosomes, whereas eukaryotes have linear chromosomes with ends called telomeres. The evolution of linear chromosomes in eukaryotes is thought to permit meiosis and sexual reproduction. However, telomeres cause an evolutionarily unfavorable condition during the synthesis of new DNA strands known as the “end-replication problem”. Briefly, the terminus of the lagging strand daughter DNA is shorter, which if not fixed would result in the loss of genetic information with each round of replication. To counteract this end-replication problem, most eukaryotes evolved the enzyme complex telomerase to add nucleotides to the end of the chromosome and prevent the loss of genetic information. To better understand the evolution and function of linear chromosomes, we are genetically engineering a simple eukaryotic organism, *Saccharomyces cerevisiae*, to convert each of their 16 linear chromosomes into circularized versions. Our approach utilizes DNA cassettes with selectable marker genes that are inserted into the ends of a single chromosome. The DNA cassettes can undergo DNA recombination to join the ends of the chromosome together, eliminating the telomeres and creating a single circular chromosome. Chromosome XV has been circularized and phenotypic characterization revealed no temperature, salt, UV, or doubling time phenotypes versus the wildtype. Further characterization will include circularization of the opposite mating type to test meiotic reproduction. Ultimately, these experiments will provide better understanding of the function and evolution of linear chromosomes in eukaryotes.

11:00 - 11:15 a.m.

**A Dendroecological Study Of The Forest In Spaws Creek Gorge,
Menifee And Morgan Counties, Ky**

CS-39

***Ashley Hunt**, Dr. Allen Risk, mentor, Department of Biology and
Chemistry, College of Science**

Dendrochronology involves using the patterns of the annual growth rings found in trees to date events and changes in the environment during the tree’s lifetime. The annual growth rings can be measured and analyzed to determine if any disturbances in the forest, such as logging and fire, or if any environmental pressures affected the growth of trees in the area. In the Spaws Creek area, logging was performed by settlers of the area during the early 1900s. We believe logging took place in a linear pattern, starting in the eastern part of the Spaws Creek Gorge and ending in the western portion of the gorge. When large trees are removed, the forest canopy is exposed, allowing saplings to take advantage of the newfound sunlight and soil nutrients. This causes the annual growth rings to expand notably, sometimes exponentially. This is called a “release” in dendrochronology. Our research is focused on quantifying the extent of the release and discovering a correlation between the release year trend of the remaining trees and their placement in the gorge, allowing us to reconstruct the logging patterns of the Spaws Creek Gorge.

11:30 - 11:45 a.m.

Proof Of Concept Test For Multiple Floor Isolated Building Under Seismic Excitation

CS-41

***Ryan Justice**. Dr. Tathagata Ray, mentor, School of Engineering and Computer Science, Smith College of Business and Technology**

Recent earthquakes in Taiwan and Turkey have raised questions about the effectiveness of the current means of preventing earthquake damage in buildings. One of the existing means of protecting a building from earthquake damage is referred to as “base isolation,” where isolators are placed between the foundation and superstructure of a building. While this is often effective at protecting structural elements of a building, nonstructural elements, such as hospital beds, HVAC units, elevators, pipes, and drywall, often face catastrophic damage during earthquakes. This research project aims to test the effectiveness of “floor isolation,” where isolators are inserted not only between the foundation and superstructure but also between the individual floors of the building. The testing compared the resulting accelerations of a base-isolated and floor-isolated building, and it consisted of testing model buildings and other testing using computer software. The model building testing consisted of models made using styrofoam floors and walls with rubber balls representing roller bearings and paper business cards representing elastomeric bearings, the two elements of which the floor isolation design consists of. The models were subjected to scaled accelerations by a shake table to measure the effects on the buildings. Additionally, four juniors from the Craft Academy assisted with the testing in order to give the URF for the project, Ryan Justice, a chance to mentor the students in college level research.

Moderator: Philip Krummrich

12:00 - 12:15 p.m.

Catastrophe Theory Applied To Physical Systems

CS-32

***Kelsey Ball**. Dr. Joshua Qualls, mentor, Department of Mathematics, College of Science**

Despite the ubiquity of nonlinear phenomena in modeling the physical universe, many undergraduate institutions are only able to offer an introductory course on ordinary differential equations. Morehead State University is in the process of creating an Applied Mathematics track that will include a course on nonlinear dynamics. This course will better integrate the concepts of pure mathematics with exercises and investigations that emphasize computational and numerical approaches to topics like bifurcation theory and catastrophe theory. One popular choice for demonstrating concepts in catastrophe theory is the mechanical system of a mass that is subjected to a spring force and that moves along a tilted wire. In this talk we will cover the foundations of catastrophe theory and how they apply to physical systems. In particular, we examine an experimental set-up and use mathematical analysis to compare experimental behavior to our numerical simulations regarding stability bifurcations.

12:15 - 12:30 p.m.

The Newtonian Limit Of Hermitian Gravity In 8 Dimensional Complex Space

CS-33

***Richard Knupp**. Dr. Joshua Qualls, mentor, Department of Mathematics, College of Science**

A unified theory of gravity has been a long-standing problem in modern-day physics. Many attempts have been made to intricately weave general relativity and quantum mechanics into a smooth fabric. The works of Mantz, Prokopec, and Burgers suggest that by considering the theory of Hermitian gravity, one can approach this unification problem in a different way. In this presentation, we extend the work of Mantz, Prokopec, and Burgers. In the authors' paper, they show the Newtonian limit for three complex dimensions. In this paper we show the Newtonian limit for eight complex dimensions to better understand the theory of Hermitian gravity and further generalize Einstein's theory of general relativity.

12:30 - 12:45 p.m. Numerically Solving Bound State Energies For Norton's Well

CS-34

Ashley Peters**. *Dr. Joshua Qualls, mentor, Department of Mathematics, College of Science

Norton's dome is a three-dimensional dome that comes to a point on top, where a particle is placed. When solving for the equations of motion for the particle, there are two solutions. In one solution, the particle stays there indefinitely. The other solution shows the particle falling down the side of the dome after an arbitrary amount of time. The first half of this thesis explores the equations of motion using Lagrangian mechanics to understand the shape of Norton's dome. The second half of this thesis flips Norton's dome upside down to make it Norton's well. The well retains the shape of the dome, and now it can be used as a finite well. Using principles of quantum mechanics, the bound states for different sizes of Norton's well are calculated numerically using the "wag the dog" approximation method.

12:45 - 1:00 p.m. Statistics In The Sand

CS-35

Anya Reinhard**. *Mr. Christopher Schroeder, mentor, Department of Mathematics, College of Science

Collegiate beach volleyball is seeing huge growth in the number of teams and level of play, but there is little to no comprehensive rankings for these NCAA teams. The current rankings only take into account the top few teams or those within the same conference. In this talk we will look at data from the 2022 spring records of each D1 NCAA team to create a comprehensive ranking for all D1 teams. We will use MATLAB to automate the so-called Random Walker method, which assigns autonomous fans a number of votes for each team, then has them change their vote, with a set probability, based on whether their current team won or lost that match. This project will allow for a full ranking of each NCAA team in one place and by comparing the number of votes each team ends up with there is a chance to better predict upsets.

1:00 to 1:15 p.m. Rotate!: A Statistical Analysis Of Volleyball

CS-36

Bridget Bessler**. *Mr. Christopher Schroeder, mentor, Department of Mathematics, College of Science

There is surprisingly little data analytics methodology for the sport of volleyball. In this talk, we will set out to try and modify player ratings from other sports to create a statistical analysis of each player's successes on the Morehead State Volleyball team. Modifying Baseball's Pythagorean Theorem and Basketball's Adjusted +/- Player Ratings, we will attempt to create a prediction of how well each player will do in a particular game. Our goal is to use mathematics to find the most successful players and then predict the most successful lineup of players using conference games in the 2022 season.

Poster Session

1:30 – 3:00 p.m.

ADUC Ballrooms

The Biodiversity Of Ichneumonoid Parasitoid Wasps In Eastern Kentucky

P-1

Shelby Barker. Dr. Sean O'Keefe, mentor, Department of Biology and Chemistry, College of Science

Biodiversity refers to the number of different species in an area, and it is used to justify conservation projects' goals and provide metrics for their successes. Hymenoptera is an insect order that contains ants, bees, and wasps; it is incredibly diverse in terms of species. Their diversity exceeds the total diversity of all vertebrates. The majority of wasps are parasitoids (45 of the 74 families in North America are parasitoid wasps). Parasitoids target specific hosts and lay their eggs on or in them. Parasitoid biodiversity is especially great in the Ichneumonoidea, consisting of the families Ichneumonidae and Braconidae. The Ichneumonoidea is extremely diverse, with an estimated 31,000-200,000 species worldwide. In North America, the Ichneumonoidea includes 61 subfamilies, 465 genera, and over 3,300 described species. Ichneumonoids play a large role in affecting natural ecosystems. Ichneumonoidea are also incredibly host specific, and therefore make excellent candidates as biodiversity indicators. Ichneumonoid hosts are diverse, including aphids, beetles, sawflies, termites, moth and butterfly larvae, lacewings, flies, other wasps, etc.; and different parasitoids may target hosts at different stages of their lives. Ichneumonoids are also sensitive to environmental disruption. Their specificity and biodiversity also means they can be used for biocontrol projects with great success. Understanding the biodiversity of these wasps can help us indicate the biodiversity present in an ecosystem and contribute to agricultural and forest health. We have collected several thousands of wasps from pan traps in Rowan county, and at least one-third are Ichneumonoids.

Biodiversity Of Social Vespidae Wasps In Eastern Kentucky

P-2

Leire Galvan, Hannah Edmonds *, Hannah Ramey*. Dr. Sean O'Keefe, mentor, Department of Biology and Chemistry, College of Science*

Biodiversity often refers to the number of species in an area, which includes plants, animals, fungi, protists, and bacteria. Biodiversity is known to support healthy ecosystems, which clean our water, purify air, maintain soil, regulate climate, recycle nutrients, and provide food. Biodiversity is known to provide species with the ability to adapt to new environments and survive threats from competitors and parasites. Biodiversity can be used as an indicator of measuring the health of an ecosystem. Bioindicators are organisms that are used as surrogates for biodiversity to indicate the health of an ecosystem. Hymenoptera is a large group of insects that include bees, ants, and wasps. Social wasps, solitary wasps and parasitoids wasps can be considered as great bioindicators because of their role in assessing biodiversity. Social wasps play major roles in natural pest control/management, pollination, and ecosystem balance. Specifically, social wasps such as the paper wasps, bald-faced hornet, and yellowjackets, provide other resources such as sustenance for other animals, and act as predators of many pest insects. As part of our research, we reviewed the social wasps, which include some 700 species worldwide and 20 different species in North America. The social wasps native to eastern Kentucky include paper wasps (Polistes), yellow jackets (Vespula), hornets (Dolichovespula) and the European hornet (Vespa). Social wasps are known to live in large colonies, build distinctive nests, and for their painful stings. They belong to a single-family the Vespidae.

Biodiversity Of Solitary Sphecidae Wasps In Eastern Kentucky

P-3

Hannah Edmonds*, Leire Galvan*, Hannah Ramey*. Dr. Sean O'Keefe, mentor, Department of Biology and Chemistry, College of Science

Biodiversity refers to the measure of variety of living species in an area, which includes plants, animals, fungi, protists, and bacteria. This can include large ecosystems and the varying genetic diversity of species present within. Biodiversity is widely known to support the production of healthy ecosystems. Biodiversity is known to provide species with the ability to adapt and thrive in an ecosystem and survive the threats of parasites and competitors. Biodiversity is also known to be the key indicator of the health of an ecosystem. Bioindicators can be defined as species that allow for the health of an ecosystem to be continuously assessed. Hymenoptera, one of the largest orders of arthropods, includes ants, bees, and wasps. The wasps themselves can be divided into social wasps, solitary wasps, and parasitoid wasps. Wasps, specifically, play major roles in natural pest control and management, pollination, and ecosystem balance. Specifically, the solitary wasps such as mud daubers, sand wasps, and thread-waisted wasps, are known to provide other resources such as sustenance, and act as predators of many insects that can be specifically harmful to humans. In this part of our research project, we reviewed the solitary sphecid wasps. These have been known to contribute to the diversity in insects with over 1100 species native to North America. Solitary wasps are known to nest in the ground or build nests out of mud. They are also known to avoid people if at all possible and are not harmful to the population.

Biodiversity Of Solitary Vespoidea Wasps In Eastern Kentucky

P-4

Hannah Ramey*, Leire Galvan*, Hannah Edmonds*. Dr. Sean O'Keefe, mentor, Department of Biology and Chemistry, College of Science

Biodiversity is one of the most essential parts of the solution to climate change. It measures the variation of all living species that are found within an area. Biodiversity is usually measured using bioindicators. Hymenoptera, a group of insects including, ants, bees, and wasps, can be a good surrogate to measure biodiversity because they are exceedingly diverse. The use of Hymenoptera saves approximately \$146 billion annually on plant pesticides and chemicals worldwide. There are 4 broad categories of wasps that are responsible for this, parasitoid wasps, social wasps, solitary sphecid wasps, and solitary vespoid wasps. Solitary vespoid wasps, including Tiphidae, Mutillidae (velvet ants), Pompilidae (spider wasps), and Scoliidae, provide crucial roles within our ecosystems. Tiphidae include about 200 species in North America, which are mostly parasites of scarab beetle larvae. Mutillidae (velvet ants) are parasites of larvae of wasps, bees, beetles, and flies with about 435 species in North America. The 290 species of Pompilidae (spider wasps) are very common, but hard to identify, they all parasitize on spiders. All 23 species of Scoliidae wasps in North America parasitize scarab beetle larvae. Many of these wasps parasitize crop pests such as plant bugs, scarab beetles, and moth caterpillars. These wasps are a beneficial natural control of pest insects.

The Kentucky Ant Project: An Attempt To Catalogue The Ant Species Of Kentucky

P-5

***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 than that. Not only are they vital to monitor as 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, we know there are about 900 species of ants.

Kentucky is home to some of the most biologically diverse areas in the US. Despite this, 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 (ie. 74 species in Kentucky, 132 in Ohio, 139 in Indiana, 147 in Illinois, and 149 in Tennessee). The goal of the Kentucky Ant Project is to remedy this data disparity. This year, we created a projection of what species are likely to occur in Kentucky, some simple identification resources, and information about the diversity of Kentucky Ant Fauna. As work on the project progresses, we plan to confirm species on this list (and hopefully find new ones).

We predict that there are 30 ant genera in Kentucky, from 6 subfamilies. This includes 4 unrecorded genera, Dorymyrmex, Forelius, Dolichoderus, and Formicoxenus. We also report new state records for Kentucky, including Aphaenogaster picea, Stenamma diecki, Myrmica sp., and Solenopsis sp. This poster will also feature an Augmented Reality Component for visitors to interact with.

Leaf Litter Inhabiting Spiders: An Ignored Guild?

P-6

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

There are over 100,000 described species of arachnids in the world; these include spiders, scorpions, ticks, mites, etc. There are some 45,000 described species of spiders worldwide, with 3,800 species known from within the United States. Spiders can be classified into a number of guilds, including sensing web weavers, sheet web weavers, space web weavers, orb web weavers, specialists, ambush hunters, and ground hunters. A guild for spiders is defined as a group of spiders that exploit similar resources using similar behaviors in the same habitat. We are interested in assessing the spiders that are obligatory leaf litter dwellers – these are spiders that spend their entire lives within the tight spaces of the forest floor leaf litter. These spiders, as adults are extremely small, 1-3 mm in length, and only occur in a habitat that is largely ignored by most arachnologists. Therefore, for this project, we are interested in assessing the biodiversity of spiders that are obligatory leaf litter inhabitants. Obligatory leaf litter spiders may represent an ignored guild of spiders. To date, we have identified 13 families of leaf litter dwelling spiders, but only five families we consider obligatory leaf litter inhabitants. These include spiders from the families Cybaeidae, Gnaphosidae, Liocranidae, Lycosidae, and Salticidae. We are only examining mature male and female spiders since these are most likely obligatory leaf litter dwellers. The most abundant families include both Liocranidae and Lycosidae, with Salticidae and Gnaphosidae being the least abundant.

Predicting The Reactions Of CS₂ With Group Iv And Group Vi Transition Metal Oxides

P-7 *Marissa Blair**, *Dr. Zachary Lee***, *Dr. David Dixon ***, *mentors*, Department of Biology and Chemistry**, College of Science, Department of Chemistry and Biochemistry**, The University of Alabama, Tuscaloosa Alabama

Building onto a recent series of ab initio studies of various acid-gas reactions with metal oxide sorbents, electronic structure methods are being used to study the addition of CS₂ to Group IV (MO₂)_n and Group VI (MO₃)_n (n = 1, 2, 3) nanoclusters, beginning with the MO₂ and MO₃ monomers according to a "bottom-up" approach. The preliminary density functional theory (DFT) calculations in this study provide structures and vibrational frequency thermodynamic corrections for later expanding upon by way of single point correlated molecular-orbital theory (MO) calculations, mainly CCSD(T) and MP2 to study the structures and energies which could arise from Lewis acid-base addition (physisorption) and formation of COS₂²⁻ (chemisorption) of CS₂ to these clusters will be predicted. For future work, these CS₂ ligand binding energies (LBE) will be compared to established CO₂ results in the literature and to any known experimental and computational values for the interactions of CS₂ with bulk metal oxides. These LBEs will then be analyzed for any correlation to any known trends in the metal oxide Lewis acidity, metal oxide redox chemistry, and acid gas basicity to establish useful thermodynamic benchmarks for the practicality of Group IV and Group VI transition metal oxides for the sequestration and conversion of CS₂. The results of this work and beyond could also have serious implications for the sequestration of CS₂ from high-sulfur areas of the arctic permafrost and could provide valuable mechanistic insights into the possible reactions and products of metal oxide degradation during the Claus Process.

STEM Persistence In Kentucky: What Disparities Affect Students?

P-8 *Riley Hicks**, *Dr. Wilson Gonzalez-Espada*, *mentor*, Craft Academy for Excellence in Science and Mathematics, Department of Physics, Earth Science and Space Systems Engineering

Even though children in the U.S. have the right to receive a quality education, concerns about disparities in school funding, facilities, and resources between different counties within a state have emerged. This "zip code effect" causes some students to be "predestined" to receive a poor foundational education based on their home address. Because high school STEM classes require lab space, materials, equipment, and specialized teachers, disparities in school funding can impact students who want these careers, particularly in quantitative disciplines like mathematics. To make matters worse, national research suggests that female college students experience further disparities and are less likely to declare a STEM major and persist until graduation. The purpose of this exploratory study is to identify disparities associated with STEM persistence in Kentucky.

Predicting The Mechanism And Products Of CS_2 Capture By NH_3 An Exemplar Benchmark Study

P-9

Shelbie Black**, *Dr. Zachary Lee, *Dr. David Dixon***, *mentors*, Department of Biology and Chemistry**, College of Science, Department of Chemistry & Biochemistry**, Arts & 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 CS_2 with NH_3 and H_2O in the gas phase and to determine the plausibility and kinetics of thiocarbonic acid, thiobarbonate, thiocarbamic acid, and thiocarbamate from the possible sequestration processes of CS_2 by amines. An implicit self-consistent reaction field aqueous solvation approach (COSMO) was applied to the gas phase pathways to provide insight into these CS_2 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 CS_2 capture by amines in both the gas phase and aqueous solution as well as in the solid state, analogous to amine capture of CO_2 mechanisms recently established by the respective Dixon and Lee research groups. These mechanisms of CS_2 sequestration may have serious environmental implications for the development of CS_2 scrubbing techniques for industrial CS_2 emissions as well as significant atmospheric and astrochemical relevance as it pertains to the possible formation of thiocarbonates and thiocarbonates in areas of high organosulfur content, such as Earth's permafrost or the atmospheres of Venus and Saturn's largest moon Titan.

Linked In Analysis Job Placement For Students In Sport Management Program Of An Eastern Kentucky Public University

P-10

***Jose Garcia**, *Will Wellman**, *Dr. Steve Chen*, *mentor*, School of Business Administration, Smith College of Business and Technology**

In addition to standardized tests and program assessments of academic programs, tracking college graduates' employment is deemed as an effective method for measuring student success. In this case study, the authors examined 334 students' LinkedIn profiles (57% males & 43% females) by using keywords such as the name of the institution and sport management to gather information about current employment status, degree of program completion and primary skills of observed individuals. Results showed that 205 students had completed a bachelor degree in sport management from 2011 to 2022. The rest of 129 students were majored in 15 different degrees or programs, but had their profiles associated with sport management field. Despite the job placement rate of sport management graduates remained high (> 80%), only about 34% of them held a sport-related job. In general, students majored in a business- (including sport management) and technology-related degrees dominated the observed profiles. Organizing skills, creativity, teamwork, problem solving, flexibility, leadership, collaboration, and, communication were top self-perceived job skills among the observed students. Overall, these identified job skills were coincided with the primary skills for job success suggested by numerous studies. Sport Management graduates may not necessarily hold a sport-related jobs; however, they remain competitive in the job market as long as they self-reported the essential job skills on their profiles. After witnessing many undergraduate students' profiles through our observations, the authors encouraged the future students to create a LinkedIn profile, especially those who study in social sciences and arts.

Challenges In Creating Circularized Versions Of Linear Chromosomes

P-11

***Tanner Hamilton**, Dr. Melissa Mefford, mentor, Department of Biology and Chemistry, College of Science**

DNA, the genetic material of organisms, is arranged in structures called chromosomes. Chromosome structure can vary from a single circular chromosome in prokaryotes to multiple linear chromosomes in eukaryotes. The ends of linear chromosomes are composed of specialized regions called telomeres, which protect the DNA from degradation. However, each time a cell replicates, telomeres become shorter due to the end-replication problem. The goal of our lab is to circularize the linear chromosomes of brewer's yeast (*Saccharomyces cerevisiae*), a unicellular eukaryote with 16 chromosomes. Our genetic engineering strategy involves creating two DNA cassettes and inserting them into the left and right arms of a target chromosome. Once the cassettes are integrated, we select for a DNA recombination event that circularizes the linear chromosome. I have been working on three chromosomes (Ch. I, III, and V), which have presented various interesting challenges to our proven genetic engineering strategy. It is possible that additional troubleshooting will allow confirmation of these circular chromosomes. Alternatively, these chromosomes could be lethal when circularized, which would be an interesting result to explore what features make these chromosomes different from those that can be circularized. Together, these experiments will shed light on the function and evolution of linear versus circular chromosome architecture.

Sex Differences In Parkinson's Disease: Brain Regions Affected, Symptoms, And Treatment

P-12

***Sara Monfalcone**, Dr. Ilsun White, mentor, Department of Psychology, College of Science**

Parkinson's disease (PD) is a neurodegenerative disorder, characterized by motor and non-motor symptoms. Motor symptoms include resting tremor and inability to initiate movement. Non-motor symptoms include depression, inability to recognize emotion, and REM sleep disorder. This study examined the neural basis of PD and treatment and also compared sex differences through literature review. Results indicate that in females with PD, the visual cortex, raphe, and locus coeruleus showed a greater atrophy, whereas in males, the frontal cortex and globus pallidus showed a greater atrophy. Consistent with such brain pathology, females showed more non-motor symptoms, compared to males. However, males showed a greater severity in motor symptoms, compared to females. Moreover, treatment of symptoms differed, in that more motor symptoms were primarily treated with dopamine agonists. On the other hand, non-motor symptoms were treated with serotonergic and/or noradrenergic agonists. Present findings demonstrate that sex difference in PD symptoms are likely to be mediated via different brain regions, and also emphasize the importance of differential treatment in motor and non-motor symptoms in PD. A further study is warranted.

Comparison Of Methanol, Water, And Hplc Mobile Phase As The Solvent For Quantification Of Nicotine Using Hplc

P-13

***Josephine Traver**, *Dr. Emmalou Schmittzehe*, mentor, Department of Biology and Chemistry, College of Science**

Nicotine is a highly addictive chemical present in the tobacco plant. E-cigarettes, predominantly used among the adolescent population, are becoming increasingly popular. We can quantify the nicotine levels in unknown solutions using HPLC (high-performance liquid chromatography) by first preparing a calibration curve from standard nicotine samples. This experiment aims to understand the difference between using various solvents for the nicotine samples and how using one solvent may be more effective.

Six solutions were prepared in varying concentrations of nicotine mixed with three different solvents: methanol, water, and the HPLC mobile phase (a mixture of water, acetonitrile, and triethylamine). These solutions were then run through the HPLC and the signal areas were used to create a calibration curve for nicotine with each solvent. By comparing the slopes of the lines and the R^2 values, we can create a hypothesis on why one solvent may be more effective than the other.

Based on the graphs, it can be concluded that the use of HPLC mobile phase created a more linear trend in comparison to the use of methanol and water. By comparing the R^2 values, we can see that the HPLC mobile phase is closer to 1.000, having a difference of 0.008, while the use of the solvent methanol is further away from the R^2 value being 1.000, the difference being 0.0417.

The Revitalization Of Hazel Green Academy

P-14

***Bethany Lucio**, *Sagar Patel**, *Jude Hall**, *Camryn Banbel**, *Derek Gill**, *Allison Hall*, *Alyssa Turner*. *Dr. Rachel Rogers*, *Dr. Thomas Kiffmeyer*, mentors, Craft Academy for Excellence in Science and Mathematics, Craft Academy for Excellence in Science and Mathematics**

Hazel Green Academy (HGA) was a residential college preparatory school founded by W.O. Mize, J.T. Day, and Green Berry Swango in Wolfe County, KY in 1880. It offered a work-study program for those unable to pay tuition and offered STEM based courses to the often-overlooked students of Appalachian Kentucky. HGA continually added buildings to its campus to better serve both students and the community up until 1983, when the steady influx of public schools and decreasing enrollment caused the academy to close. The only two buildings remaining useable are the former general store, now the Jot 'Em Down secondhand store, and the administrative building that holds classrooms and an auditorium. The Hazel Green Academy Leadership Team of students at the Craft Academy have recognized the historical and regional significance of the academy and have been working closely with the Hazel Green Christian Church and the community of Hazel Green, KY to restore and revitalize the campus. Utilizing Craft Academy volunteers, regional companies and organizations, and the members of the community, we have made steps to propel HGA back to its original glory. The team has been working with our academic mentor to nominate the campus onto the Historic National Register to further preserve its public history, moving to open the auditorium as a venue space for Music on the Green, and to utilize the classrooms for educational outreach and classes. We hope to preserve the original function and style of the buildings while bringing new life to them.

Synthesis Of Asymmetric Hydroxyfulvenes

P-15

***Alina-Sophie Koch**. Dr. Mark Blankenbuehler, mentor, Department of Biology and Chemistry, College of Science**

The synthesis of a variety of asymmetric hydroxyfulvenes was attempted using lithium cyclopentadienide and an acyl halide. The reactions, performed at low temperatures, yielded a mixture of symmetric and asymmetric hydroxyfulvenes. The mixtures were purified via column chromatography using silica and a 90/10 mixture of hexane and ethyl acetate. The recovered compounds were analyzed using Proton Nuclear Magnetic Resonance (HNMR) and thin-layer chromatography (TLC).

Research On Energy Harvesting And Wireless Charging Technology For The Internet Of Things (Io T) Applications

P-16

***Aidan Ray**. Dr. Anindita Paul, mentor, School of Engineering and Computer Science, Smith College of Business and Technology**

This ongoing research intends to build and test a prototype of a typical system that harvests energy from the environment and wirelessly transfers this energy to Internet of Things (IoT) devices. The availability of the harvested energy varies mainly with time in a non-deterministic manner. We will consider multiple energy-scavenging sources for an uninterrupted power supply to the network. We have started this work considering photovoltaic energy harvesting to test ideas and build foundational knowledge. A PV cell is used for harvesting photons from solar and other light sources. A 9V rechargeable battery is used to store the harvested energy. We have used two coils to transfer energy near the field. In near-field wireless power transfer, magnetic fields transmit power over short distances through inductive coupling (electromagnetic induction) between wire coils. The maximum distance we could cover is 3 inches through our experimental setup. The significant findings from the ongoing experiment are that 1) the harvested energy is very noisy. So for powering a noise-sensitive analog block, we must design a Low dropout regulator to suppress noise and volatility efficiently in the harvested energy. 2) We need to design an antenna that can transfer energy efficiently at least a distance of 10 ft.

The outcome of this project can solve various disruptive effects depending on its applications (e.g., disruption in farmers' crop harvesting, a heart patient's pacemaker malfunction, and losing self-driving vehicles' navigational control) due to the failure in battery power.

Impact Of Informal Stem Learning On Student Professional Skills

P-17 *Alyssa Turner**, *Allison Hall**. *Dr. Rachel Rogers, mentor, Craft Academy for Excellence in Science and Mathematics, Craft Academy for Excellence in Science and Mathematics*

The Hazel Green Academy special project is focused around restoring and repurposing a once STEM-based academy. One of the strategic goals of the leadership team is to transform one of the buildings to conduct community and educational outreach. As a STEM academy, the Craft Academy for Excellence in Science and Mathematics offers its students many educational opportunities beyond the classroom. The revitalization of Hazel Green Academy will serve the community socially, academically, and holistically. Informal STEM learning experiences can be defined as “lifelong learning in science, technology, engineering, and math (STEM) that takes place across a multitude of designed settings and experiences outside of the formal classroom” (CAISC, 2017). Students in traditional classroom settings will get exposure to STEM topics during their K-12 education, but according to research, there are additional benefits to STEM informal learning experiences (Denson et al., 2015). Informal learning environments can provide context and purpose to formal learning, students opportunity and access, and extend STEM content learning and student engagement (Roberts et al., 2018). Informal STEM experiences can extend and deepen STEM content learning while providing opportunity and access to content, settings, and materials where students otherwise would not have access (Roberts et al., 2018). Hazel Green Academy Special Project allows students to grow outside the classroom to give them real world experience. The special project offers students the opportunity to engage in their STEM education as well as serve the community.

Visual Pollution Classification Using Convolutional Neural Networks

P-18 *Jacob Vogelpohl**. *Dr. Heba Elgazzar, mentor, School of Engineering and Computer Science, Smith College of Business and Technology*

Visual pollution is an impairment on an individual's ability to enjoy their surroundings. It usually takes the form of a messy and chaotic environment that can cause overstimulation of the visual senses. This includes trash, advertisements, construction, electric cables, and similar objects. Convolutional Neural Networks (CNNs) are a form of artificial intelligence that use supervised learning to process and classify images. In this research, a CNN processed images of city streets and classified them as polluted or not polluted based on the visual characteristics that it learned from during its training period. The CNN achieved a promising accuracy of 98%.

The Lex A Like Repressor Umu D Ab And Its Corepressor Ddr R Affect Cell Division Phenotypes In Acinetobacter Baumannii

P-19

Hannah Stanley*, Landon Hodge*. Dr. Janelle Hare, Dr. Deborah Cook, mentors, Department of Biology and Chemistry, College of Science

Acinetobacter baumannii is a multi-drug resistant pathogen commonly found in hospital-acquired infections. We study the effects of overexpression of UmuDAb and DdrR on this bacterium's cell length to understand how it controls its response to antibiotic exposure and DNA damage, and how these exposures halt its cell division. UmuDAb and DdrR corepress error-prone polymerases in Acinetobacter baumannii until after DNA damage. They also regulate and induce non-polymerase genes, prompting us to examine DdrR and UmuDAb mutants for DNA damage-related phenotypes. We observed that ddrR and umuDAb mutants possess two DNA damage-related cell division phenotypes: growth sensitivity and alterations in filamentation.

The ddrR mutant's growth was affected more than wild-type (WT) cells after DNA damage. We measured (by OD600) and compared cell growth in the presence and absence of DNA damage (mitomycin C; MMC) in late log-early stationary phase (4-6 hours). WT cell growth after MMC treatment was ~85% of control growth, whereas growth of a ddrR insertion mutant after MMC treatment was only 70%.

Cell filamentation occurred in WT but not ddrR mutant cells (40+ cells for each strain measured with MicrobeJ and analyzed by ANOVA). Interestingly, umuDAb mutant cells were longer than WT cells even under control conditions. UmuDAb expression from a plasmid-based arabinose-inducible promoter, confirmed by western blotting, restored WT cell lengths. Furthermore, these longer umuDAb cells further increased in length after DNA damage, and this filamentation depended on UmuDAb self-cleavage and relief of repression. Our data show that the amount of DdrR and UmuDAb affects cell lengths.

The Effect Of Mood Congruency On Word Recall

P-20

Madison Cornelius*, Johnna Brown, Daisy Pratt, Grace Stubblefield. Dr. Gregory Corso, mentor, Department of Psychology, College of Science

Mood Dependent Memory (MDM) suggests that recall is improved when one's mood at the time of encoding matches one's mood at the time of retrieval. This study investigated the effect of mood congruency and the difficulty level of a task on memory. Participants were randomly assigned to either a mood-congruent (happy/happy or sad/sad) or a mood-incongruent condition (happy/sad or sad/happy). In the mood-congruent conditions, the same mood was induced during the study and test phases. In the mood-incongruent conditions, different moods were induced during the study and test phases. During a session, participants study a word list consisting of twenty-five disyllabic words or twenty-five quadrisyllabic words and then are asked to recall each list. The order of the word lists was counterbalanced. After each study and test phase, participants completed the Positive and Negative Affect Schedule to measure mood. We hypothesized that the number of words recalled would be greater in Mood Congruent conditions (Happy – Happy or Sad – Sad) than in Mood Incongruent conditions (Happy – Sad or Sad – Happy) across difficulty conditions (Easy/Difficult). To test these hypotheses, undergraduate students (n = 56) participated for class credit and were treated in accordance with IRB guidelines. Repeated measures analysis resulted in no significant interaction between the difficulty level of words and the assigned condition (mood-congruent/mood-incongruent), (F(1,3)=.707, p=.552). This may have been caused by the nature of the task or a motivational factor. In the future, a different task coupled with a performance-based incentive should be used.

IRB: 22-07-04

The Comparison Between Fetal Kidney And Sacral Length In Determining Gestational Age

P-21

Emily McAdams. Ms. Jennifer Clark, mentor, Department of Kinesiology, Health and Imaging Sciences, College of Science

Accurate measurements of fetal anatomy are essential in determining proper fetal growth and gestational age. Previously head circumference, bi-parietal diameter, abdomen circumference, femur length, cerebellum, amniotic fluid index and cervical length have been the key parameters to measure in an obstetrical ultrasound. The purpose of this study was to measure fetal kidney length and fetal sacral length in millimeters and identify if the data correlated to gestational age. The data was then used to discover if fetal kidney length or fetal sacral length correlated most accurately to gestational age. To obtain the data, pregnant volunteers in the 18-36 weeks range would sign a consent form to allow us to scan and obtain measurements of the fetal sacrum and fetal kidneys. Results from this study showed strong correlation of kidney length to gestational age compared to fetal sacral length. The conclusion from what was learned is that fetal kidney length will provide a more accurate determination of gestational age and should be incorporated into daily obstetrical ultrasound measurements to determine gestational age.

Protocol Review Number: 23-01-48

Silent Spring By Rachel Carson (1962) The Detrimental Effects Pesticides Have On The Environment

P-22

James Cox*, Nathan Walden, Dylan Dehart*. Dr. Douglas Mock, mentor, School of Humanities and Social Sciences, Caudill College of Arts, Humanities and Social Sciences

Silent Spring is a best selling book that was published in 1962 and is now regarded as one of the most important pieces in the environmental movement. Carson puts her focus into the application of chemicals (pesticides, insecticides, herbicides) and how those chemicals negatively affect the entire ecosystem. Throughout the 20th century, the use of dangerous chemicals were apart of a lot of Americans daily lives and the effects were not known. For example, if a field was sprayed with a pesticide like DDT then that chemical is exposed to all of that environment from the soil underneath to the animals who graze the fields. The author demonstrates how connected nature is by giving real-world examples of the destruction that these chemicals had caused in many cases. Ultimately, if the goal was to kill of weed, invasive insects, or other pests the unintended consequences too often outweigh the costs. The introduction of Silent Spring brought a sense of realization in society of the potential detriments of these uses and the war on nature had ben taking on for centuries.

Preservice English Teachers As Writing Mentors For High School Students: Anti Racist Literature In A Mirrors, Windows, Doors Reading/Writing Curriculum

P-23 *Lily (Lee) McConnell**, *Christopher Logan**, *Dr. Alison Hruby***, *Dr. Andrea Olinger***, *Dr. James Chisholm***, *mentors*, **School of English, Communication, Media and Languages****, **Caudill College of Arts, Humanities and Social Sciences, English ****, **University of Louisville, Education****, **University of Louisville**

This study stems from a "Mirrors, Windows, Doors Literature Circles" Field Experience Project for MSU undergraduate teacher candidates, a collaboration between the English education program at MSU and a local school district. The project title stems from Rudine Sims Bishop's work on expanding reading experiences for students. A "Mirrors, Windows, Doors" approach to Literature Circles means that students meet in student-led, teacher-guided small groups to discuss books by nonwhite authors and about nonwhite characters or people. Using a qualitative case-study analysis approach involving participant observation of a general-education senior English class and a semi-structured interview with one student from the class, we addressed the following research question: How do high school writers feel about feedback on their writing drafts from pre-service English teachers, when those drafts are written during a Mirrors, Windows, Doors Literature Circles unit? Preliminary findings from the semi-structured interview indicate that the high school student (Dawn*) felt she received beneficial feedback from her draft from the pre-service English teacher as a Writing Mentor. The student signified that the feedback allowed her to reflect on the purpose of her writing as well as her audience within the Literature Circles unit. Dawn indicated she felt passionate about their own connections to the literary media reflection and desired to share her writing with her peers for their own personal connections.

IRB Protocol # 21-10-47 *All names are pseudonyms.

Fungal Palynology Of Early Middle Miocene Sediments From Northwestern Peru

P-24

Jeremyah Cabrera**, *Chris Marsh**, *Liberty Smallwood**, *Ollie VanderEspt**. *Dr. Jen O'Keefe, mentor, Department of Physics, Earth Science and Space Systems Engineering, College of Science

Fungal communities provide vital terrestrial ecosystem functions. Understanding how they respond to climate change is necessary for predicting future assemblage dynamics and ecosystem function. Sediments deposited during the Miocene Climate Optimum (MCO), 18-13 million years ago, provide an opportunity to examine fungal responses to a warming event with CO₂ values both similar to those today and in line with forecast climate change. Few fungal datasets exist for tropical regions during the MCO, and only one uses modern methods to identify fossil fungi and complete paleoecological inferences. To date, none have completed paleoclimatological reconstructions using the nearest living relative method. Two past studies examined fungal diversity in northwestern Peru. However, these did not utilize stratigraphically controlled samples, without which it is impossible to explain how fungal communities changed prior to, during, or following the MCO. For this study, new samples with stratigraphic control were collected in Summer 2022 and were studied for fungal content. Here we present fungal diversity results from the lowermost part of the section to the uppermost. Samples from the lower part of the section contain a sparse, low-diversity assemblage, while the uppermost part of the section contains an abundant, diverse assemblage, suggesting that fungal diversity increased during this period of climate change. Using the nearest living relative method, we demonstrate that the fungal assemblages both track previously documented changes in moisture availability and indicate deposition under increasing warm conditions.

Planning And Evaluation For The Regional Floyd County Veterans Treatment Court

P-25

Johnathon Carmack**. *Dr. Lisa Shannon, Ms. Shira Birdwhistell, mentors, School of Humanities and Social Sciences, Caudill College of Arts, Humanities and Social Sciences

Introduction: "Veterans suffer from greater rates of substance abuse than non-veterans, and their substance abuse problems appear to be secondary to service-related issues such as post-traumatic stress and traumatic brain injury" (Douds and Hummer, 2019, p. 323). Veterans Treatment Court (VTC) is a specialty court emerging in many jurisdictions across the United States; these courts can address veterans' unique needs. Related to the success of a pilot program, funding was received to formalize a regional Floyd County VTC (FCVTC). Morehead State University (MSU) was contracted to evaluate the FCVTC. A comprehensive literature review of recent peer reviewed articles was completed. The authors used MSU's Camden-Carroll Library online database. Fourteen peer-reviewed articles were selected based on relevance. Results: Evidence from the literature review suggested, "over 700,000 veterans are in the corrections system" (Ahlin and Douds, 2015, p. 84). "Successful court completions constituted slightly over two-thirds (69%) of veterans exiting the courts" (Frederick, 2014, p. 224). "[V]eterans who complete VTC programs benefit from improved mental health, decreased PTSD symptoms, decreased depression and anxiety, and improved quality of life" (Douds and Hummer, 2019, p. 326). Discussion/Lessons Learned: These findings show the positive effects of VTCs and could be used to advocate for broader expansion/implementation. (IRB Protocol # 18-05-04)

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

P-26

Brooklin Routt, Ashley Routt. Dr. Robyn Moore, mentor, School of Creative Arts, Caudill College of Arts, Humanities and Social Sciences

This research project will provide the student with practical experience in the management of a fine art photography lab and darkroom. The student will learn how to mix and store photographic chemistry, provide assistance to undergraduate and graduate photography students, and generate ideas for improvements to the lab. The student will contribute to the revision of a lab manual that specifies best practices and operating procedures for photography lab monitors. The student will also assist other students with digital printing, as needed. Additionally, the student will improve his/her knowledge of various analog and digital photographic processes through self-directed research with the goal of helping other students learn how to further develop and understand their work.

Parental Criticism And Coherence In Association With Adolescent Internalizing Symptoms.

P-27

Emma Ammerman*, Hope Meyers*, Andrew Russel, Makayla Adams. Dr. Shari Kidwell, mentor, Department of Psychology, College of Science

The concept of toxic stress within the family has gained considerable attention in the last several years. Expressed emotion procedures are one method of assessing toxic family stress (Peris & Miklowitz, 2015). The aim of this study is to demonstrate an association between parental expressed emotion and internalizing symptoms amongst adolescents. As part of a larger, longitudinal study, 21 families participated in a 3-hour campus visit. Children averaged 16.6 years of age and approximately half were female. The Five-Minute Speech Sample (FMSS: Magana-Amato 1993) involves asking parents to describe their teen and to discuss the parent-teen relationship. Following published guidelines (Sher-Censor et al., 2013), FMSS transcripts were coded for positive and critical remarks, as well as for overall narrative coherence. Symptoms were rated utilizing the Child Behavior Checklist (CBCL, Achenbach & Rescorla, 2001), which was completed by both the parent and teen. Internalizing symptoms specifically suggest the experience of anxiety and depression. Coding is underway, but the authors hypothesize that parents who are more critical, less positive, and less coherent will tend to have teens with greater internalizing symptoms, consistent with the extant literature. This research was funded by MSU's RCPC & URF programs, as well as KY EPSCoR. IRB Protocol 15-09-11.

A Green Chemistry Experiment: Magnetic Citrate Alginate Hydrogels Remove Methylene Blue From Water.

P-28

***Katelynn Setters**, *Dr. Elizabeth Thomas*, mentor, Department of Biology and Chemistry, College of Science**

Green Chemistry is the design of chemical products and processes to reduce the use and generation of hazardous substances. The Twelve Principles of Green Chemistry include rules to help chemists achieve the goal of sustainability at the molecular level. The twelve principles include: prevention, atom economy, less hazardous chemical synthesis, designing safer chemicals, safer solvents and auxiliaries, design for energy efficiency, use of renewable feedstocks, reduce derivatives, catalysis, design for degradation, real-time analysis for pollution prevention, and inherently safer chemistry for accident prevention. Green Chemistry is a growing field that continues to get more attention around the world at universities and institutions each year. The objective of this research was to design a Green Chemistry experiment that synthesizes magnetic citrate alginate hydrogels and test their effectiveness of the removal of methylene blue dye (a common water pollutant). In this experiment, the magnetic nanoparticle was synthesized first, and then incorporated into alginate hydrogels. To test the effectiveness of methylene blue removal, the magnetic citrate alginate hydrogels were dispersed evenly into three separate beakers containing the same concentration of methylene blue for varying times. To test the results, the app "Colorimeter" was used, obtaining the absorbance value of the solution in each of the three beakers to generate a graph and correlation value, r^2 , to evaluate the effectiveness of the experiment.

Leadership Initiatives International Internship Program: Public Health And The Dangers Of Self Medication In Nigerian Communities

P-29

Ryan Cabrera*, *Landon Pritchett**, *Brooklyn Adams**, *Joshua Day**, *Jennifer Nguyen**, *Mahathi Siripurapu**, *Dr. Rachel Rogers, *Ms. Roxanne Lockard***, *Ms. Lauren Hensel***, *Mr. Rabi Garba***, mentors, Craft Academy for Excellence in Science and Mathematics**, Craft Academy for Excellence in Science and Mathematics, Leadership Initiatives **, Leadership Initiatives ****

Leadership Initiatives is an international youth development non-profit organization that leads the International Public Health Internship Program, a nine-month global health program that 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 self-medication in the community of Bauchi State, Nigeria. As stated by the National Library of Medicine, self-medication has been proven to cause an increase in false self-diagnosis, decreased healthcare accessibility, adverse reactions, and more within this community. By establishing proper healthcare practices within this community, we worked to educate and prevent misconceptions about self-medication. Within our campaign and workshop, we hoped to cause a domino effect in the region by making the dangers of self-medication 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 self-medication. This will lead to the campaign spreading not only within Bauchi State, but throughout the entire country of Nigeria.

A Brief History Of Environmental Policy Through Literature

P-30 *Nathan Walden**, *Adam Abdel-Rahman**, *Brady Lawson**, *Mathew Delancy**. *Dr. Douglas Mock, mentor, School of Humanities and Social Sciences, Caudill College of Arts, Humanities and Social Sciences*

Environmental policy is a relatively new policy area, yet in spite of that there is a growing body of literature on the subject. This poster will present a brief history of environmental policy through this literature. Starting with the seminal work *Silent Spring* by Rachel Carson a book that heavily criticizes and brought the use of DDT into the public eye. *The Diversity of Life* by Edward O. Wilson provides a glimpse into the environment from an overtly scientific viewpoint supplemented by a plethora of specific examples gathered through decades of scientific knowledge. Recognizing environmental diversity at the species level provides for a deeper analysis of what makes ecosystems incredibly resilient. That said, biodiversity has been consistently threatened by natural and anthropogenic actions. In *Collapse*, author Jared Diamond establishes a pattern of struggle, flourishing, and extinction that has plagued societies for generations. In doing so, he attempts to draw attention to modern civilization's large-scale mirroring of this trend. And finally *Love Canal a Toxic History* by Richard Newman is a history of the environmental disaster at Love Canal and the subsequent effort of the residents of Love Canal to seek out some form of environmental justice in the wake of the tragedy.

First Examination Of Palynology Across The K Pg Boundary In The Jackson Purchase Region Of Kentucky

P-31 *Marilyn McCarty**. *Dr. Jen O'Keefe, mentor, Department of Physics, Earth Science and Space Systems Engineering, College of Science*

The recently re-located Cretaceous-Paleogene (K-Pg) boundary site in western Kentucky contains a relatively complete record of deposition in terrestrial environments from the upper McNairy Formation (Cretaceous) through the lower Clayton Formation (Paleocene), separated by an iridium-enriched zone located above the iron concretion bed previously thought to demarcate the boundary. While sedimentological, geochemical, and amber-based re-studies of the boundary interval have been completed, the palynology, which was originally used to determine the boundary position, has not been re-examined more than 40 years. Here we present a new palynological study that examines both paleoecological and paleoclimatological conditions present at the time of deposition using tandem studies of both plant and fungal remains. At this site, preliminary climate reconstructions indicate seasonally wet and dry subtropical to warm-temperate climate in a terrestrial setting throughout. This study improves the palaeoecological record of the Jackson Purchase region during the K-Pg Boundary interval and sheds light on the terrestrial ecology of a rarely studied region.

Attitudes On Immigration And Border Security: A Method For Change

P-32

Grace Stubblefield*, Johnna Brown, Madison Cornelius, Daisy Pratt. Dr. Gregory Corso, mentor, Department of Psychology, College of Science

This research investigated whether video games might be an instrument of change for social issues. An earlier study similar to this was undertaken at the University of Houston, Clear Lake (Jones, Debs, Kelling, Kelling, Lucas, & Cherry, 2022). All participants (n=60) answered a pre-game questionnaire asking about various demographics and their opinions on border security agents and immigrants. Participants then played "Papers, Please" (n = 36) or "Oregon Trail" (n = 21) for 45 minutes, without instruction on how to play. "Papers, Please" is a video game where the player acts as a border security agent and encounters people trying to immigrate to a fictitious country. Likewise, the video game Oregon Trail deals with players immigrating but does not involve the same socially driven decision-making processes as Papers, Please. After playing their randomly assigned game, a post-questionnaire asking identical questions about border security and immigrants was completed. Participants responded using a 5-point Likert scale, from "strongly agree" to "strongly disagree." Significant interactions for the Pre/Post and Game responses ($F(1,55) = 4.573, p = .037$) and among the pre/post-game questionnaires, the questions, and the game, $F(3,165) = 2.797, p = .042$ were observed. Responses to the question "Border Patrol Agents are a restriction on civil liberties and rights" but only for the "Papers, Please" game was significant, $F(1,55) = 4.135, p = .047$, with a decrease in agreement to this question. These results suggest that video games may provide a means for change.

IRB 22-09-28

Failure To Rescue Abstract

P-33

Kyla Wilson*, Cedric Meadows*, Geanna Ferguson*, Leah Moore*, Savannah Thompson*, Savannah Sizemore*, Courtlyn Salyers *, Payton McGlone*, Jordan Sims*. Dr. Suzi White, mentor, Department of Nursing, College of Science

This presentation focuses on the prevalence of failure to rescue in healthcare that we have evidenced in the clinical setting. Issues that emerged include failure to work as a team, understaffing, professionals not furthering their education, a lack of competence, a lack of evidence-based practice, funding issues, failure to react timely, and failure to recognize a change in status. Analyzing common themes in these issues will allow for a bigger picture to develop as to why failure to rescue is becoming such a large affair in healthcare today.

Exam Accuracy Resulting From Different General And Induced Anxiety Levels

P-34

***Daisy Pratt**, *Johnna Brown*, *Madison Cornelius*, *Grace Stubblefield*. *Dr. Gregory M. Corso*, *mentor*, Department of Psychology, College of Science**

This research investigated induced anxiety combined with general anxiety level. Participants completed the Examination Anxiety Scale to determine a level of general anxiety. Based on the general anxiety level, participants were assigned to either the Induced Anxiety or Non-Induced Anxiety conditions. We hypothesized that the mean exam score for the Induced Anxiety condition would be lowest relative to the Non-Induced Anxiety condition. We also hypothesized that the mean exam score for participants who were classified as High General Anxiety in the Induced Anxiety condition would be lowest. Undergraduate students ($n = 54$) participated in our study. Participants completed the Examination Anxiety Scale, read a passage, completed an exam, and completed a self-report anxiety scale. Analysis of exam scores for the Induced Anxiety and Non-Induced Anxiety conditions resulted in significant differences, $F(1, 52) = 10.85$, $p < .01$. This contradicts our first hypothesis because the mean exam score for the Induced Anxiety condition was highest. Analysis of exam scores accounting for General Anxiety classifications resulted in significant differences, $F(5, 48) = 2.55$, $p = .04$. Post hoc tests showed significant differences between the mean exam scores for participants classified as Low General Anxiety in the Induced Anxiety condition relative to participants classified as Low General Anxiety in the Non-Induced Anxiety condition, $p = .02$. This contradicts our second hypothesis because the mean exam score for participants classified as Low General Anxiety in the Non-Induced Anxiety condition was lowest. Implications include inducing optimal anxiety levels to improve exam accuracy.
20-09-23

Gc Ms Analysis Of E Liquids

P-35

***Charlotte Gabbard**. *Dr. Emma Schmittzehe*, *mentor*, Department of Biology and Chemistry, College of Science**

Electronic cigarettes are one of the most commonly used methods of nicotine delivery, especially among the adolescent population. Due to the lack of regulation in manufacturer labeling of refillable nicotine solutions (e-liquids), the actual concentration of nicotine and other additives is variable as compared to the reported values. Misreporting of nicotine content is a contributor in the development of nicotine dependency and potentially tobacco product dependency. One objective of this research is to identify a reliable gas chromatography-mass spectrometry (GC-MS) method to study the variations in nicotine levels in e-liquids. Standard nicotine samples were prepared and tested using a published GC-MS method for analyzing nicotine levels in e-liquids. The results from the method used were inconsistent and the GC chromatograms often contained spikes instead of true chromatogram peaks.

Economic And Financial Analysis Of Rainwater Harvesting Pond: Case Study At Morehead State University

P-36

Riley Williams*, Dr. Vijay Subramaniam, Dr. Amanda Skidmore, mentors,
Department of Agricultural Sciences, College of Science

Rainwater harvesting (RWH) was primarily considered as a source for fresh water supply or a conservation practice for overcoming water shortages in drought prone areas. In recent years, RWH systems are also recognized as a low impact development technique for storm water management. Consequently, many state and local governments have begun to encourage the use of rainwater harvesting as a storm water best management practice. Morehead State University has designed and installed four rainwater harvesting systems at the Derrickson Agricultural Complex as a demonstration site for best management practices with a collaboration of Kentucky Department of Agriculture and the University of Kentucky.

Main objective of this study is to assess whether RWH strategies are economically warranted management practices for the Eastern Kentucky region. The cost and benefit analysis and net present value methods were employed to assess economic and financial feasibilities of Pond-Tire (P-T) RWH System. The catchment areas of the PT was 18,800 sqft. The initial investment cost of the PT system was \$22,400 and the annual economic benefits were \$1,476 based on 9 months of water utilization. Based on the 25-year life expectancy of the RWH systems, the present value of future benefits of the PT system was \$25,702. It shows that implementing P-T system proves to be economically and financially feasible. This study suggests that the economic benefits of RWH systems depend on factors such as the size of the catchment areas, annual rainfall distribution, usefulness of rainwater, cost of installation and cost of alternative water sources.

Craft Academy Solar Electric Racing: The Building Of A Solar Car

P-37

Casey Hovis*, Hope Meyers*, Hailey Castle*, Sophia Day*, Landon Ray*, Brayden Paynter*, Dr. Rachel Rogers, Dr. Joyce Stubbs, Dr. Steve Stubbs, mentors, Craft Academy for Excellence in Science and Mathematics, 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 aerodynamics, friction, and power. We are improving upon previous CASER team designs, such as creating a more aerodynamic structure, redesigning the frame, and adjusting the axle. We had to make challenging decisions, such as deciding between building our car with three wheels or four wheels. 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 a frame design and begin the welding process by the end of the year. By next year, we would like all mechanical parts of the car to be in place and to begin working on electrical components.

Continued Professional Development Research Abstract

P-38 *Peyton Kennedy*, Andrew Morris*, Jascie Greene*, Riley Boling*, Natalie Crace*, Abigail Wesselkamper*, Abigail Blair*, Joseph Sewell*. Dr. Suzi White, mentor, Department of Nursing, College of Science*

This presentation focuses on the importance of nurse participation in continued professional development programs because it is a shortcoming that we noticed in clinical practice. Factors that we researched include barriers and challenges, availability, cost, how it affects patient outcomes, new skill updates, and different delivery methods hospitals can offer. Exploring these factors to continued professional development shines a light on the disparities which will allow for change to encourage more nurse participation in educational activities.

Colorimetric Redox Reactions To Determine Base Composition In Unknown Monomeric Dna Samples

P-39 *James Dials*, Mara Stout. Dr. Elizabeth Thomas, mentor, Department of Biology and Chemistry, College of Science*

Base composition assays are vital tools for analytical biochemists to use in order to determine the identity of a DNA sample. Most of these assays, however, require extensive reagents, advanced computer programs, or expensive analytical instruments. Herein, we describe an inexpensive, robust, and simple colorimetric assay designed for the undergraduate laboratory classroom that uses non-toxic reagents along with a spectrophotometer and a smartphone camera to determine the percentage of each base in an unknown monomeric DNA sample. The percentage of thymine nucleotides in the solution is measured using a redox reaction with potassium permanganate, after which the percentage of adenine is measured by an hour-long incubation with alkaline cleavage and a bicinchoninic acid (BCA) assay. Finally, the total percentage of purines in the sample is measured using acidic cleavage followed by a BCA assay. This value can be used to calculate the percentages of guanine and cytosine in the sample, allowing the student to measure the total base composition of a nucleotide sample. After completion of this experiment, the student will have gained experience in performing redox reactions, as well as learned analytical techniques to determine the base composition of an unknown solution.

College Students' Financial Literacy In A Eastern Kentucky Regional University

P-40

Hannah Barrett*, Dr. Steve Chen , Dr. Christy Trent, mentors, School of Business Administration, Smith College of Business and Technology

Financial literacy is an essential knowledge for recent college graduates to be able to manage a stable job career and personal wealth. This study examined the financial literacy of 107 college students (56 males; 50 females) of a regional public university in Eastern Kentucky. The participants were randomly invited to complete a 22-item online financial literacy survey, which was created based on the work of Cude et al (2006). The survey contents included five demographic questions and 17 five-point Likert scale (1= strongly agree/ always, 5= strongly disagree/ never) for rating participants' knowledge on topics related to investment, saving, credit, and budget. The data collection period lasted about one-and-a-half months between mid-October and early December, 2022. The authors were able to identified five factors covering the personal financial literacy: (1) understanding of investment, (2) understanding of financial risk and budgeting, (3) perceptions on saving and spending, (4) longing for saving and investing, and (5) motivation for learning financial literacy. The results showed females and individuals who had taken a finance course had a higher rating in understanding of investment, financial risk, and budgeting than those of males and who had not taken a course. Furthermore, those who had a financial literacy course before showed a greater score on the factor--perceptions on saving and spending. In conclusion, it is suggested that increasing the opportunity to attend financial literacy classes and mock experiences will help students build the foundation knowledge and confidence in utilizing effective finance skills.

Collapse: The History Of How We Fail, And What We Can Do To Save Ourselves

P-41

David Ace*, Dr. Douglas Mock, mentor, School of Humanities and Social Sciences, Caudill College of Arts, Humanities and Social Sciences

This abstract was written with the intent of presenting the main ideas of Jared Diamond's Collapse: How Societies Choose to Fail or Survive, in a scholarly setting. This book analyzes in detail how many different human societies in various parts of the globe have failed, and their modern parallels in "civilized" societies. In doing so Diamond confronts his audience with a question, what are we doing now that will make us as the ancient, and some not so ancient, peoples contained within Collapse. Diamond also presents ideas as to how society can change to prevent the same kinds of collapses on display in his book, but these plans take effort to accomplish and end with several reasonings as to why modern society may be able to avert those self-same reasons for collapse. We have created a project synthesizing these main ideas contained within Diamond's work and synthesized them into a significantly easier to understand package. By presenting Diamond's work to a wider audience, we hope to spark broader interest in investigating how and why societies collapse, and by that what can be done by people now to avoid the kind of man-made, or man-accelerated, catastrophes that many societies have undergone or are currently undergoing. The conclusion that has been drawn from Diamond's work is simple and is what we wish to communicate in our presentation, that even in the face of collapse, and the weight of its historical implications, there is hope.

Burnout Related To Nursing Care

P-42

Riley Hayes*, Dr. Mary White, mentor, Department of Nursing, College of Science

Nursing burnout is a worldwide crisis that has only skyrocketed since the COVID 19 pandemic. In a study conducted by Kronos Incorporated, 98% of nurses reported that their career is physically and mentally demanding. Furthermore, 63% of nurses reported that their occupation has resulted in burnout (Well-Being Index Team 2021). A thorough review of the literature of 56 studies was conducted, for themes related to nursing burnout. Within these, there was collectively a mixture of qualitative and quantitative studies. The overarching themes observed include burnout related to pay, assault, staffing shortages, COVID 19, stress, and the unit.

Building For The Exchange

P-43

Abigail Cooper*, Gabriel Barcus*, Alexa Deaton, Brittany Graziani, Maddie Dodrill. Dr. Janet Ratliff, mentor, School of Business Administration, Smith College of Business and Technology

As a part of the Appalachian Teaching Project, and its respective grant funding, students in Dr. Ratliff's Fall 2022 LevelUP section of the Business Plan Development course worked on a service-learning project entitled "Building for the Exchange" while partnering with Downtown Morehead, Inc. Our project was intended to solve the problem of existing vacant spaces in downtown Morehead. The downtown area was once a core with neighborhoods built around it. A surge in population in the last 70 years has caused businesses to spread out across the community; thereby, making it difficult for certain businesses to maintain viability in a downtown area. Our class was split into four teams and were tasked to create business plans to fill these spaces. Students in the class created four businesses from three different industries: Fresh Start, a healthy eating option that partners with local farmers for fresh produce; a UPS Store, a United Parcel Service franchise; a Breakfast Bakery & Co., a dine in breakfast and bakery restaurant; and Morehead Outdoors, a retail store that sells recreation and outdoor accessories. By creating a plan for these businesses, undergraduate students learned the processes of creating a business plan while integrating management, marketing, finance, and operations. We became aware of resources such as the Small Business Administration that entrepreneurs can utilize when creating a business. Through collaboration and communication, students enhanced their teamwork and research skills. As a result, students acquired a deeper understanding of the history and hardships of the Appalachian region.

Brain Drawing Contest In Eastern Kentucky, 2022 2023

P-44 *Christian Wright*, Timo Klausnitzer, Cassandra Westwood, Andrea Grimes, Emma Brock, Olivia Blatt. Dr. Ilsun White, mentor, Department of Psychology, College of Science*

The Brain Drawing Contest is one of the events that the Neuroscience Outreach Program (2002-present) at Morehead State University offers to enhance student (K-12) interest in the brain and behavior and to promote brain health. Before COVID, 800-1000 students (K-12) from 3-4 different counties were involved. During 2022-2023, approximately 500 students from 3 different counties were involved. These students have been exposed to various topics such as the regions of the brain and their functions, brain health, and the effects of drugs and alcohol on the brain. Through the Brain Drawing Contest, students (K-12), parents, teachers, and administrators from our community actively participated in learning about and promoting awareness of the brain and behavior. This collaborative effort reflects continuing community support for the Brain Awareness Program. Enhanced awareness of brain function in the community supports and strengthens our effort to advance public awareness about brain health and the benefits and progress of brain research. Supported by a grant from the Kentucky Academy of Science.

Golding Yang Gallery Fellowship

P-45 *Karlye Lane*, Macie Lowe*. Ms. Lisa Mesa-Gaido, Mr. Mike Bowen, Mr. Quinn Maher, mentors, School of Creative Arts, Caudill College of Arts, Humanities and Social Sciences*

In 2021, we began our Undergraduate Research Fellowship as assistants in Morehead State University's Golding-Yang Gallery. The purpose of our fellowship was to gain knowledge and experience of arts administration and by working under the gallery director to assist in installing exhibitions and attending receptions. The fellowship is still currently ongoing but through it we have learned variety of skills such as designing exhibits, installing both 2D and 3D artwork, arranging lighting, and operating a lift machine. Additionally, we have learned how to manage and organize receptions and visiting artists, create visuals promoting the exhibitions, and handle important paperwork pertaining the artists and their pieces. This fellowship and the research done within it has allowed us to obtain technical skills and experience that will allow us to work in a professional gallery setting.

The Role Of Year And Animal Origin On Key Determinants Of Ewe Longevity.

P-46

***Audrey Burton**, *Annika Weaver**, *Rebekah Mills*. *Dr. Patricia Harrelson*, *Dr. Flint 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) and 2023 (Year 2) lambing season has been included. We collected measurements from Katahdin ewes (n = 38; 1-4.5 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. Main effects of treatment are reported if no interaction was observed. An interaction of year and origin (P = 0.02) was observed in FEC. A year effect was observed on FAMACHA, as ewes in Year 1 had lower and more desirable FAMACHA scores in comparison to Year 2 (2.18 vs. 1.97, respectively). Teat scores were different by year, (P < 0.01) as Year 1 was higher compared to Year 2 (5.58 and 4.46, respectively). Udder scores were not different by year or origin (P > 0.148). Ewe BCS differed by year (P = 0.06) and 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

Associations Between Sexuality And Mental Health Disorders

P-47

***Elizabeth Arnold**, *Lena Day**, *Mary Sherrard**, *Charlie Knapp**. *Dr. Gregory Corso*, *Dr. Rachel Rogers*, *mentors*, Department of Psychology, College of Science**

Research has suggested associations between sexual orientation and mental and physical health. It has been estimated that 48% of LGBTQIA+ youth have admitted to self-harm in the past twelve months, and 68% had anxiety symptoms. This research is part of a larger project investigating possible associations between issues in the LGBTQIA+ community and mental health disorders. To investigate these associations, we generated 76 questions and presented the survey online. The participants were recruited through Prolific and were paid \$3.00, and 510 people were recruited, 503 gave informed consent, and after data screening, the data from 500 participants were subjected to analysis. Approved IRB procedures were followed. Twelve questions about mental disorders and sexual orientation were selected from the database. Fisher's exact test with Monte Carlo estimates was used to analyze the data. The analysis revealed an association between questions related to mental disorders and sexual orientation. Questions such as "What is your sexual orientation?" and "Have you ever been diagnosed with any Mental Disorders by a medical professional?" showed a significant association (p < .01), along with "If you have a Mental Disorder, are you actively seeking help for that disorder?" and "Have you ever questioned your gender or sexuality?". The question related to gender orientation had no association with suspected undiagnosed mental disorders. These findings suggest significant associations between the LGBTQIA+ community and mental health disorders. However, some aspects of mental health are not directly associated with the LGBTQIA+ community.

IRB123456566

The Diversity Of Life By E.O. Wilson

P-48 *Brady Lawson, Matthew Grace*, Emma Collins*, Michelle Lopez*, Dawson Rousey*. Dr. Douglas Mock, mentor, School of Humanities and Social Sciences, Caudill College of Arts, Humanities and Social Sciences*

The Diversity of Life by E. O. Wilson is a text about how our earth is on track for another extinction event and we are at fault. Wilson also discusses various topics such as environmental preservation, biodiversity and its importance, and how life has evolved over time. Wilson views biodiversity differently than many as he focuses on all species found in the ecosystem rather than narrowing his focus on one. He mentions how new species can be created by groups evolving and developing new skills or existing in new environments. Species are going extinct and being created constantly, these extinctions don't have to be large, they can exist on small scales yet still cause an impact on the entire ecosystem. Wilson goes on to explain that humans have existed for a small period of time yet we are the number one cause of extinction events within species. Ultimately humans will be the cause of their own downfall as the environment is a reflection and product of human actions.

Mental And Emotional Health Determinants For Nurses

P-49 *Samantha Trimble*, Haley Blankenship*, Tess Wallace*, Madalyn Wilburn*, Ashley Jenkins*. Dr. Mary White, mentor, Department of Nursing, College of Science*

Purpose: Assess and evaluate the mental health status of practicing nurses and determine how reported status affects the nurse's ability to provide adequate care.

Design: The present study was conducted based on the mixed research design of the concurrent convergent strategy.

Methods: We provided an interview with several nurses within the same patient care unit at the start of their shift to assess their mental health at that time. We then observed and analyzed how the nurse performed during their shift.

Findings: The participants reported high stress and anxiety levels during the peak of their shift, which hindered their performance and ability to provide the most quality care possible to the patients. When stress and anxiety levels were reported as low, the quality of care and performance of the individual nurses peaked.

Conclusion: There are several factors that need to force a rethinking of how health care teams can maintain and expand the mental health of nurses.

Implications for Nursing: Policies need to be developed and implemented to promote and maintain a healthy workforce, including physical, mental and emotional. This will strengthen the health workforce and improve across the board our ability to provide safe and adequate care. It is important to start at the source of the care and make sure our nurses have a balanced mental health in order to provide critical and competent care to the patients.

Associations Between Religion And Mental Health

P-50

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

This research project investigated the relationship between religion and mental health. The body of research on the connections between religion and mental health has grown from 988 articles abstracted in Psych Info in 1950 to over 34,000 in 2020. Much has been said about the benefits of religion. But there may also be a downside. Ellison et al. (2014) have demonstrated a positive link between an “anxious attachment to God and psychiatric symptoms.” The current study was a partial replication of the Ellison et al. (2014) study. A 76 multiple-answer and open-ended questionnaire was developed. Data were supplied by Prolific participants (n=500). They were paid \$3.00 when they completed the survey. The questions asked about lifestyle, religion, traumatic life experiences, mental disorders, sexuality, gender identity, political views, and childhood experiences. For the research reported in this document, we used three multiple-answer questions drawn from the questionnaire set involving religion and one mental disorder question. To investigate the relations with which we were most concerned, we used Fisher's exact test to show dependence or independence among the responses. An association between the household religion as a child and the religion of the hometown community ($p < .01$) was observed. There was a very strong and significant association between childhood religion and one's current religion ($p < .01$). But there was no association between religion and the diagnosis of mental disorders by a medical professional. The demographic questions may shed additional light on some responses related to religion and mental disorders.

IRB123456566

Effect Of Light Soaking On The Performance Of Cd Te/Cd Se Solar Cells

P-51

*Elinor Sinn**. *Dr. Kent Price*, *mentor*, Department of Physics, Earth Science and Space Systems Engineering, College of Science

The solar cells within this study are CdTe/CdSe thin-film solar cells. Thin-film solar cells contribute to maintaining a substantially low cost making the production of thin-film solar cells simple regarding competing solar cells. Their high absorption corresponds to the amount of energy they are able to produce, despite their short lifespan. In contrast, the production of gallium arsenide solar cells has become a rather strenuous option due to the scarcity of gallium, and the absorption rate of silicon or crystalline silicon (c-Si) solar cells is significantly lower than thin film solar cells. CdTe/CdSe thin-film solar cells are comprised of fewer materials than both gallium arsenide and crystalline silicon solar cells. It was hypothesized that if the duration of light soaking increased, then the efficiency of these particular solar cells would change.

The study aimed to see how increased light exposure affected the performance of CdTe/CdSe thin-film solar cells. We used halogen light bulbs to replicate the solar spectrum and expose solar cells to light for varying periods of time. Light soaking occurred with a controlled intensity of the halogen bulb, distance, and size of the contact portions of the solar cells. Current-voltage curves before and after varying times of light-soaking were taken for each cell. Changes in parameters such as short-circuit current, open-circuit voltage, fill factor, and efficiency were expected and observed after light soaking. By intently studying how and which of these parameters changed, information regarding the electronic process's limited performance in the solar cells was determined.

Religious Beliefs On Marital Satisfaction

P-52

Trenton Rose*, Dr. Monica Himes, mentor, School of Humanities and Social Sciences, Caudill College of Arts, Humanities and Social Sciences

Abstract:

Marriage is a unified commitment that demonstrates love and trust between couples. There are many ways to make a marriage work, but this study aimed to analyze the relationship between religious beliefs and marriage satisfaction. Prior to the research, a literature evaluation was conducted on race and ethnicity, the role of the community and the church, religious commitment, and well-being. This study has been completed and explored the effect of being a religious or non-religious individual and how this impacts overall marital satisfaction. This study is a descriptive study using survey methodology. The study had 189 participants, 90.4% of participants were female, and 9% of participants were male. The participants took an anonymous online survey, which included an informed consent form, the requirement that you be married to take the survey, and 34 questions about overall marital satisfaction. The majority of the participants that I studied were individuals who have been married for a shorter period and the highest frequency was 2-5 years with 35 participants (18.5%). Overall, the study found that religious views do influence marital satisfaction.

Keywords: Marriage, Marital satisfaction, religion, religious beliefs, commitment

Introducing Quantum Snakes And Ladders

P-53

Ashley Peters, Curby Bair*, Alexa Cunningham*, Dr. Joshua Qualls, mentor, Department of Mathematics, College of Science

Snakes and Ladders is a worldwide classic spanning centuries. But the standard game leaves a little to be desired in terms modern rules. In this work, we introduce "Quantum Snakes and Ladders" as a quantum update of this children's game. After introducing the rules and novel game mechanics, we present results comparing Monte Carlo simulations of the classical and quantum versions before concluding with plans for developing a larger, playable version integrating truly quantum-mechanical play.

Associations Between Poverty Poverty And Mental Disorders

P-54 *Sophia Day**, *Charlie Knapp*, *Mary Sherrard*, *Elizabeth Arnold*. *Dr. Gregory Corso*, *Dr. Rachel Rogers*, *mentors*, **Craft Academy for Excellence in Science and Mathematics, Craft Academy for Excellence in Science and Mathematics**

Without knowing all the factors that contribute to mental disorders, it can be challenging to treat them. However, linking mental disorders to life factors may result in better ways of preventing or treating those disorders. Poverty is an issue that affects many people, so understanding any association between poverty and mental health may allow for better prevention. This research was done in conjunction with a larger research project regarding mental health and life aspects. A 76-question survey was developed. A total of 500 participants provided data for the survey and received \$3.00 in compensation. For this research, 18 questions involving poverty and mental health were extracted from the survey. A Fisher's exact test using Monte Carlo estimations identified 15 significant associations between life factors and mental health. The life factors considered included aspects of income, education, and changes in the location of the home. The significant associations between the poverty and mental disorders questions likely mean they may have a common cause, and that may be linked to the situations that individuals experience. With this knowledge, programs intended to help people with poverty or mental disorders may do a better job of recognizing that a significant portion of the people seeking assistance with one of those issues will need help with the other. This may permit better support systems to be developed for people who are dealing with poverty, mental disorders, or both. IRB22-09-33

B

The Editorial Process Of The Kentucky Philological Review

P-55 *Olyvia Neal**, *Jalyn Findley**. *Dr. Karen Taylor*, *mentor*, **School of English, Communication, Media and Languages, Caudill College of Arts, Humanities and Social Sciences**

The Kentucky Philological Review (KPR) is the MLA-indexed academic journal of the Kentucky Philological Association. This journal contains essays, book reviews, and creative work selected by the Editorial Committee from the work presented during the prior year's conference. These submissions are edited for MLA format, grammar, syntax, and cohesion of themes. We have been editorial assistants for the KPR Editorial Committee for the past four years and have edited volumes 33, 34, 35, 36, and 37. We contributed thorough comments and edits on each piece, which are discussed and compiled through weekly meetings with the Editor, Dr. Karen Taylor. The edits referenced consistency and proper MLA format, structure and syntax, clarity of theses, and general perspectives as readers. These comments are sent to the authors, who make the needed corrections. We give all new drafts an additional edit with Dr. Taylor before they are compiled. Once assembly of the KPR begins, we proofread the journal's draft in its entirety until it's ready for publication. For volumes 35 and 36, we were able to design the cover of the printed journal. Through this editorial process we were able to gain a comprehension of MLA format, a better understanding of how to communicate ideas effectively within an academic community, the necessity of thorough research when writing a body of work, and the importance of revision and critique. This has provided us with instrumental skills necessary to be successful in graduate school and bolstered our confidence in our own research and writing.

Childhood Trauma And The Elementary Music Class: Obstacles, Solutions, And Suggestions For Music Educators

P-56

***Shianne Smith**, Dr. Michele Paynter Paise, mentor, School of Creative Arts, Caudill College of Arts, Humanities and Social Sciences**

In this study I have explored how childhood trauma affects the learning and development of students in the elementary music classroom. After completing a literature review and interviewing experts in this field, I discovered that music may be one subject that can help students experiencing trauma. In this study, I have presented my findings and offered suggestions on how music teachers might positively influence students who might otherwise fail to be successful in a school setting. I conclude by offering suggestions for future research to be conducted in this area.

The Development Of A Colorimetric Assay To Detect Uracil In Monomeric And Oligomeric Dna

P-57

***Mara Stout**, James Dials. Dr. Elizabeth Thomas, mentor, Department of Biology and Chemistry, College of Science**

Uracil commonly occurs in ribonucleic acid (RNA) and not in deoxyribonucleic acid (DNA). The typical nucleobases in DNA include adenine, thymine, guanine, and cytosine. However, uracil in DNA arises from the deamination of cytosine, thus chemically transforming cytosine's heterocyclic nucleobase into a uracil nucleobase. Uracil in DNA is one of the most common single-base mutations that often leads to impaired protein function, malignant tumor progression, and cytotoxic cell behavior if left unrepaired. To repair the uracil mutation that occurs in DNA, uracil DNA glycosylase (UDG) removes the uracil leaving an apurinic/apyrimidinic (AP or abasic) site. This site is then further repaired through the base excision repair (BER) pathway. This pathway is responsible for repairing approximately 10,000-50,000 AP sites per day per cell under typical aerobic conditions. However, if left unrepaired, these DNA lesions leave an AP site resulting from the hydrolysis of the N-glycosidic bond. Herein is described a colorimetric assay that utilizes colorimetric reagents that detect uracil in DNA. Such colorimetric reagents include potassium permanganate (KMnO₄) and copper with bicinchoninic acid (BCA). The KMnO₄ reacts directly with the N-heterocyclic uracil nucleobase while the copper/BCA detects AP sites generated from the UDG hydrolysis of uracil found in oligomeric DNA. These colorimetric assays produce a chromophore that can be quantified by either using UV-VIS spectrophotometer and/or an iPhone with a colorimetric app along with the application of the Beer-Lambert law.

Associations Between Childhood Trauma And Mental Disorders

P-58 *Charlie Knapp**, *Sophia Day*, *Elizabeth Arnold*, *Mary Sherrard*. *Dr. Gregory Corso*, *Dr. Rachel Rogers*, *mentors*, **Craft Academy for Excellence in Science and Mathematics, Craft Academy for Excellence in Science and Mathematics**

This research examined the possible associations between childhood trauma and mental disorders and was part of a more extensive study investigating the effects of many life aspects on mental health. A survey was administered on the internet through the Prolific platform. The survey consisted of 76 multiple-choice, multiple-answer, and open-ended questions. Participation in the survey was restricted to people living within the US, aged 18 or older, and who spoke fluent English. A total of 510 participants responded, with 500 participants consenting and finishing the survey. The participants were paid \$3.00 each. The survey covered demographics, sexuality, gender identity, religion, politics, trauma, and mental disorders. For this research topic, the answers to 17 questions regarding homelessness and displacement, parental figures, abuse, and mental health over COVID-19 were tested on their relationship to the question: Have you ever been diagnosed with a mental disorder by a medical professional? The survey results were analyzed using Fisher's exact test, with Monte Carlo estimations. Seven questions had significant associations ($p < .01$) with the mental disorder question. It was shown that mental, physical, emotional, sexual, and financial abuses were associated with a professional diagnosis of mental disorders. Also associated with a professional diagnosis of mental disorder were moving between multiple houses before 18 and a change in mental health during the COVID-19 pandemic. This investigation demonstrates the relationship between disruptive life events and mental disorders. More efforts should be made to reduce these disruptive events in the lives of people. IRB22-09-33

Sustainable Management Options For The Msu Browning Orchard

P-59 *Jonathan Stanley**. *Dr. Amy Collick*, *Ms. Caroline Roush*, *mentors*, **Department of Agricultural Sciences, College of Science**

The Morehead State University (MSU) Browning Orchard is a 250-acre orchard located in Fleming County, Kentucky where apples and blueberries are grown by the MSU Agriculture Department. This project largely focused on the most-recently planted apple trees. The goal of this project was to investigate the disease and pest pressure affecting apple production on this orchard and to develop a sustainable management plan that would mitigate their effects. A common apple disease affecting Kentucky orchards and present at the Browning Orchard is fire blight, a bacterial disease, eventually causing damage to the entire tree. Common insect pests include codling moth and various beetles, attacking the fruit and leaves, respectively. Geographical Information Systems (GIS) mapping software was utilized to create maps of the orchard. and global positioning system (GPS) receivers were used to plot geospatial locations of trees and areas where pests were present. Using the spatial data and scouting information collected, an Integrated Pest Management (IPM) plan and spray schedule were created to control the pest populations.

Solar Panel Acoustic Resonance Cleaning System (S.P.A.R.C.S.) A Research And Development Project

P-60

Hannah Roberts*, Mr. Jeff Kruth, Mr. Michael Combs, mentors, Department of Physics, Earth Science and Space Systems Engineering, College of Science

For years, NASA has been trying to solve the issue of dust from mars or the moon settling on solar panels, lenses, and other surfaces. Many scientists aim to find a solution for cleaning the solar panels. Previous cleaning methods were developed for terrestrial solar panels that include mechanical contact cleaning, hydro cleaning, and more recently, electrostatic charge. Implementing electrostatically cleaned solar panels for space applications will alter the very method of solar panel mounting, design, and structure as we look towards the future of space. The intention of the project was to find an easier to produce system to use now without extensive alterations to current solar panel structures. This method is modifiable or applicable to both terrestrial solar panels and space panels. The method researched and implemented was acoustic resonance- using an emitted tone frequency to remove the dust particles from a surface. To accomplish this several system configurations using piezoelectric diodes were created to test the best possible method. Using testing procedures, frequency modulation, lab equipment, solar panels, and two types of simulant particles a successful method of solar panel cleaning was achieved. It was discovered that with the correct configuration of piezoelectrics and frequency, the particles of both types were removable from the surface of solar panels. This project was done in completion of a senior capstone for SSE 499 with Professor Jeff Kruth and Michael Combs as project manager and mentor respectively.

Preschooler Attachment And Adolescent Psychological Flexibility.

P-61

Tara Bello*, Alex Urs. Dr. Shari Kidwell, mentor, Department of Psychology, College of Science

Psychological flexibility refers to broadly being open, aware, and actively engaged. Psychological flexibility has consistently been associated with psychological symptoms and well-being, but few researchers have examined this construct developmentally. Attachment, the quality of the parent-child relationship, is one of the most important influences on children's developing emotion regulation capacities. We predict that individuals with higher-risk preschool attachment strategies will show decreased psychological flexibility as adolescents. Twenty-one children (about 50% female) participated at 4.5 and at 16.6 mean years. Attachment strategies, assessed in the Strange Situation, were divided into low vs. high-risk. Psychological flexibility was assessed using the Avoidance and Fusion Questionnaire for Youth (AFQY: Greco, Baer, & Lambert, 2008). The Social Desirability Scale-17 (Ströber, 2001) was included as a covariate. Data was analyzed using ANOCOVA. Results showed that attachment risk approached significance in its association with psychological flexibility ($p = .063$), but it did not meet the standard to be statistically significant [$F(1,21) = 3.913, p > .05, \eta^2 = .179$]. This is likely due to low sample size. Results suggest that psychological flexibility may be one factor in determining why insecure attachment creates risk. This research was funded by MSU's RCPC & URF programs, as well as KY NSF. IRB Protocols 04-09-12R1 and 15-09-11.

Impact Of Nurse Pateint Interactions On Patient Outcomes: A Quality Improvement Project

P-62

***Emma Wallace* *. *Dr. Mary White* , *mentor*, Department of Nursing, College of Science**

The purpose of this project is to address the benefits of care related to nurse and patient interactions. Throughout the project we have researched these benefits within different specialties of medicine. Some different specialties we studied include, communication in the ICU (intensive care unit), communication within the palliative/hospice setting, communication in the ED (emergency department), communication in the medical surgical setting, patients' perception of nurse/ patient interactions, nurse communication techniques and training, and lastly the costs of effective and ineffective communication.

Development Of Metal Oxide Sensor Array For Rapid Detection Of Mixed Volatile Organic Compounds

P-63

***Samuel Evans* *. *Dr. Cheng Cheng*, *mentor*, School of Engineering and Computer Science, Smith College of Business and Technology**

Abstract: Volatile organic compounds, or VOCs, are organic chemicals that constitute a large class of low-molecular-weight (<300 Da) carbon-containing compounds. They can rapidly evaporate from liquid or sublime from solid form due to their low boiling points. VOCs molecules have a wide range of sources, both natural (plants, animals, bacteria etc.) and anthropogenic (fossil fuels, automobile exhaust gas etc.). Detection of poisonous and explosive gases emitted from industry productions, indoor environments and biological processes is important for production control, environmental protection as well as human health. Recently, electronic noses are gaining popularity for on-site recognition of VOCs in practical settings. Typically, an electronic nose is composed of several gas sensors with different specificities and a suitable pattern recognition algorithm. In this work, an open-air flow design that more closely mimics a real-life detection setting is selected to detect VOCs such as acetone, ethanol, isopropyl alcohol (IPA) and their binary and ternary mixtures. An array of metal-oxide-semiconductor (MOS) gas sensors is adopted for their low cost, orthogonal sensitivity, reliability, and long-term stability. Correlation coefficient and principal component analysis are used to select sensors.

Relationships Among Maternal Characteristics In Hair Sheep

P-64

***Rebekah Mills**, *Audrey Burton*, *Annika Weaver*. *Dr. Patricia Harrelson*, *Dr. Flint 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 and 2023 lambing seasons collected from our Katahdin ewes ($n = 38$; 1-4.5 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 $P < 0.05$. Ewe age provided the most correlations, including a negative relationship ($r = -0.384$) with teat score and a positive relationship ($r = 0.28$) with BCS. There was also a negative correlation ($r = -0.31$) between FEC and ewe age, along with a positive relationship ($r = 0.267$) with the incidence of mastitis. Furthermore, udder scores were negatively related ($r = -0.25$) to FAMACHA, and positively correlated to FEC. Also, the teat score was negatively correlated ($r = -0.34$) with BCS. The results of this project underline the importance of multiple traits which could contribute to ewes leaving the flock early. IACUC #22-11-02

A Search For The Time Variability In The Population Of X Ray Binary Systems In The Galaxy Ic 342

P-65

Brannon Jones**. *Dr. Thomas Pannuti, *Dr. Eric Schlegel***, *mentors*, Department of Physics, Earth Science and Space Systems Engineering**, College of Science, Department of Physics and Astronomy**, University of Texas-San Antonio**

X-ray binaries (XRBs) are comprised of a neutron star (NS) or stellar-mass black hole (BH) that is accreting material from a stellar companion. Studies of these sources yield insights into the properties of NSs and BHs as well as the dynamics of mass transfer and stellar evolution in binary star systems with sources at stages of advanced stellar evolution. Studies of X-ray binaries in the Galaxy are compromised by massive absorption extinction along Galactic lines of sight and by significant uncertainties in the distances to these sources. In contrast, studies of XRBs in nearby face-on galaxies with high current rates of star formation, locations at high Galactic latitudes and face-on orientations feature lower amounts of extinction. In addition, uncertainties in the distances to these XRBs are reduced to uncertainties in the distances to the host galaxies themselves. With this motivation, we are conducting a timing analysis of the XRB population in the nearby face-on spiral galaxy IC 342. Our analysis of archival X-ray observations that were made of this galaxy using the Chandra X-ray observatory have identified 123 discrete X-ray sources, the majority of which are XRB candidates. We are conducting a timing analysis on twelve of these sources detected at high confidence (at 1000 total counts or more) to identify variability both during an observation and between observations themselves. We have identified 9 sources that exhibit clear evidence for variability -- initial results will be presented and discussed.

Parental Sensitivity In A Play Task: Associations With Preschooler Psychological Symptoms.

P-66

***Abigail Chaney**, *Taylor Corbin**, *Brandi Stone*, *Sierra Workman*. *Dr. Shari Kidwell*, *mentor*, Department of Psychology, College of Science**

Parental sensitivity has been shown to be an important risk or protective factor for children's development (van der Voort et al., 2014; Zhang et al., 2020). Sensitivity is defined as parental behavior that is attuned to children's emotional needs. In the present study, we hypothesize that parents' sensitivity will be related to child- and parent-report of symptoms. As part of larger study, 48 preschoolers and their parents participated in a game of ring toss. The Toddler Care Index 15-point scale (Crittenden, 2007) was utilized to rate parents' sensitivity during the procedure. Lower scores indicate decreased sensitivity, including both withdrawn and hostile parenting. Children were interviewed about their internalizing (e.g., anxious) and externalizing (e.g., oppositional) behaviors, using a puppet interview developed for the study. Parents completed the Child Behavior Checklist (CBCL: Achenbach & Rescorla, 2001), which also assesses internalizing and externalizing symptoms. Data coding and analysis is ongoing, but we expect that parents who displayed greater sensitivity in the play task will tend to have children with lower levels of internalizing and externalizing symptoms. Of particular note, if our hypothesis is supported, the findings have implications for risk assessment and early intervention. This research was funded by MSU's RCPC & URF programs, as well as KY NSF. IRB Protocol 04-09-12R1.

Health And Financial Disparities In Eastern Kentucky

P-67

***MaCaila Blankenship**. *Dr. Geoffrey Gearner*, *mentor*, Department of Biology and Chemistry, College of Science**

Eastern Kentucky lags behind the rest of the state regarding proper health, while Kentucky as a whole is doing worse than national averages. Kentucky leads the United States in cancer mortality. Along with this, Kentucky sees higher mortality from heart disease, injury, suicide, diabetes, and chronic obstructive pulmonary disease. High poverty rates throughout Eastern Kentucky contribute to the health crisis being observed. Poverty rates in Black communities across America are some of the highest, at 19.5 percent. Poverty rates in the Appalachia region of Kentucky are at 25.4 percent. Compare this also to the rates of Asian Americans throughout the United States, at 8.1 percent, and White Americans at 8.2 percent. Though some efforts have been made at reducing poor health and poverty, few have seen much success. Recently the ARC commission has invested in Appalachia's economic future, which will in turn contribute to Eastern Kentucky's overall health. Funds are needed throughout much of the Appalachia region while obtaining and spending them properly seems to be a struggle. It is no secret that health has a direct correlation to one's wealth and resources. Along with being financially secure, those who are educated tend to have better health outcomes as well. Resources and access to these necessities contribute to health outcomes just as much, if not more. The closure of many rural hospitals has had a direct impact on eastern Kentuckian's ability to access healthcare, and without the ease of access, many forgo treatment contributing to poor health.

A Review Of The Implications Of The Love Canal Disaster And The Subsequent Actions Of The State And Federal Government

P-68

Hannah Albright*, Brooklyn Hurtt*. Dr. Douglas Mock, mentor, School of Humanities and Social Sciences, Caudill College of Arts, Humanities and Social Sciences

For this project, we read *Love Canal: A Toxic History from Colonial Times to the Present* by Richard Newman. This book explores the history of Love Canal and the disaster that caused the entire town to be evacuated per federal order. Our objective was to review the environmental law and find connections between it and the Love Canal incident, as well as identify main themes throughout the book. The results we found were that the central idea Newman was trying to display is the power of grassroots movements and the importance of Love Canal as a whole. This event brought human health and the health of the environment into the hands of the federal government.

An Analysis Of Galactic Supernova Remnant G340.6+0.3

P-69

Walker Hartman*. Dr. Thomas Pannuti, mentor, Department of Physics, Earth Science and Space Systems Engineering, College of Science

Pointed observations of Galactic supernova remnants (SNRs) as conducted at multiple wavelengths and with leading observatories (such as the Chandra X-ray Observatory and the Spitzer Space Telescope) have revealed many new insights into both SNRs themselves and the interstellar medium (ISM) with which these sources are interacting. We are currently investigating the multi-wavelength (chiefly X-ray and radio) properties of poorly studied SNRs that have been readily detected in the infrared to help improve understanding of how SNRs and their surrounding ISM interplay. To demonstrate this, we present an analysis of an archival pointed observation of the Galactic SNR G340.6+0.3 with the Chandra X-ray Observatory. The high angular resolution image reveals shell-like morphology that similarly matches the radio morphology of the SNR. In addition, spatially-resolved spectroscopy of the SNR using standard thermal plasma models reveals an asymmetry in the spectral properties of the rim. While enhanced (relative to solar) abundances of elements such as silicon are indicated from fits to the spectrum of the X-ray luminous northeastern rim (indicating that X-ray emitting plasma at this site is ejecta-dominated), the measured elemental abundances at other locations of the SNR are consistent with solar, indicating that those sites' plasma is dominated by swept-up ISM. From spectral fits and our adopted distance to this SNR of 15 kiloparsecs, we estimate a median electron number density for X-ray-emitting plasma to be 0.20 per cubic centimeter and the swept-up X-ray emitting mass of the plasma to be approximately 50 solar masses. Further results will be presented.

A Novel Apparatus For Assessing Anxiety In Rats

P-70

Olivia Blatt*, Emma Brock*, Timo Klausnitzer. Dr. Wesley White, mentor, Department of Psychology, College of Science

In previous research, we began to evaluate a new apparatus for assessing anxiety in rats. The new apparatus was more compact and customizable than the traditional apparatus used to assess anxiety, the elevated plus maze. The prior study used twenty adult male Wistar rats. The new apparatus that was used was an elevated choice alley. The alley had two arms. One arm had high opaque walls (closed arm), and the other arm had no walls (open arm). During session one, each rat explored the alley for five minutes. The number of times rats entered closed and open arms, and the percentage of time rats spent in the closed arm were very similar to values previously obtained in the plus maze. The animals were divided into three groups. In session two, each group was placed in one of three configurations of the alley. Each configuration had a closed arm, but the other arm was open (as in session one), had transparent walls, or had covered walls. Results indicated that the presence of walls and the opaqueness of walls made independent contributions to the level of anxiety obtained. The goal of the current research was to replicate these prior results using twenty-three additional rats. The replication assessed the reliability of the methods used. In addition, by increasing the total number of subjects assessed, the replication had the potential to establish the statistical significance of some strong trends seen in the prior research. IACUC protocol number: 22-03-10

Optimizing Thrombin Cleavage Of Proteins Tags Of Co Repressors, Umu D Ab And Ddr R, In The Pathogen *Acinetobacter Baumannii* For Cross Linkage Studies

P-71

Mercy Hailu. Dr. Janelle Hare, Dr. Deborah Cook, mentors, Department of Biology and Chemistry, College of Science

The *Acinetobacter baumannii* strain 17978 is a Gram-negative and nosocomial ESKAPE pathogen. It utilizes its unique SOS genes, *umuDAb* and *ddrR*, to inhibit cell division and control mutagenesis in response to DNA damage, as it lacks the typical SOS repressor, LexA. Even though it is well known that the repressor *UmuDAb* becomes cleaved in the process of DNA repair and binds to *DdrR*, the stoichiometry of their interaction is still unknown. This study aims to determine how many copies of these proteins bind to each other to co-repress the error-prone polymerases. We plan to test the ability of *UmuDAb* and *DdrR* to form heterodimers by performing cross-linkage experiments using formaldehyde. However, the presence of an N-terminal protein tag needed for these proteins' purification could interfere with their binding to each other. So we used an enzyme, thrombin, to cleave off these N-terminal protein tags from these proteins before testing if they would bind to each other. *UmuDAb* was first purified using TALON resin and filter dialysis. We then used thrombin digestion for differing periods of time to cleave off the protein tag from *UmuDAb*. This was followed by western blotting that confirmed the successful removal of the protein tag by using antibodies recognizing the protein tag. We have optimized the thrombin enzyme needed to cleave the tag from one of the two proteins, *UmuDAb*. After optimizing conditions for cleavage of the protein tag from *DdrR*, we will test *DdrR*'s interaction with *UmuDAb* using cross-linking experiments.

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

P-72

***Caitlyn Senters**, *Zoe Baker**, *Jared Vise*, *Shelby Black*. *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 rivers. Despite the Highland Shiner's prevalence in this area, little published information exists describing the life history of this minnow species. The goal of our research is to study the life history, including age and growth, reproductive cycle, and diet of *Notropis micropteryx*. This part of our study is an analysis of the age and growth of a Highland Shiner population in the Rockcastle River, Kentucky from early June to mid-October. Length-frequency analysis of standard length (SL), corroborated with examination of scale annuli of preserved specimens, were used to determine the age of each individual. We found that the Highland Shiner lives only 2 years. Highland Shiners averaged 39.6 mm SL for age 0 fishes (June-October), 46.6 mm SL at 12 months, and 52.3 mm SL at 24 months. Preliminary comparisons indicated females grow at a faster rate than males. Further gonad analysis, in combination with our results from this age and growth study, will help us better understand their reproductive cycle and times at which they are most vulnerable (breeding season). Results from these studies can help conservation workers manage Highland Shiners and other fish members of their community. This research was approved under IACUC protocol 21-12-09R1.

Period Analyses Of Variable Stars Alpha Orionis And Beta Lyrae

P-73

***Gianna Federico**. *Dr. Jennifer Birriel*, *mentor*, Department of Physics, Earth
Science and Space Systems Engineering, College of Science**

Variable stars change in brightness over regular or semiregular periods of time. Causes of variability include pulsation (changes in size) or the presence of a companion star or planet that eclipses part of the stellar surface. We examine period changes of the bright variable stars Alpha Orionis (Betelgeuse) and Beta Lyrae using data from the American Association of Variable Star Observers (AAVSO). Periods were analyzed by applying Fourier and weighted wavelet z-transforms to the light curves of each star over a 30-year time span. Our analyses showed that both the short and long secondary periods of Betelgeuse changed with time. The long period decreased at a nearly constant rate, and the short period increased in sudden "jumps" before suddenly decreasing. The period of Beta Lyrae had only small variations surrounding the expected period, with the exception of a sudden 3-day decrease which immediately increased back to the expected period again. The AAVSO database contains contributions from amateur and student observers: our ultimate goal is to use an older DSLR to contribute to the AAVSO database of bright variable stars.

Impact Of Informal Stem Learning On Student Success

P-74 ***Kiera Fehr*. Dr. Rachel Rogers, mentor, Craft Academy for Excellence in Science and Mathematics, Craft Academy for Excellence in Science and Mathematics***

As faculty of an elite STEM academy, I have observed that informal STEM learning experiences lead to academic student success. Many students have been able to use the unique STEM experiences outside the formal classroom as opportunities to promote academic growth. Science, Math, Engineering, and Technology (STEM) is a growing field; by 2029, it is projected to grow roughly 8% (Zilberman and Ice, 2021). The rise in interest and demand for STEM careers is a call for growth in our future generations. This research will present personal experiences from student informal STEM-focused learning experiences; sending a science experiment to space, a trainee program to operate a 21-M Space Tracking Antenna, creating innovative research to compete at an international level, and traveling to present ideas as a company ambassador. These unique experiences have led to the development of skills such as how to conduct research, problem-solve in creative ways, properly collect data, and communicate with a variety of audiences. Considering the increase in interest in STEM-based career fields, the opportunity for concepts to be presented in innovative scenarios such as those in informal STEM learning experiences both prepares students for future occupations and encourages a deeper grasp of the course content.

Universal Quality Control For Brewers

P-75 ***Taylen Hylton. Dr. Geoffrey Gearner, Mr. Derek Caskey, mentors, Department of Biology and Chemistry, College of Science; Sawstone Brewing Co.***

Beer, the product of fermentation that arguably changed the course of human civilization. Though the first brewing process dates back to ancient Mesopotamia, the modern method still presents a host of flaws. There are both many steps of fermentation and many opportunities for contamination. Most breweries will experience some form of spoilage in their lifetime. These invading microorganisms can alter turbidity, coloration, aroma, taste, and the overall quality of the product. This disruption is devastating for commerce. A centralized method of testing would help to eliminate spoiled products and prevent future infections. The following procedure utilizes a combination of polymerase chain reaction and media to detect suspected contaminants. The PCR primer sets cover general bacteria and fungi, Saccharomyces to non-Saccharomyces, and diastatic variants.

Gender Identity And Perception Of Happiness

P-76

*Victoria Miller**, *Dr. Lynn Geurin, mentor*, School of Humanities and Social Sciences, Caudill College of Arts, Humanities and Social Sciences

How individuals identify themselves in the context of gender, is often fluid rather than a simple dichotomous view of being man or woman (known as binary). Statistics show that approximately 1.2 million people in the United States identify their gender as being nonbinary (Wilson & Meyer, 2021). Previous studies and discussions on gender and outcomes frequently focus on gender as a binary concept. Additionally, many gender minorities find their gender identity creates barriers to gaining essential support systems, successful careers, and living a life free from judgement and discrimination because of who they are (Hafi & Uvais, 2020).

This study explored the topic of gender identity and overall happiness based on a fluid or nonbinary perception of gender. In the quantitative study, the researcher surveyed more than ninety people (n=94) about gender identity and happiness. A Gender Self-Perception Scale (Kasabian, 2015) was used to capture information about gender identity and a Perception of Happiness Scale (Baucells & Sarin, 2012) was used to measure happiness. Findings suggest the closer an individual fits to either side of the gender binary scale, the higher their perception of happiness will be. This study has important implications, as it creates a dialogue about gender identity and allows social workers and other human service professionals to gain more understanding for helping diverse groups of people and gender minority individuals specifically.

Keywords: Gender, Happiness, Nonbinary

IRB Protocol Number: 22-03-73

Disparities Faced By Incarcerated Patients Receiving Healthcare Services

P-77

*Riley Hall**, *Aaliyah Manson**, *Madison Mason**, *Katelyn Martha**, *Morgan Callihan**, *Mariam Bradley**, *Martin Helms**, *Sandra Frederick**, *Dr. Suzi White, mentor*, Department of Nursing, College of Science

It is evident that in the 21st century, discrimination still plagues our society, and unfortunately, it is not limited to social interactions. In fact, it can also be observed in the healthcare setting, where certain populations are often mistreated due to their socio-economic status. One group that has been consistently subject to unequal treatment when receiving medical attention is the population of prisoners or jail inmates. Regrettably, this issue is frequently overlooked and understudied. As such, it is essential to acknowledge and explore the inequality that prisoners face in terms of healthcare, especially given the numerous factors that can impact their health. The purpose of this research was to identify the discrepancies incarcerated patients face in the healthcare system. The objective of this research was to bring to light the disparities incarcerated patients experience, and how to eliminate these. In order to develop a better understanding of the prejudiced actions incarcerated patients face in the healthcare spectrum, numerous studies have been analyzed. Topics that are included in these analyzed studies include general health of incarcerated patients, barriers and challenges related to prison healthcare, inequities in treatment as a hospitalized patient, financial impacts of prison healthcare, nutrition provided in incarceration, most common diseases seen and diagnosed while incarcerated, healthcare resources available for this population, and poor outcomes related to incarceration.

Differential Effects Of Nmda Muscarinic Vs. Dopamine Muscarinic Interaction On Locomotor Activity In Rats

P-78

Timo Klausnitzer*, Olivia Blatt, Dr. Ilsun White, Dr. Wesley White, mentors, Department of Psychology, College of Science

It is well-known that psychostimulants, such as amphetamine, produce hyperactivity. Studies have shown that inactivation of muscarinic acetylcholine receptors or N-methyl-D-aspartate (NMDA) receptors also produce hyperactivity and disrupt learning and memory. In fact, a muscarinic receptor antagonist, scopolamine, is commonly used in animal model of Alzheimer's disease (AD). However, the underlying mechanisms for hyperactivity produced by different neurotransmitter systems remain unclear. The present study examined NMDA-muscarinic and dopamine-muscarinic interaction in spontaneous locomotor activity in rats. Our hypothesis was that combination of either NMDA antagonist and muscarinic antagonist or dopamine agonist and muscarinic antagonist will enhance activity synergistically. Wistar rats (n=6) were habituated in the open-field station (Day1) and received saline injection (Day 2). In Experiment 1, rats received four drug combinations: MK801+scopolamine, scopolamine+saline, MK801+saline, and saline+saline. In Experiment 2, rats received similar combinations, with amphetamine replacing MK801. Scopolamine (0.5mg), MK801 (0.05mg) and amphetamine (0.25mg) were dissolved in saline. All injections were given intraperitoneally, <2 min before testing. Consistent with previous reports, scopolamine and MK801 alone increased locomotion compared to saline. However, co-administration of drugs produced differential effects on scopolamine-induced hyperactivity: MK801 further enhanced hyperactivity, whereas amphetamine slightly attenuated hyperactivity. Given that both NMDA-receptor antagonists and dopaminergic agonists are used as cognitive enhancers in AD, our data suggest that treatment with an NMDA antagonist may increase the risk and danger of wandering. Further study is warranted to elucidate the precise mechanisms underlying differential effects of neurotransmitter interaction on behavior.

Age And Growth Of The Popeye Shiner (Notropis Ariommus) In The Rockcastle River

P-79

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

The Popeye Shiner (*Notropis ariommus*) is a minnow species in the Ohio River basin. The Popeye Shiner was petitioned to be added to the endangered and threatened species list in 2011 by the US Department of the Interior. The objective of this study was to determine the age and size distribution of the Popeye Shiner in Rockcastle River, Kentucky. Scale annuli were used to age preserved specimens collected in 2022. The Popeye Shiner was found to have very few individuals living beyond a second year with the most mortality occurring after their first year. The shiners average about 52 mm at 12 months and grow about 10 mm more in their second year. These findings, paired with our ongoing study of its reproductive biology, will give wildlife management authorities a greater understanding of the species, useful in making appropriate conservation decisions. This study was conducted with approved IACUC protocol 21-12-09R1.

Blackacre: Adventures In Property Law (A Role Playing Game For Education)

P-80

***Savannah Jackson**, Dr. Laken Albrink, mentor, School of Humanities and Social Sciences, Caudill College of Arts, Humanities and Social Sciences**

"Blackacre: Adventures in Property Law" is a tabletop roleplaying game designed to teach its players essential principles of United States property law in a fun and interactive manner. Players develop a working vocabulary in real property law and learn to apply property law concepts to a fictitious scenario while competing against each other to acquire the most money. The "rule book" is a legal memoranda of property law statutes, case law, and other sources explaining real-life application of the game's rules. "Blackacre" is one method legal studies instructors may utilize to supplement classroom instruction and improve student learning outcomes.

Characteristics Of Long Term Care In Nursing Home Facilities In Eastern Kentucky

P-81

***Jennifer Bailey**, Dr. Ilsun White, mentor, Department of Psychology, College of Science**

In nursing home facilities, trained care providers care for the individuals who need long-term care due to chronic illnesses. This study examined the characteristics of care provided in two nursing home facilities in Eastern Kentucky, focusing on types of care under specific health conditions. A total of 160 care receivers were categorized under their diagnosis and types of care were characterized based on the daily routine protocols. A majority of care receivers had impaired neurological and cognitive impairment, with aging (33.1%), Alzheimer's disease (AD 27.5%), or Parkinson's disease (PD, 25.6%). Types of cares provided for care receivers were characterized and categorized into three types: social interaction (49.3%), personal hygiene (33.3%), and physical (17.3%). For AD and PD, characteristics of care were proportionally similar and resource allocation was comparable. However, compared to AD or PD, patients with aging-related impairment received substantially less care, particularly in social interaction category. Given that about 1/3 of care receivers were aging-related, the present findings indicate that comparable resources need to be allocated for these individuals to ensure quality health care.

Collection Maintenance After Maintenance Lost: Making Meaning From The Rock Pile

P-82

***Abbie Grzynkowitz**, *Zachary Strait**, *Miles Terry**, *Dr. Jen O'Keefe*, *mentor*,
Department of Physics, Earth Science and Space Systems Engineering, College
of Science**

Geoscience Collections at Morehead State University have not been properly accessioned or curated since prior to the Lappin Hall renovations in the mid-1990's. In the intervening decades, many samples have been lost, damaged, or destroyed due to improper storage. No specimens added to the collection in that time period were accessioned into the catalog. Thus, significant portions of the collection have no collection and/or locality information associated with them. A concerted effort to organize the collections began in 2018. This organization effort has now progressed to comparing existing specimens to the existing catalog to identify what of the historical collections remain intact and determination of which newer specimens to retain. Specimens with no label information are not being retained unless it is identifiable to locality without a label (uncommon occurrences) or are excellent examples used in teaching. This has resulted in generation of large numbers of orphaned specimens. Retained specimens are being accessioned into the catalog and all accessioned specimens are being assigned QR codes through SESAR and will be part of an international searchable database of geological specimens upon completion of the project.

Repressor Of The Sos Response Mechanism In *Acinetobacter Baumannii* Requires Helix Formation And Dimerization For Its Dna Binding Ability

P-83

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

Acinetobacter baumannii is an opportunistic pathogen that continues to evolve multidrug resistance. After DNA damage, it activates its SOS response, pausing cell division to allow DNA repair and inducing error-prone polymerases that cause mutagenesis. While most bacteria use the SOS repressor LexA to repress its error-prone polymerase operons, *A. baumannii* employs repressor UmuDAb, a homolog of error-prone polymerase UmuD, along with its coregulator DdrR. LexA requires dimerization to effectively bind DNA and repress transcription, and we have identified several amino acid residues and the C terminus as required for UmuDAb dimerization. We have also observed that disrupting either of two helices in UmuDAb's potential helix-turn-helix (HTH) domain impairs gene repression. To investigate if the UmuDAb HTH helices and its dimerization are required for DNA binding, we constructed and purified wild-type UmuDAb and UmuDAb proteins mutated in gene repression ability (HTH 1 and HTH2), amino acids required for dimerization in UmuD (N100D) or LexA (G124D), or the C-terminus (truncations W192X and R201X). Using a fluorescently-labeled DNA probe as a UmuDAb binding site, we performed electrophoretic mobility shift assays to observe how these mutations affected UmuDAb's DNA binding ability. We found that UmuDAb bound to DNA tightly while the various mutant UmuDAb proteins bound with more than 8-fold lower affinity than wild-type UmuDAb, indicating that helices and dimerization are essential for UmuDAb to bind to DNA. Understanding how UmuDAb represses SOS genes will further characterize DNA damage response mechanisms in *A. baumannii* and potentially uncover an exploitable feature for future therapies.

Identification Of Unknown Mold Sample From Lappin Hall

P-84

***Devan Herald**. Dr. Geoff Gearner, mentor, Department of Biology and Chemistry, College of Science**

The purpose of this undergraduate research project is to identify an unknown species of mold that was found growing in the B-wing of Lappin Hall, on the Morehead State University Campus, after the summer holiday of 2022. A sample of the unknown mold was collected using the appropriate technique, isolated, and proliferated via Sabouraud dextrose agar (SDA). The unknown mold was viewed microscopically for identifying morphological features. DNA was then extracted from the unknown mold and selective sequencing primers were used to amplify specific genome sequences. The amplified sequences can then be compared to GenBank using BLAST to identify the unknown mold.

Fundamental Or Negligible? Kentucky P 12 Teacher Websites

P-85

***Madison Stamper**. Dr. Lesia Lennex, mentor, Department of Middle Grades and Secondary Education, Volgenau College of Education**

How does a P-12 classroom teacher communicate at large with their students or their parents? There are countless ways for teachers to communicate with others. We determined that the more effective route in teacher communication would be an access-key-based Google Classroom or an open-access teacher website linked directly to their respective school's website. An available, published teacher website allows anyone with internet access to view teacher-proffered information. This information could include their name, email, phone number, short biography, picture, or Google Classroom link. We found that the most effective information to include on a teacher's website would be their name, email, and phone number in order to be reached by anyone who needed to contact them. This study sought to determine to what extent Kentucky's P-12 teachers in its 171 school districts were 1) publishing teacher websites connected to the school web page, 2) including essential elements for clear communication, and 3) Americans with Disability Act (ADA, Section 508) compliant.

Enhancing Telomerase Activity In Saccharomyces Cerevisiae Through A Genetic Screen For Gain Of Function Mutations

P-86

***Keenan Conley**, *MacKenzie Neal **, *Hailey Rietz**. *Dr. Melissa Mefford*,
mentor, Department of Biology and Chemistry, College of Science**

Telomeres are located at the ends of eukaryotic linear chromosomes and are composed of repeated nucleotide sequences. The main function of telomeres is to protect chromosomal ends. However, telomeres cannot be copied entirely during DNA replication leading to a gradual shortening known as the “end replication problem”. To counteract this problem, the RNA-dependent enzyme complex telomerase works to extend telomeres and maintain the chromosomal ends which help to prevent senescence. Understanding the structure and function of telomerase could have important implications for the development of anti-cancer therapeutics since telomerase is over-active in >85% of all human cancers. While the general role of the telomerase enzyme is known, much about the roles of individual factors remains elusive. We are interested in better understanding the function of rapidly evolving telomerase RNA. Most past research ascribed telomerase RNA function through identifying loss-of-function mutations that abolish enzyme function. In contrast, we set out to identify novel gain-of-function mutations that increase enzyme activity. To this end, we designed an elegant genetic screen in the model organism *Saccharomyces cerevisiae* that allows us to select more active versions of telomerase RNA from a pool of 5,000 random mutations. After screening over 25,000 yeast colonies, we verified 24 new gain-of-function mutants. Currently, we are adapting a PCR-based method to measure telomere length in our various gain-of-function mutants. Our next step will be to dissect the mechanism(s) through which the mutations are enhancing enzyme activity. This will further enhance our understanding of how telomerase RNA contributes to enzyme function.

Hplc Analysis Of E Liquids

P-87

***Alyssa Roark**, *Ashley Ruley**. *Dr. Emmalou Schmittzehe*,
mentor, Department of Biology and Chemistry, College of Science**

Electronic cigarettes are one of the most commonly used methods of nicotine delivery, especially among the adolescent population. Due to the lack of regulation in manufacturer labeling of refillable nicotine solutions (e-liquids), the actual concentration of nicotine and other additives have been found to be variable as compared to the reported values. The misrepresentation of nicotine content is a contributor in the development of nicotine dependency and potentially tobacco product dependency. In this research high-performance liquid chromatography (HPLC) was used to quantify nicotine levels in standard samples in order to validate the method for use in studying the variations in nicotine levels in e-liquids as compared to their reported levels. The initial method used was modeled from a published method for quantifying nicotine in e-liquids. Due to bifurcation and trailing of peaks, the method was modified identify a better solvent system.

Classroom Management In Kentucky

P-88

***Sarah Miller**, Dr. Kimberly Nettleton, mentor, Department of Early Childhood, Elementary and Special Education, Volgenau College of Education**

Classroom management is a daunting challenge for educators to implement. Knowing what style works best for an individual requires time that new teachers don't have early in the school year. This research project evaluates the different types of classroom management Kentucky educators use in their classrooms. Using a mixed method of interviews and surveys, educators from elementary, middle, and high schools share how classroom management differs for each age group. The questions in the surveys and interviews discuss student behavior, parent involvement, previous classroom management training, and individual strategies that different teachers implement in their classrooms.

Information from interviews and surveys provides insight into the most effective forms of classroom management. By comparing the similarities and differences in classroom management methods across different ages, incoming educators can better design their classroom management strategies to fit the needs of their students and provide the best learning environment possible. Classrooms effectively managed throughout the day provide more learning opportunities for students, reducing the number of distractions and behavior issues that occur.

Effects Of Active Learning Strategies And Passage Readability On Exam Outcomes

P-89

***Johnna Brown**, Madison Cornelius, Daisy Pratt, Grace Stubblefield. Dr. Gregory M. Corso, mentor, Department of Psychology, College of Science**

The question being asked in this research project was whether different rehearsal techniques would be equally beneficial for different types of learning. Participants were assigned a Concept-map or a Fill-in-the-blank rehearsal technique and either an easy or a difficult reading passage about a fictional fish population. Participants used their rehearsal technique to study the passage and then completed a series of questions about the fish population. For all participants, inferential and comprehension questions were asked. We hypothesized that the Concept-map condition would result in the highest scores for inferential questions, while the Fill-in-the-blank condition would result in the highest scores for comprehension questions. Additionally, we used two different retention intervals to determine if either rehearsal technique would have differential effects across time. Rehearsal techniques and reading level were between-subject variables, and question types and retention periods were within-subject variables. Undergraduate students ($n = 65$) participated for credit and were treated in accordance with IRB guidelines. Data from 64 participants were analyzed. Results showed a significant interaction between the rehearsal technique and question type, $F(1,60) = 6.959, p = .011$. Participants in the Concept-map condition showed the highest performance on inferential-type questions, while participants in the Fill-in-the-blank condition showed the highest performance on comprehension-type questions. Retention period and readability level had no effect on exam performance for either question type. The implications for this study are that different rehearsal techniques enhance different types of learning, suggesting that rehearsal techniques are task-dependent on the type of learning required.

IRB-protocol-number: 22-07-01

Fungal Palynology Of High Latitude Coals And Interseam Rocks From The Miocene Climate Optimum Warming Event In Victoria, Australia

P-90

***Laikin Tarlton**, *Taylor Horsfall**, *Alyssa Patel**. *Dr. Jen O'Keefe*, *Dr. Ingrid Romero*, *mentors*, Department of Physics, Earth Science and Space Systems Engineering, College of Science**

Fungi are necessary elements in all ecosystems because of their critical role in terrestrial carbon cycling, soil formation, and plant ecology. Thus, it is critical to understand how fungal assemblages may change with global warming. Fungal assemblage shifts, associated with climate change have been documented in the northern high latitudes, but prior to this study, we did not know if this also occurred in southern high latitudes. The analysis of fungal assemblages from lower-middle Miocene sediments from Victoria, Australia is key to resolving this question. The sediments studied here, which include the M1A coal, Yallourn Interseam, and Yallourn coal, were deposited during the lead-up to and through the Miocene Climate Optimum (MCO; 18-13 Ma). Preliminary results indicate that the fungal assemblages of M1A and Yallourn coals are highly diverse. The Yallourn Interseam, between the two coals, is less diverse. While the assemblages differ, preliminary reconstructions of fungal assemblage-indicated Köppen-Geiger climate zones suggest that fungal communities are changing in relation to climate change.

2022 - 2023

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 2022-2023 awardees and their mentors.

CAUDILL COLLEGE OF ARTS, HUMANITIES AND SOCIAL SCIENCES

Student URF	Class	Department	Mentor(s)
Abby Hall*	JR	SECL	Karen Taylor Willie Carver
Brooklin Routt	SR	SCCA	Robyn Moore
Christopher Logan*	JR	SECL	Alison Hruby Andrea Olinger James Chisholm
Lily (Lee) McConnell*	JR	SECL	Alison Hruby Andrea Olinger James Chisholm
Corissa Riegler*	SR	SECL	Donell Murray
Holly Hendrix*	JR	SECL	Philip Krummrich
Isabella Sailors*	SO	SECL	Ann Andaloro
Olyvia Neal*	SR	SECL	Karen Taylor
Johnathon Carmack*	SR	SHSS	Lisa Shannon Shira Birdwhistell
Karlye Lane*	SR	SCCA	Lisa Mesa-Gaido Mike Bowen Quinn Maher
Kennedy Little*	SO	SHSS	Laken Albrink Melinda Jennings
Nathan Walden*	JR	SHSS	Benjamin Fitzpatrick
Savannah Jackson*	JR	SHSS	Laken Albrink
Shianne Smith*	JR	SCCA	Michele Paynter Paise
Syria Hines*	SR	SCCA	Itza Zavala-Garrett
Trenton Rose*	SR	SHSS	Monica Himes

COLLEGE OF SCIENCE

Student URF	Class	Department	Mentor(s)
Abigail Chaney*	SR	PSY	Shari Kidwell
Abigail Fagan*	SR	PHES	Jennifer Birriel Kevin Adkins
Ashley Peters	SR	MATH	Joshua Qualls
Alina-Sophie Koch*	SR	BIOL/CHEM	Mark Blankenbuehler
Alyssa Roark*	SO	BIOL/CHEM	Emmalou Schmittzehe
Ashley Ruley*	SR	BIOL/CHEM	Emmalou Schmittzehe
Rebekah Mills*	SR	AGR	Flint Harrelson Patricia Harrelson
Samantha Trimble*	JR	NURS	Mary White
Austin Lytle*	SR	BIOL/CHEM	Melissa Mefford

Belinda Candra*	SR	BIOL/CHEM	Deborah Cook Janelle Hare
Brannon Jones*	JR	PHES	Eric Schlegel Thomas Pannuti
Breno Pontes*	JR	PHES	Thomas Pannuti
Cael Skaggs*	SR	PSY	Shari Kidwell
Jared Vise*	SO	BIOL/CHEM	David Eisenhour
Shelbie Black*	SO	BIOL/CHEM	David Eisenhour
Caitlyn Senter*	SO	BIOL/CHEM	David Eisenhour
Zoe Baker*	JR	BIOL/CHEM	David Eisenhour
Caleb Clark*	SR	BIOL/CHEM	Melissa Mefford
Grace Stubblefield*	SO	PSY	Gregory Corso
Madison Cornelius*	SR	PSY	Gregory Corso
Johnna Brown*	SR	PSY	Gregory M. Corso
Devan Herald*	SR	BIOL/CHEM	Geoff Gearner
Elinor Sinn*	FR	PHES	Kent Price
Emily McAdams	SR	KHIS	Jennifer Clark
Gianna Federico*	SO	PHES	Jennifer Birriel
Keenan Conley*	SR	BIOL/CHEM	Melissa Mefford
Leire Galvan*	JR	BIOL/CHEM	Sean O'Keefe
Hannah Edmonds*	JR	BIOL/CHEM	Sean O'Keefe
Hannah Ramey*	JR	BIOL/CHEM	Sean O'Keefe
Hannah Phirman*	JR	PHES	Kevin Adkins
Hannah Stanley*	SO	BIOL/CHEM	Deborah Cook Janelle Hare
Mara Stout*	JR	BIOL/CHEM	Elizabeth Thomas
Katelynn Setters*	SR	BIOL/CHEM	Elizabeth Thomas
MaCaila Blankenship*	JR	BIOL/CHEM	Geoffrey Gearner
Marilyn McCarty*	SO	PHES	Jen O'Keefe
Timo Klausnitzer*	SO	PSY	Ilsun White Wesley White
Riley Hayes*	SR	NURS	Mary White
Riley Williams*	SR	AGR	Amanda Skidmore Vijay Subramaniam
Ryan Whitt*	FR	BIOL/CHEM	Sean O'Keefe
Ryleigh Napier*	SR	MATH	Will Tidwell
Tanner Hamilton*	JR	BIOL/CHEM	Melissa Mefford
Taylen Hylton	SR	BIOL/CHEM	Geoffrey Gearner
Tim Wright*	SR	PHES	Thomas Pannuti
Walker Hartman*	JR	PHES	Thomas Pannuti

SMITH COLLEGE OF BUSINESS AND TECHNOLOGY

Student URF	Class	Department	Mentor(s)
Aidan Ray*	JR	SECS	Anindita Paul
Andrew Combs	SR	SECS	Jason Stepp
Dalton Hensley*	JR	SECS	Heba Elgazzar
Jacob Vogelpohl*	JR	SECS	Heba Elgazzar
John Reichenbach*	SR	SECS	Sherif Rashad
Jon Jenkins*	SR	SECS	Sherif Rashad

Mann Patel*	SR	SECS	Heba Elgazzar
Ryan Justice*	SO	SECS	Tathagata Ray
Samuel Evans*	SO	SECS	Cheng Cheng

VOLGENAU COLLEGE OF EDUCATION

Student URF	Class	Department	Mentor(s)
Madison Woosley*	SO	FGSE	Jeannie Justice
Madison Stamper*	SO	MGSE	Lesia Lennex
Sarah Miller*	SO	ECESE	Kimberely Nettleton

**presenting at the 2023 Celebration of Student Scholarship*

2022 - 2023

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 2022-2023 awardees and their mentors.

CAUDILL COLLEGE OF ARTS, HUMANITIES AND SOCIAL SCIENCES

Student URF	Class	Department	Mentor(s)
Syria Hines*	SR	DCML	Itza Zavala-Garrett
Kennedy Little*	SO	HPGL	Laken Albrink

SMITH COLLEGE OF BUSINESS AND TECHNOLOGY

Student URF	Class	Department	Mentor(s)
Nick Armstrong	SO	SECS	Jason Stepp
Andrew Combs*	SR	SECS	Jason Stepp

**presenting at the 2023 Celebration of Student Scholarship*

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