NKU NORTHERN KENTUCKY UNIVERSITY

CELEBRATION

OF STUDENT RESEARCH AND CREATIVITY

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LETTER FROM THE PRESIDENT

To Our Celebration 2025 participants and guests:

Welcome to Northern Kentucky University's annual Celebration of Student Research and Creativity. Congratulations to the students and faculty mentors who are participating this year and thank you to the guests and visitors joining us today.

This is our 23rd year celebrating outstanding undergraduate and graduate research and creativity at NKU. It is a joy and an honor to showcase the incredible work of our scholars and our creative students, and we are so proud!

I know the students featured here are excited to share their hard work with the campus and community. They have applied classroom instruction and their knowledge and passion to these projects. Active learning like this is important, and it's central to the student-centered mission of our university.

We are also delighted to highlight the dedicated faculty mentors who have been instrumental in the development of these projects, working alongside students. They foster creative and intellectual skills while helping students strengthen their presentation capabilities. The bonds our faculty build with students are evidence of our core values of excellence, integrity, inclusiveness, innovation, and collegiality.

I hope you will enjoy all the work on display this week because it exemplifies all that our NKU community does for this region as students learn skills and talent for successful careers and impactful lives. Our students are truly special and with our committed faculty's mentorship, they are transforming their communities and the world around them.

Again, congratulations to all whose work is showcased in this year's Celebration. We are grateful to all who have made this week so memorable and impactful.

All my best,

Cady Short-Thompson

Cady Short-Thompson, Ph.D.
President, Northern Kentucky University

LETTER FROM THE PROVOST

Dear Celebration Participants,

Welcome to the Northern Kentucky University 2025 Celebration of Student Research and Creativity!

This event continues to be one of my personal favorites. It is our long tradition of highlighting the outstanding student scholarly and creative work that happens under the dedicated guidance and mentoring of our faculty. Our Celebration of Student Research and Creativity is a wonderful opportunity for our students to share their work through poster, oral, and virtual presentations and through interactive demonstrations, performances, and exhibits of artistic work across the campus community.

Another reason I love this event is that it allows us to exhibit the close connection between students and faculty that is truly part NKU's DNA. We know these opportunities enhance student learning via intense engagement and discovery. We also realize the work can be challenging, but the rewards can be tremendous. I know from personal experiences both from my undergraduate research experience with my wonderful NKU professor and later as an NKU research mentor myself, that these experiences can be life-changing for students and for the faculty mentors alike!

On behalf of President Short-Thompson and the entire NKU community, I congratulate you on the research, scholarship and creative activity showcased during this annual celebration.

Sincerely,

Diana McGill

Diana McGill
Provost and Executive Vice President for Academic Affairs

SCHEDULE OF EVENTS

TUESDAY, APRIL 22

1:40 – 2:40 p.m.

College Movie Festival
Griffin Hall Digitorium

WEDNESDAY, APRIL 23

8 a.m. – 5 p.m.

Virtual Presentations
www.nku.edu/celebration

9–10 a.m.

Oral & Creative Presentations
- Session 1 (Student Union 108)
- Session 1A (Student Union 109)

10–11 a.m.

Oral Presentations
- Session 2 (Student Union 108)
- Session 2A (Student Union 109)

11 a.m. – 12 p.m.

Oral Presentations
- Session 3 (Student Union 109)
- Session 3A (Student Union 108)

12:30 – 2:30 p.m.

Poster Presentations
Student Union Ballroom

12 – 1 p.m.

Oral Presentations
Session 4 (Student Union 109)

2:30 – 3:30 p.m.

Nysa Volume 7 Celebration
(Student Union 108)

2 – 3 p.m.

Oral Presentations
Session 5 (Student Union 109)

3 – 4 p.m.

Oral Presentations
Session 6 (Student Union 109)

4 – 5 p.m.

Oral Presentations
Session 7 (Student Union 109)

4 – 6 p.m.

College of Health & Human Services Spring Summit
(Health Innovation Center Lobby)

CREATIVE PERFORMANCES FROM NKU'S SCHOOL OF THE ARTS

(see **www.nku.edu/sota** for tickets and details)

Monday, April 7

Super Sax Ensemble
7 – 8 p.m.

Tuesday, April 8

Jazz Combos
7 – 8:30 p.m.

Wednesday, April 9

String Area Recital
7 – 8:30 p.m.

Thursday, April 10

SKALD Festival of Song
7 – 9 p.m.

Tuesday, April 15

Keyboard Area Recital
7 – 8:30 p.m.

Thursday, April 17

Vocal Jazz
7 – 8:30 p.m.

Monday, April 21

Joy Burdette Studio Recital
7 – 8:30 p.m.

Tuesday, April 22

Commercial Music Ensemble
7 – 8:30 p.m.

Thursday, April 24

Philharmonic Orchestra
7 – 9 p.m.

April 24 – May 4

Jesus Christ Superstar
nku.edu/tickets

Friday, April 25

Woodwind Area Recital
7 – 8:30 p.m.

Monday, April 28

Steel Band Concert
7 – 8:30 p.m.

ORAL PRESENTATIONS SESSION 1
(9 – 10 A.M., STUDENT UNION 108)

The Effects of Tariffs on the Housing Market

Brandon Hester
Business, Accounting, Economics and Finance, Economics

Mentor: Linda Dynan

Abstract: Given the Trump administration's insistence on enacting tariffs there is a wide variety of change expected in consumer prices. Within the many markets that will likely be affected the housing market stands to be shaken quite a bit with proposed duties on lumber, steel, and other inputs into the production of houses. As with other consumer products the final point in the equation is the final price, and the housing market is no different. To see the effects of the proposed tariffs on the average price of the housing market we use time trend data to examine past instances of tariffs' effect on the housing market as well as including unemployment and population in our overall model. We then compare two different instances of tariffs, high or low, to see how varying percentages affect the average house price. Our results are currently being determined.

Impact of the Internet, Infinite Scroll, and TikTok on Standardized Test Scores Over Time. What Implications a TikTok Ban May Have

Reagan Parker
Business, Accounting, Economics and Finance, Economics

Mentor: Linda Dynan

Abstract: The rise of TikTok has changed how we interact with information, raising concerns about its potential impact on academic performance. This paper seeks to answer the question: How have the internet, infinite scroll, and TikTok impacted standardized test scores over time, and what implications may a TikTok ban have? Using time series data and difference in means tests, this study examines trends in standardized test scores from 1990 to 2024 across different subjects and grade levels. By examining how these developments have impacted test scores, this study aims to provide insight into potential implications of a TikTok ban. Results and conclusions pending.

Wages and the Price of Goods After a Mass Deportation Event

Carter Warthman
Business, Accounting, Economics and Finance, Economics

Mentor: Linda Dynan

Abstract: The election of President Trump in 2024 brought immigration policy, and its economic consequences, back into the forefront of American politics. In the face of mass deportations, this study aims to identify how a mass deportation event will impact wages and the price of goods. The mass deportation event studied is named "Operation Wetback", wherein hundreds of thousands of Mexican immigrants were removed from Los Angeles, Houston, and Chicago in the Summer of 1954. Using 1955 to separate pre-event and post-event periods, this study will determine how mass deportations impact wages and prices. Analysis, results, and conclusions are pending.

ORAL & CREATIVE PRESENTATIONS SESSION 1A
(9 – 10 A.M., STUDENT UNION 109)

Empowering Women Through Documentary Storytelling Students:

Kacey Houz
FYRE Student, Informatics, School of Communication and Media, Electronic Media & Broadcasting
Bailey Chafin
FYRE Student, Informatics, School of Communication and Media, 3D Digital Design & VFX

Mentor: Sara Drabik

Abstract: Numbers alone cannot fully convey the hardships and perseverance of someone as they rebuild their lives. This documentary project explores how personal storytelling connects audiences emotionally to the experiences of individuals at the Brighton Center for Employment Training, which provides hands-on skills for many kinds of careers. By utilizing interviews, observational footage, and different documentary techniques, this project examines how filmmaking can evoke empathy and raise awareness. This project demonstrates that visual storytelling can amplify marginalized voices, influence public perception, and inspire social change, showcasing the power of visual media to make an impact beyond written data and reports.

X-ray and UV Observations of Changing Look Active Galactic Nuclei
Salem Wolsing
Arts and Sciences, Physics, Geology and Engineering Technology, Physics & Mathematics

Mentor: Dirk Grupe

Abstract: I will report on X-ray and UV observations of Changing Look Active Galactic Nuclei. This growing field of AGN research examines the behavior of AGN that change their Seyfert type over a several year time scale. These changes come together with dramatic changes in the UV and X-ray fluxes. I will explain the general phenomenon of Changing Look AGN. These AGN have been monitored for more than a decade using the NASA Neil Gehrels Swift mission. Swift was able to trigger on the AGN which led to simultaneous follow-up observations of the ESA mission XMM Newton and the NASA NuSTAR mission covering the entire 0.2-79 keV energy range. This large energy range allows for an interpretation of the Changing Look AGN phenomenon.

ORAL PRESENTATIONS SESSION 2 (10 – 11 A.M., STUDENT UNION 108)

Impact of immigration policy changes on labor force participation rates among native-born and immigrant workers
Danish Khan
Business, Accounting, Economics and Finance, Economics and Statistics

Mentor: Linda Dynan

Abstract: The Trump administration's strict enforcement of immigration policy, including mass deportations, may reduce immigration and alter labor force participation. This study empirically examines the impact of these policy changes on labor force participation rates. We hypothesize that (1) more restrictive immigration policies may decrease labor force participation and (2) such policies may negatively influence economic outcomes. Our models are specified as: LFPt = ß0 + ß1 Policyt + ß2 Recession dummy + ß3Time + ß4Unemployment)+ +et GDP=a0+a1Policyt+a2LFPt+a3 Recession dummy+a4Time +et. Data collection is ongoing; findings and conclusions remain pending.

Labor Market Dynamics and Family Well-Being: Examining the Socioeconomic Effects of Trumps Administration Large-Scale Deportation Policy's
Jackson Hemingway
Business, Accounting, Economics and Finance, Economics

Mentor: Linda Dynan

Abstract: Immigration ranked among the top issues for young voters in the 2024 election, reflecting concern about immigration in the U.S. This paper examines the socioeconomic impacts of the Trump administration's large-scale deportation policies. This research assesses the effects of deportation rates on inflation, unemployment, and GDP using multivariate regression analysis. It tests the hypothesis that mass deportations will adversely impact all the dependent variables: inflation, unemployment, and GDP. It uses historical data to estimate the models and then makes predictions of the potential impacts of the Trump administration's immigrant policy.

Effects of National Tariffs on Kentucky's Spirits Industry: Extrapolating 2018 Tariff Effects to Explain
Brady Hall
Business, Accounting, Economics and Finance, Economics

Mentor: Linda Dynan

Abstract: In 2018, the first Trump administration imposed 25% tariffs on steel and 10% on aluminum imports. This prompted retaliatory tariffs from US trading partners. As of February 2025, the reinstatement of similar tariffs invites investigation into the prospective impact of tariffs on Kentucky's spirits industry. Over 95% of the world's bourbon is produced in Kentucky, leaving the state's economy susceptible to the implications associated with the 2025 proposed tariffs. Drawing insights from the effects of tariffs observed post-2018, this paper uses multiple regression analysis to extrapolate the potential effects of proposed tariffs on Kentucky distillery employment, annual wages, and tax revenue.

ORAL PRESENTATIONS SESSION 2A
(10 – 11 A.M., STUDENT UNION 109)

American Spirit and the Polar Dream
Ava Ryan
Arts and Sciences, History, History

Mentor: Andrea Sutherland

Abstract: Polar exploration is often perceived as a solely European endeavor, but American involvement tells a different story. This presentation examines American participation in polar exploration to highlight three core tenets of the "American Spirit": competition, individuality, and idealism. By examining the Americans involved in the global saga of polar exploration, we can see how their identity as Americans distinguishes their exploits from their European counterparts. Additionally, this exploration reveals how a nation's spirit can shape and be shaped by its people, contributing to a unique national identity.

The Tet Offensive and The New York Times
Jacob Bolling
Education , History, History

Mentor: Andrea Sutherland

Abstract: The New York Times' coverage of the Tet Offensive in 1968 exemplified an analytical journalism style that coincided with declining soldier morale, failed U.S. government initiatives, and growing anti-war sentiment. This presentation examines how the newspaper's reporting influenced societal attitudes toward the Vietnam War, the desire for peace, and the press's role in shaping American military actions.

Oxycodone does not increase the number of Fos-positive neurons in the rat forebrain
Ana Rey Caldera
Arts and Sciences, Psychological Science, Psychology and Neuroscience

Mentor: Mark Bardgett

Abstract: Oxycodone is an opioid drug that is widely used to manage pain but possesses high liability for misuse. Data characterizing the patterns of neural activity induced by oxycodone may identify brain regions that support oxycodone dependence. In this study, twenty-four adult Long-Evans rats (n = 12 females) were administered oxycodone (3.0 and 9.0 mg/kg) or saline. Brain tissue was collected 90 minutes later and processed for immunohistochemical detection of Fos, a protein marker of neuronal activity. Cell counting in several forebrain regions did not reveal any significant effect of oxycodone on the number of Fos-positive neurons.

ORAL PRESENTATIONS SESSION 3
(11 A.M. – 12 P.M., STUDENT UNION 108)

Stimulating the Economy: Evaluating the Effectiveness of Tax Policies Under the Trump and Biden Administrations
Fawwaaz Abdulazeez
Business, Accounting, Economics and Finance, Economics

Mentor: Linda Dynan

Abstract: Taxation is a crucial economic tool that governments use to influence economic growth by regulating money circulation within an economy. This paper examines the effectiveness of tax policies in the United States. I employ linear regression and Granger causality to analyze the correlation and causation between taxation and economic growth. While my results and conclusions are still pending, I hypothesize a negative relationship between taxation and economic growth. The findings of this study will have policy implications for both economic growth and taxation. My dependent variable is the GDP growth rate, while my independent variables include the tax rates for low, middle, and high-income brackets, along with other control variables.

Mass Deportations and Unemployment Rate
Jason Albers
Business, Accounting, Economics and Finance, Economics

Mentor: Linda Dynan

Abstract: In this paper, I will be exploring how we expect the mass deportation of illegal immigrants and the reduced flow of legal immigrants to our country to affect the unemployment rate in the near future. This is an interesting statistic because a change in the current unemployment rate could be a key factor in how the economy will do in the future. To begin my analysis, I will provide descriptive statistics and generate graphs to help answer the question of what we expect unemployment to be. My model is u_(s,t)=ß_1+ß_2*?State1?_1+ß_3 ?*State2?_2+ß_4*Wet+ß_5 t+e. Results are pending

What would be the potential impact of implementing tariffs on imports from China, Mexico, and Canada on inflation rates in the United States?
Abhinam Josh
Business, Accounting, Economics and Finance, Economics

Mentor: Linda Dynan

Abstract: This research examines the potential impact of implementing tariffs on inflation. My hypothesis is that a tariff war will lead to inflation and hurt the economy. However, the Trump administration is pursuing such a policy. This research will allow us to better assess whether the actions taken by President Trump are reasonable or not. To examine this, I will be conducting a regression analysis with inflation rate as dependent variable and tariff rates along with other factors like interest rates, stock market indices etc. as independent variables. Data are being collected, results and conclusions are pending

ORAL PRESENTATIONS SESSION 3A (11 A.M. – 12 P.M., STUDENT UNION 109)

Immediate and Delayed Effects of Early-Life Antipsychotic Drug Administration Locomotor Activity
Khydesia Teasle
Arts and Sciences, Psychological Science, Psychology
Morgan Goeppe
Arts and Sciences, Psychological Science, Psychology
Isabelle Carr
Arts and Sciences, Psychological Science, Psychology
Ana Rey Caldera
Arts and Sciences, Psychological Science, Psychology
Christina Gogzheyan
Arts and Sciences, Biological Sciences, Neuroscience

Mentor: Mark Bardgett

Abstract: We measured the immediate and delayed effects of risperidone, the most widely prescribed antipsychotic drug in children, on locomotor activity in developing and adult rats. Risperidone was administered twice a day over two weeks beginning at postnatal day 14 for developing rats and postnatal day 77 for young adult rats. Locomotor activity was tested after risperidone injection for 40 minutes once a week and one week after the last injection. Immediately after injection, risperidone decreased activity but to a greater degree in adult rats. Developing but not adult rats administered risperidone were more active one week after the last injection.

Effects of Early-Life Risperidone on General Reward Preference
Elizabeth Farwick
Arts and Sciences, Psychological Science, Psychology
Isabelle Carr
Arts and Sciences, Psychological Science, Psychology
Ana Rey Caldera
Arts and Sciences, Psychological Science, Psychology
Christina Gogzheyan
Arts and Sciences, Biological Sciences, Neuroscience
Khydesia Teasely
Arts and Sciences, Psychological Science, Psychology

Mentor: Mark Bardgett

Abstract: Over the past 30 years, antipsychotic drug (APD) prescriptions among children have increased in the absence of data regarding their long-term effects on brain development. Using rats as a model, we examined whether early-life exposure to risperidone, an APD, enhances reward sensitivity, measured by sucrose preference, in adulthood. Rats received risperidone (0.75 mg/kg) or saline injections twice daily from postnatal day 14-28, followed by a sucrose preference test seven weeks later. Early-life risperidone did not alter sucrose preference but increased locomotor activity. Early-life APD administration does not appear to alter reward sensitivity but may impair inhibitory control.

Behind the Chair: Unveiling the Emotional Complexities of Hairstylists' Mental Health
Sarah Lingren
Business, Marketing, Sports Business and Construction Management, Marketing and Entrepreneurship

Mentor: Justin Yates

Abstract: Hairstylists are often treated as de facto therapists, yet they are not given any formal training. This research study will examine the intersection between emotional labor and mental health among cosmetology professionals. This research aims to examine how professional boundaries are established, maintained, or compromised in the context of client relationships. This project will incorporate both surveys and face-to-face interviews. Data collection is ongoing but will be completed before the celebration event.

ORAL PRESENTATIONS SESSION 4
(12–1 P.M., STUDENT UNION 109)

"The Love that Dare Not Speak its Name": Creating the Homosexual in Nineteenth and Early Twentieth Century Britain

Robert Petsch
Arts and Sciences, History, History

Mentor: Jonathan Reynolds

Abstract: While it is often said that queer people have always existed, the ways they have understood themselves have changed greatly over time. Previous literature has reviewed this point—most notably in Jeffrey Weeks' Coming Out—but its implications on queer discourse have not been fully explored. After reviewing a variety of sources relating to this issue (focusing on homosexual men in nineteenth and early twentieth century Britain), I will argue that the advent of a definition, identity, and subculture of homosexual men principally began in the late nineteenth century. Recognizing this, while difficult, is necessary and far more interesting than anachronism.

2Pac's Media Odyssey: From Misunderstood to Mythical

Ahmad Richardson
Honors, School of Communication and Media, General Business

Mentor: Stacie Jankowski

Abstract: 2Pac is one of the most iconic figures in music history, whose portrayal in popular media shifted. I present a thorough explanation of his narrative transformation from
troublemaker to legend. I selected key events during 2Pac's music career, 1991-1996, and
analyzed the contrast in his and the media's perspectives to observe the depiction of his image. Then, I examined the aftermath of his death to see his reframing. My observations suggest 2Pac was misunderstood and his duality as an artist and activist diverted attention from his controversies. This highlights the media evolution of 2Pac and similarities for notable figures.

Fort Ross: An Untold Story of Failure and Non-Commitment

Alexander Montoya
Arts and Sciences, History, History

Mentor: Andrea Sutherland

Abstract: This presentation explores the largely unknown Russian colony of Fort Ross, near modern-day San Francisco. It examines Russia's expansion into Northwestern territories, leading to the founding of Fort Ross. The colony's administration will be detailed, highlighting the roles of Russian colonizers and Native American laborers, and will explain how poor decisions and lack of support from St. Petersburg resulted in the colony's eventual sale.

ORAL PRESENTATIONS SESSION 5
(2–3 P.M., STUDENT UNION 109)

The Magic Fabric

Lauren Wessel
Arts and Sciences, Biological Sciences

Mentor: Robert Wallace

Abstract: Since its publication, "Moby-Dick" has been considered a classic chronicle of the male
experience, with no female characters and women merely mentioned a few times. Despite this,
"The Magic Fabric" was inspired by those mentions of the wives that haunted the sailors. This blanket pays homage to the fictional and real women who endured their husbands` absence. Particularly, the wife of first mate Starbuck, Mary, inspired this knitted piece. While preparing for her husband`s departure, she knitted the scarred skin and protective blubber layers of this blanket to give herself and her husband the strength and hope to survive.

The Call of the Wretched Seas: Heavy-Metal Moby-Dick from Germany
Lucas King
Arts and Sciences, English , English

Mentor: Robert Wallace

Abstract: Of the many artistic works that interpret

Moby-Dick, none have been as brazen yet unnoticed by the academic community as metal music. This can be attributed to academia's understanding of metal music as popular culture, which lacks the complexity of prestigious mediums. This presentation will challenge this notion by analyzing the work of German metal band Ahab. Their album Call of the Wretched Seas is a momentous work that delivers one of the most unconventional interpretations of Moby-Dick ever created. Through analysis of the album, I will uncover a story that equals the complexity of traditional mediums.

Seeing What Melville saw in the Private Gallery of Samuel Rogers in 1849.
Alex Wallace
Informatics, School of Computing and Analytics, Computer Science

Mentor: Robert Wallace

Abstract: This project objective is to reconstruct Herman Melville's experience during his visit to Samuel Rogers's home late in his London trip in 1849—a pivotal moment in Melville's artistic journey. Our website will present Rogers's collection room by room as Melville would have seen it. Descriptions will identify each painting in the collection and explore Melville's
experience of the artists displayed. This project will be integrated with the website Melville's Print Collection Online, created by Dr. Robert Wallace, ensuring that it remains accessible to future generations

ORAL PRESENTATIONS SESSION 6 (3–4 P.M., STUDENT UNION 109)

Elizabeth Blackwell: A Luminary for Women in Medicine Molly Gustin
Arts and Sciences, History, French and History

Mentor: Andrea Sutherland

Abstract: Elizabeth Blackwell, the first woman in America to receive a medical degree in 1849, broke barriers in the patriarchal medical field through her individualism and perseverance. Using Blackwell's own writings, this presentation details her slow yet steady impact on the medical profession in the nineteenth century. Her pioneering efforts introduced women to the discipline of medicine and advocated for their inclusion. Her publications and work in establishing a hospital and a medical college for women underscore her legacy.

Breaking Barriers: Black Business in Mount Sterling, KY in the 19th and 20th Century
Jay Scott
Arts and Sciences, History, History

Mentor: Andrea Sutherland

Abstract: This presentation explores the thriving era of Black business in Mount Sterling, Kentucky, during the late 19th and early 20th centuries. Through historical documents and photographs, it showcases influential entrepreneurs such as the Magowan Brothers, Peter Hensley, and EW Stockton, who founded the first Black newspaper in Montgomery County and the Montgomery County Colored Fair. By examining these key figures, the presentation highlights their perseverance, achievements, and their broader impact on the community of Mount Sterling.

The Sisters of Charity of Cincinnati as Nurses in the Civil War
Monica Robertson
Arts and Sciences, History, History

Mentor: Andrea Sutherland

Abstract: During the Civil War, Catholic Sister nurses, like the Cincinnati Sisters of Charity, were invaluable. With more experience and training than most women, they were often requested by government officials and preferred by surgeons. Using government reports, newspapers, and the Sisters' own writings, this presentation recounts how their dedication and humility left a positive impression, which helped to reduce prejudice against Catholics. The women's comforting presence reflects the broader impact of these women religious who served with compassion and courage.

ORAL PRESENTATIONS SESSION 7 (4–5 P.M., STUDENT UNION 109)

Coral Growth Under Varied Light Spectra Students
Jordan Clark
Arts and Sciences, Biological Sciences, Biology
Ashley Denney
Arts and Sciences, Biological Sciences, Biology

Mentor: Charles Acosta

Abstract: Tropical coral reefs are declining globally due to pollution and other factors. Corals are primary producers in ocean ecosystems that rely on light. These animals use their symbiotic relationship with zooxanthellae to gain energy through photosynthesis. If the light is limited, coral health suffers. In the NKU Coral lab, we have been exploring light levels and the impact it has on coral growth. Corals appear to respond maximally to a prescribed regime of full blue and limited red spectra but differ in response by species. Our aim is to understand which part of the light spectrum impacts the growth of corals, and so, improve captive rearing efficiency.

Juvenile olive baboon (Papio anubis) social networks predict and are impacted by the process of troop fission at the Uaso Ngiro Baboon Project in Laikipia, Kenya
Marissa Vestal
Arts and Sciences, Sociology, Anthropology and Philosophy, Anthropology
Ashley Wood
Arts and Sciences, Sociology, Anthropology and Philosophy, Anthropology

Mentor: Monica Wakefield

Abstract: Baboons live in stable social troops, but troop fissions occur. The fission process takes years to complete, severing familial and social ties. We used four years of grooming data from a wild olive baboon troop undergoing fission to assess the impact on juveniles as they develop social relationships. Juveniles groomed within their eventual sub-troop at significantly higher rates than between, even prior to the onset of fission ($X2 = 450.168$, $p < 0.00001$) but each year the difference grew more extreme ($F = 3894021.5518$, $p < 0.00001$). As a result, juvenile social networks shrank and became more concentrated.

Smart AI Ethogram Based Handwritten Recognition System
Connor Perry
Informatics, School of Computing and Analytics, Computer Science

Mentor: Junxiu Zhou

Abstract: Writing is a common occurrence, but if you want to copy that writing to the computer, it is very time-consuming and often can include errors. Looking in a laboratory setting, behavior tests are often written down then uploaded later, ethograms are a major offender of this. In this project, the ethogram file was preprocessed to isolate or segment characters using OpenCV, then, conducted text recognition on the segmented characters using our own OCR model trained on various handwriting styles. Based on our current observations, our system performs better than other publicly available systems, such as Tesseract.

POSTER SESSION
(12:30 – 2:30 PM, STUDENT UNION BALLROOM)

Poster Number: 1
A Data-Driven Analysis of Trends in the Artificial Intelligence Job Market
Gaurab Baral
School of Computing and Analytics, Data Science

Mentors: Junxiu Zhou, Yangyang Tao, & Haoqiang Jiang

Abstract: Artificial intelligence (AI) is rapidly transforming industries, increasing demand for skilled professionals to develop and deploy advanced AI systems. Understanding the AI job market is crucial for job seekers, employers, and educators. This study analyzes AI job postings from Indeed.com (September–December 2024), applying rigorous preprocessing to obtain 2,000 unique listings. Key insights include salary distributions, geographic trends, required skills, and qualifications. Essential skills involve machine learning, NLP, and data analytics. Prominent roles include Data Scientist, ML Engineer, and Prompt Engineer. Text mining identifies key themes in job descriptions. Text mining was employed to further understand the AI job market.

Poster Number: 2
Motz Group Project
Katie Stratman
Business, Management , Human Resource Management
Zach Johnson
Business, Accounting, Economics and Finance, Accounting
Braden Greis
Business, Accounting, Economics and Finance, Accounting
Mentor: Jennifer Gardner

Abstract: For our BUS 301 class, we acted as consultants for the Motz Group, addressing their challenge of recruiting and retaining women employees. Through research and analysis of their current practices, along with comparisons with similar companies, we identified areas for improvement. Our proposed solutions included both short-term and long-term strategies, emphasizing the importance of leveraging social media and partnering with universities. By engaging students aligned with Motz' mission and optimizing social media outreach, we developed a plan to enhance recruitment and retention efforts. We competed against another NKU BUS 301 team in front of Motz executives and won the first-place award.

Poster Number: 3
Utilizing Kama Muta Effect in Treating Social Anxiety Disorder
Dan Bui
Arts and Sciences, Psychological Science, psychology

Mentor: Justin Yates

Abstract: Social Anxiety Disorder manifests as debilitating fear of evaluation despite cognitive- behavioral treatments. While research has explored physiological aspects of being moved (Kama Muta), its therapeutic application remains unexplored. We hypothesize Kama Muta experiences—characterized by tears, goosebumps, and warmth—can counteract maladaptive social perceptions by fostering connection. Our between-subject experiment assessed Kama Muta-evoking stimuli on SAD symptoms. Results show significant anxiety reduction and improved emotional regulation compared to controls. This research establishes Kama Muta as a promising therapeutic pathway for anxiety disorders beyond conventional cognitive approaches.

Poster Number: 4
Investigation on the Ketone Bromination Conditions
Sarah James
Arts and Sciences, Biological Sciences, Biology

Mentor: Lili Ma

Abstract: Heteroaryl compounds are valuable in the medical and chemical industries. This study focuses on the heteroaryl molecule I11, which contains a ketone functional group, making it a key target for structural modification. The a-carbon was brominated using N-bromosuccinimide (NBS) under microwave irradiation. The products were analyzed using infrared (IR) and nuclear magnetic resonance (NMR) spectroscopy. Undergraduate lab students collaborated on this project. Our research enhances understanding of heteroaryl ketone bromination, optimizes reaction conditions, and promotes green chemistry. This study also supports research on kinase inhibitors for targeted cancer therapies and contributes to Course-based Undergraduate Research Experiences (CURE) in organic chemistry.

Poster Number: 5
Reaction Condition Optimization for 2-bromo-1-(4-chlorophenyl)ethenone (C5-Br) Synthesis
Bella Menetrey
Arts and Sciences, Chemistry, Biology
Teodora Knezic
Arts and Sciences, Chemistry, biology

Mentor: Lili Ma

Abstract: Brominated ketones play a crucial role in the development of pharmaceutical agents, particularly biologically active compounds such anti-cancer drugs and antibiotics. In this study, the bromination reaction was carried out using p-TSOH as the catalyst and NBS as the bromination agent. Different equivalents of the reaction agents as well different reaction temperatures were explored to find the optimal conditions. 1H NMR was used to evaluate the product purify and reaction conversion. This work contributes to the techniques for synthesizing bioactive molecules using bromine compounds in a laboratory setting.

Poster Number: 6
Synthesis and Characterization of 4-(4-fluorophenyl)-2-(2-(8-methyl-8- azabicyclo[3.2.1]octan-3-ylidene) hydrazinyl)thiazole (I80-M22-C18)
Emma Buckman
Arts and Sciences, Biological Sciences, Biology
Kaylee Elliott
Arts and Sciences, Biological Sciences, Biology
Sarah James
Arts and Sciences, Biological Sciences, Biology

Mentor: Lili Ma

Abstract: Tropinone thiazole derivatives are an important class in the medicinal industry. They provide a potential solution to many diseases including cancer. In this project, undergraduate lab students perform a multi-step synthesis to make tropinone thiazole derivatives: the bromination of 4-fluoroacetophenone and the cyclization of the thiazole ring. The first step was carried out using bromination agent NBS and catalyst p-TsOH under microwave irradiation for 20-40 minutes at 110°C. The 2nd step was performed with tropinone and thiosemicarbazide at 50 °C for 1 week. All products were characterized by IR and NMR spectroscopy.

Poster Number: 7
Synthesis and Characterization of 4-(4-methoxyphenyl)-2-(2-(8-methyl-8-azabicyclo[3.2.1]octan-3-ylidene)hydrazinyl)thiazole (I80-M22-C6)
Olivia Neal
Arts and Sciences, Chemistry, Chemistry
Stephanie Messmer
Arts and Sciences, Biological Sciences, biology

Mentor: Lilli Ma

Abstract: Green Chemistry is the designing of chemical processes with the goal of eliminating or reducing the amount of hazardous waste produced. This reaction was performed on the microscale by reacting a ketone with one e.q. of NBS and p-TsOH as the catalyst in Acetonitrile solvent. The reaction was heated under microwave irradiation at 110°C for 40 minutes. The crude product was separated via a microscale extraction. The product was then characterized via NMR and IR spectroscopy. Undergraduate lab students collaborated as a class to advance the study of microscale reactions as a contribution to the principles of green chemistry.

Poster Number: 8
Synthesis and Characterization of 2-bromo-1-(3-methoxyphenyl)ethenone (C6-Br)
Stephanie Messmer
Arts and Sciences, Biological Sciences, Biology
Olivia Neal
Arts and Sciences, Chemistry, Chemistry

Mentor: Lili Ma

Abstract: The purpose of this work is to study how the molecule C6 reacts with NBS and p-TsOH forms the product C6-Br. This ketone undergoes tautomerization in order to form an enol alpha-haloketone intermediate that then reacts with the NBS to form the alpha-bromo ketone. We performed our reaction via microwave irradiation at 110? for 40 minutes. These alpha- haloketone intermediates are important in this reaction due to their high reactivity to nucleophilic groups. Alpha-brominated carbonyl groups are very sought after for pharmaceutical synthesis. They are used as the building blocks for natural products, diagnostic aids, and surfactants.

Poster Number: 9
Synthesis and Characterization of a Thiazole Derivative of Tropinone (I80-M22-C5)
Teodora Knezic
Arts and Sciences, Chemistry, Biology
Bella Menetrey
Arts and Sciences, Chemistry, Biology

Mentor: Lili Ma

Abstract: Ketone bromination followed by thiazole formation is a useful reaction sequence to modify tropinone compounds. The bromination step happens at the ketone a-position, using catalyst p-TsOH and bromination agent NBS. Thiazole formation using TEA as a base. IR and NMR were taken to monitor the reaction progress. Our research results contribute to broader understanding of halogenation mechanisms and can help scientists find quicker, more efficient ways to carry out organic synthesis reactions. This reaction is significant because of its benefits to the pharmaceutical industry with drugs being produced from it.

Poster Number: 10
Synthesis and Characterization of (2E,7E)-2,7-bis(4-chlorobenzylidene)cycloheptanone (D5-I17-D5)
Drew Scott
Arts and Sciences, Chemistry, Chemistry (Pre-Pharmacy)

Mentor: Lili Ma

Abstract: The Claisen-Schmidt reaction is an organic transformation used to synthesize a,ß- unsaturated ketones, which serve as crucial intermediates in medicinal chemistry. This research focuses on using this reaction to modify tropinone derivatives. Tropinone and its derivatives are known for their biological activity. These compounds provide a scaffold for chemical modifications, potentially enhancing their cytotoxic effects against cancer cells. By synthesizing and evaluating these derivatives, this study aims to develop novel bioactive compounds with improved medicinal potential. The findings of this study contribute to the growing field of medicinal chemistry, offering insights into the development of new anticancer agents.

Poster Number: 11
Synthesis and Characterization of biphenyl methylene Tropinone derivatives.
Devin Flaugher
Arts and Sciences, Chemistry, Chemistry
Elliot Glos
Arts and Sciences, Biological Sciences, environmental science
Mentor: Lili Ma

Abstract: Tropinone derivatives have strong tumor cell growth inhibitory effects. These effects can be improved by the addition of a substituted phenyl group via the Claisen Schmidt reaction. Twelve tropinone derivative were identified and synthesized in this collaborative project. Typically, the Claisen Schmidt reactions started at 0 oC as the reactive intermediate enolates were added. The reaction mixture was then left at room temperature to react for one week. The products were purified by recrystallization and characterized using a 500MHz NMR and IR spectra.

Poster Number: 12
Synthesis and Characterization of (2E,7E)-2,7-bis(2,4,5- trimethoxybenzylidene)cycloheptanone (D17MeO-I17-D17MeO)
Elliot Glos
Arts and Sciences, Biological Sciences, Environmental Sciences
Devin Flaugher
Arts and Sciences, Chemistry, Chemistry

Mentor: Lili Ma

Abstract: Modified heteroaryl compounds, such as Tropinone, have recently shown to have significance in breast cancer research, by way of aromatase inhibition. The aromatase enzyme has proven to play an important role in the formation of breast cancer when excessive amounts of estrogen are produced by the enzyme. In an undergraduate lab, novel derivatives of tropinone were created through Claisen-Schmidt addition reaction and left to crystalize over several days, then extracted and analyzed via IR, 1H and 13C NMR. The potential pharmaceutical application of these molecules were investigated by computer modeling and drug discovery software.

Poster Number: 13
Synthesis and Characterization of tropinone derivates (D5-I80-D5) using Claisen- Schmidt Reaction
Drew Scot
Arts and Sciences, Chemistry, Chemistry (Pre-Pharmacy)
Mikki Rodgers
Arts and Sciences, Biological Sciences, Biological Sciences

Mentor: Lili Ma

Abstract: Tropinone derivates are molecules that have proven to have an important role in the fields of chemistry and medicine. The derivates of tropinone are thought to have potential antitumor activities, particularly adding an unsaturated ketone to the tropane scaffold. The reaction was in ethanol solvent, with the mixture being stirred at 0°C for 30 minutes then at room temperature for 7 days. NMR was used to characterize the product. A collaboration of undergraduate lab students spearheaded the research project. This study provides information on how to efficiently produce potentially bioactive tropinone derivatives.

Poster Number: 14
A War Within a War: Cincinnati's Anti-German Hysteria during WWI
Kennedy Schraer
Arts and Sciences, History, History

Mentor: Andrea Sutherland

Abstract: During the 1830s, Germans immigrated to America for political, religious and economic reasons, with many settling in the Cincinnati area. During World War I, German American immigrants in Cincinnati and Northern Kentucky faced relentless attacks aimed at erasing their culture and influence. This presentation explores these attacks and considers how, if successful, they would have left the region devoid of the rich German history it is known for today.

Poster Number: 15
Investigation on Thiazole ring formation using 1-(2-methoxyphenyl)ethenone (C61-Br)
Alexandria Easton
Arts and Sciences, Chemistry, Biology

Mentor: Lili Ma

Abstract: Heteroaryl compounds play a vital role in medicine and chemistry. Tropinone, a key alkaloid intermediate used for Parkinson's treatment, is also being studied for cancer therapies. In this study, a thiazole ring formation was studied using a house-made bromination compound C61-Br, a thiosemicarbazide, and a cycloheptanone. The undergraduate lab students contributed the advancement of this project. These findings may aid in developing breast cancer treatments that reduce costs and side effects of existing therapies.

Poster Number: 16
Synthesis Optimization for Esterification process on primary and secondary alcohols
Ella Durham
Arts and Sciences, Biological Sciences, Biology
Yara Abdou
Arts and Sciences, Biological Sciences, Biology

Mentor: Lili Ma

Abstract: Esterification is the act of taking an alcohol and combining it with an acid to make an ester group, which is prevalent in natural products and pharmaceuticals. The esterification process uses EDC·HCl, DMAP, and TEA under microwave irradiation at 110°C for 20 minutes. The IR and NMR spectroscopy data were taken on the purified products after an acid base extraction. The 4 undergraduate students collaborated on this subproject to study the substrate scope. The study can provide useful information on the use of esterification of compounds to further medicine.

Poster Number: 17
Investigation on a Bromination Reaction using NBS
Andrea Fischer
Arts and Sciences, Biological Sciences, Biology
Alexandria Eaton
Arts and Sciences, Biological Sciences, Biology

Mentor: Lili Ma

Abstract: The bromination of thiazole derivatives is crucial in medicinal chemistry, enabling heteroaryl functionalization for drug discovery. Thiazole-containing compounds exhibit favorable protein interactions, enhancing their pharmacological value. The reaction was performed with C61 using NBS and p-TsOH as catalysts, yielding C61-Br under microwave irradiation at 110°C for 40 minutes. The purity was analyzed using IR and NMR spectroscopy. Traditional bromination methods generate toxic byproducts and require harsh conditions.
Using NBS as a milder brominating agent minimizes hazardous waste, while p-TsOH, a catalytic acid, replaced stronger acids to reduce reaction corrosiveness and improve safety, aligning with green chemistry principles.

Poster Number: 18
A Bromination Study on Various Ketones with Methyl and Methoxyl Substitutents 2-bromo-1-(m-tolyl) ethenone (C16-Br)
Elizabeth Fisher
Arts and Sciences, Chemistry, Biology
Emily Forbes
Arts and Sciences, Chemistry, Chemistry

Mentor: Lili Ma

Abstract: Ketone Bromination reactions are important reactions in medicines, particularly in cancer medication. Heterocyclic compounds such as the ones used in this reaction are good for medicines because of their ability to modulate some pharmaceutically desired traits such as potency, selectivity, and metabolic stability. These compounds are also common in nucleic acids and other naturally occurring products. The specifics of the reactions involve a range of ketones with methyl and methoxy groups to create C16-Br and C61-Br. Microwave irradiation is used at 110°C for 20-40 minutes to induce this reaction.

Poster Number: 19
Drug-like Property Prediction
Emily Forbes
Arts and Sciences, Chemistry, Chemistry
Elizabeth Fishe
Arts and Sciences, Biological Sciences, Biology

Mentor: Lili Ma

Abstract: ACD Percepta is a drug discovery software used to predict the physicochemical properties of small organic molecules. A bromination followed by a thizaole ring formation is an important reaction due to the formation of a heterocyclic ring. In this project, Percepta and Lipinski's Rule of Five are used to study the drug-like property of tropinone derivatives. Undergraduate lab students worked together using different variations of tropinone to synthesize and find the most effective molecule to potentially discover an aromatase inhibitor to fight against breast cancer.

Poster Number: 20
A Microwave-assisted Approach to the Preparation of 3-phenylpropyl 2-oxo-2H- chromene-3-carboxylate (E12-J41)
Kylie Green
Arts and Sciences, Biological Sciences, Biology (CMG)
Alston Gray
Arts and Sciences, Biological Sciences, Biology (CMG)

Mentor: Lili Ma

Abstract: At NKU, Undergraduate Research is one of the driving factors that make students well rounded in improving their scientific techniques, writing, thinking, and leadership skills. In this Course-based Undergraduate Research Experience (or CURE) lab course, undergraduate students are involved in a drug discovery research. By investigating the microwave-assisted esterification of alcohols with carboxylic acids, it allows for the preparation of pharmaceutically interesting esters involving natural product motifs. This research provides opportunities for undergraduate students to experience the real-world research in a lab setting and to acquire industry standard lab skills such as IR, NMR, and PyMol.

Poster Number: 21
Synthesis and Characterization of cyclohexyl 2-oxo-2H-chromene-3-carboxylate (E7-J41)
Alston Gray
Arts and Sciences, Biological Sciences, Biological Sciences (CMG Track)
Kylie Green
Arts and Sciences, Biological Sciences, Biological Sciences (CMG Track)

Mentor: Lili Ma

Abstract: This study employed Steglich Esterification using a carboxylic acid as the acyl donor to synthesize a potential drug-like molecule. Green Chemistry principles, including microwave reactions, microscale techniques, and solventless methods, were utilized to enhance efficiency. Protocol adjustments were made to optimize yield, purity, and overall reaction performance.
The compound was characterized using NMR and IR spectroscopy to confirm structural integrity. Finally, Lipinski's Rule of Five was applied to assess drug-likeness based on molecular properties. This investigation highlights an environmentally conscious approach to ester synthesis while evaluating pharmaceutical potential.

Poster Number: 22
Steglich Esterification approach to (1R,3s,5S)-8-methyl-8-azabicyclo[3.2.1]octan-3- yl 4-methoxybenzoate (E80-J32)
Yara Abdou
Arts and Sciences, Biological Sciences, Biological Sciences
Ella Durham
Arts and Sciences, Biological Sciences, Biological Sciences

Mentor: Lili Ma

Abstract: Ester compounds are biologically important molecules that can serve as building blocks for various pharmaceuticals. This research utilizes Steglich esterification to form esters from natural product scaffold such as tropine. The reaction was performed in dichloromethane (CH2Cl2) with 4-dimethylaminopyridine (DMAP) as a catalyst under microwave irradiation at 110°C for 20 minutes. Following the purification and characterization of our desired molecule, drug discovery software ACD Percepta was used to calculate physiochemical properties. This study contributes valuable information for research on the methodology establishment of interesting ester compounds.

Poster Number: 23
Increase synthesis and purification of benzene contained tropinone derivatives through Claisenn-Schmidt reaction
Austin Clifton
Arts and Sciences, Chemistry, Chemistry

Mentor: Lili Ma

Abstract: Both phenols and tropinone derivatives are important in the pharmaceutical industry. This research follows the synthesis and purification of a various Claisenn-Schmidt products including D0-I17-D0, D4-I17-D4 and D4-I80-D4. This was done by mixing aldehyde and ketone in ethanol with sodium hydroxide as the catalyst. After purification, the final product was characterized by NMR and IR. This research is important as phenols have been listed to contain antioxidant abilities. If these molecules can successfully retain the tropinone CNS activity, they can be further investigated for neuroprotective effects, possibly relevant to neurodegenerative diseases.

Poster Number: 24
On the Purification of Claisen-Schmidt Condensation Product D2-I17-D2 and D2- I80-D2
Hunter Webe
Arts and Sciences, Biological Sciences, Biology
Rylee Schurger
Arts and Sciences, Chemistry, Chemistry

Mentor: Lili Ma

Abstract: The purpose of this experiment is to synthesize and later purify the compounds D2- I17-D2 and D2-I80-D2 through a Claisen Schmidt reaction. These compounds are called chalcones and are orally active compounds that exhibit anti-tumor activity. This reaction was done by reacting the ketone and aldehyde compounds together in ethanol and NaOH. Then an extraction was performed in diethyl ether to retrieve the product. The product was analyzed via NMR and infrared testing showing that the product was pure. This allows for future research on how to optimize the synthesis and improve yield of the products.

Poster Number: 25
A Green Chemistry Approach to the Synthesis of a,ß-Unsaturated Ketones via Claisen-Schmidt Condensation
Timothy Wallace
Arts and Sciences, Biological Sciences, Biology
Herrison Sizemore
Arts and Sciences, Chemistry, Chemistry

Mentor: Lili Ma

Abstract: a,ß-Unsaturated Ketones are important intermediates that can be used in the synthesis of tropinone derivative molecules, which are used in numerous pharmaceuticals. This study explores a green chemistry approach to synthesis, focusing on the development of solvent-free Claisen-Schmidt condensation. A solventless reaction can make reactions more economical and minimize hazardous byproducts. The reaction was performed using a porcelain spot plate to pulverize the catalyst, sodium hydroxide, with the ketone. Then the ketone mixture was pulverized with aldehyde. The reaction progress was monitored with infrared spectroscopy. This study provides a potential method to make Claisen-Schmidt condensation reactions solventless.

Poster Number: 26
Synthesis and Purification of A Heteroaryl Thiazole Compound I80-M22-I61
Joseph Land
Arts and Sciences, Chemistry, Chemistry

Mentor: Lili Ma

Abstract: Heteroaryl compounds play a crucial role in medicine and biology due to their diverse biological and chemical properties. This research focuses on the synthesis and purification of I80-M22-I61, incorporating a thiazole group in the target molecule. By employing modern synthetic techniques, we optimized reaction conditions to enhance yield while minimizing side products. The final product was characterized using spectroscopic methods to confirm its structure and purity. Insights gained from this study contribute to the broader understanding of heteroaryl-thiazole synthesis, with potential applications in material sciences and pharmaceuticals.

Poster Number: 27
Synthesis and Purification of 2-bromo-1-(naphthalen-2-yl)ethenone I61-Br
Coleman Neeley
Arts and Sciences, Chemistry, Biology
Joseph Land
Arts and Sciences, Chemistry, Chemistry

Mentor: Lili Ma

Abstract: Heteroaryl compounds are structures containing an aromatic ring and at least one heteroatom in its ring structure. They are unique compounds in chemistry compared to aromatic compounds made of carbon. One such heteroaryl compound is the Thiazole group which has unique properties like enhanced lipophilicity and the ability to act as bioisosteres. Our study focuses on synthesis and then purification of I61-Br, which is important for the formation of a thiazole group. This product was synthesized using microwave-assisted irradiation and purified using recrystallization technique.

Poster Number: 28
Green approaches to synthesizing (2E,7E)-2,7-bis(4-chlorobenzylidene)cycloheptanone (D5-I17-D5)
Herrison Sizemore
Arts and Sciences, Chemistry, Chemistry
Timothy Wallace
Arts and Sciences, Biological Sciences, Biology

Mentor: Lili Ma

Abstract: The purpose of this work is to synthesize (2E,7E)-2,7-bis(4- chlorobenzylidene)cycloheptanone, D5-I17-D5. This compound have many applications, seen in pharmaceuticals and perfumes. Synthesis of this compound involves reacting cycloalkanones and substituted benzaldehydes. In this study, Claisen-Schmidt condensation was used to react cycloheptanone, D5, and benzaldehyde with chlorine substituents, I17. The reaction was microscale, solventless, and catalyst assisted to promote green chemistry principles. Our research provides more environmentally safe ways to synthesize this compound and will assist in breast cancer drug research. Additionally, this project will lead to further implementation of Course-based Undergraduate Research Experiences.

Poster Number: 29
Comparisons of Ion Cross-Sections From Simulations
Juan Calderon
Arts and Sciences, Physics, Geology and Engineering Technology, Physics

Mentor: Scott Nutter

Abstract: GEANT4 is a particle physics software suite used in simulating data for particle physics experiments, including for cosmic ray detectors. Data simulated with GEANT4 are used to interpret cosmic-ray measurements from balloon-borne and International Space Station experiments. We have extracted interaction rates (cross sections) of a projectile nucleus on a target nucleus as predicted by GEANT4 using an interaction model and compared it to measurements. We have also examined the difference in predictions when switching target and projectile. We explored the range of energies from 200 MeV/nuc to 50 GeV/nuc.

Poster Number: 30
One Small Step - Random Walks in Higher Dimensions
Daniel Inman
Arts and Sciences, Physics, Geology and Engineering Technology, Physics and Engineering Physics

Mentor: Michael Waters

Abstract: This study examines the behavior of lattice random walks in higher dimensions, focusing on return probabilities and interactions between multiple walks. Computational
simulations in Mathematica confirm Pólya's theorem, demonstrating that as dimensionality
increases, the probability of returning to the origin approaches zero and intersections become much less frequent. Additionally, the study analyzes the distribution of steps before self- intersection, revealing a strong inverse-Gaussian pattern. These findings enhance the understanding of random walk propagation, with applications in physics, computational modeling and game design. The results provide new insights into higher-dimensional stochastic walk theory and its practical implications.

Poster Number: 31
Stephen C. Foster and the Myth of the Old Kentucky Home
Ava Ryan
Arts and Sciences, History, History

Mentor: Andrea Sutherland

Abstract: Grown from a minstrel composer to the father of American music, Stephen C. Foster is an important symbolic figure in patriotic songwriting. Much of this legacy is, however, fabricated, including his unsubstantiated visit to the site of what is now My Old Kentucky Home State Park in Bardstown, KY. Foster's work is reliant on a past that never existed; the romanticization of the Old South and the Lost Cause. It's vital to uncover the legitimacy of Foster's personal mythos, to determine whether his importance to Kentucky and wider America is warranted, and to examine how a myth makes a man.

Poster Number: 32
Clinical Pathology of Cadavers in Science Education
Ashlyn Kendrick
Arts and Sciences, Biological Sciences, Biology

Mentor: Mary Schilling

Abstract: While technological alternatives in medical education are expanding, human cadaver dissection remains valuable for understanding anatomical variations and pathologies. This project documented pathological findings from Northern Kentucky University's 2024-2025 anatomy lab cadavers, creating educational autopsy reports. Pathologies identified included a pacemaker, aortic aneurysm, inguinal hernia, rotator cuff repair, Alzheimer's disease, and a kidney tumor. These reports support NKU's anatomy courses and outreach programs, enhancing anatomical education by connecting physical findings with fundamental concepts.

Poster Number: 33
Synthesis and Characterization of (2E,7E)-2,7-bis(2-methoxybenzylidene)cycloheptanone (D2-I17-D2)
Rylee Schurger
Arts and Sciences, Chemistry, Chemistry

Mentor: Lili Ma

Abstract: This study was conducted on a heteroaryl compound, D2-I17-D2 for advancement of the cancer research field. The structure of this compound is symmetrical, two groups of D2- MeO, bound by a tropinone, which is very reactive in the body because of the nitrogen it contains. The reaction involves the edition of two equivalences of D2-MeO, and one equivalence of I17, dissolved in ethanol using NaOH as a catalyst, then recrystallizing the product. Our synthesized compounds were proven by NMR, and IR spectroscopy. This research is vital for the advancement of novel aromatase inhibitors, hoping to use them in the fight against breast cancer. Our research will also support future projects like Course-based Undergraduate Research Experiences (CURE) and Undergraduate Research in Organic Chemistry Course (UROCC).

Poster Number: 34
Steglich Esterification approach to (1R,3s,5S)-8-methyl-8-azabicyclo[3.2.1]octan-3- yl 4-methoxybenzoate (E80-J32)
Yara Abdou
Arts and Sciences, Biological Sciences, Biology
Ella Durham
Arts and Sciences, Biological Sciences, Biology

Mentor: Lili Ma

Abstract: Ester compounds are biologically important molecules that can serve as building blocks for various pharmaceuticals. This research utilizes Steglich esterification to form esters from natural product scaffold such as tropine. The reaction was performed in dichloromethane (CH2Cl2) with 4-dimethylaminopyridine (DMAP) as a catalyst under microwave irradiation at 110°C for 20 minutes. Following the purification and characterization of our desired molecule, drug discovery software ACD Percepta was used to calculate physiochemical properties. This study contributes valuable information for research on the methodology establishment of interesting ester compounds.

Poster Number: 35
Structure and Physicochemical Properties of 4-(4-fluorophenyl)-2-(2-(8-methyl-8- azabicyclo[3.2.1] octan-3-ylidene)hydrazinyl)thiazole (I80-M22-C18)
Kaylee Elliott
Arts and Sciences, Biological Sciences, Biological Sciences
Emma Buckman
Arts and Sciences, Biological Sciences, Biological sciences
Sarah James
Arts and Sciences, Biological Sciences, Biological Sciences

Mentor: Lili Ma

Abstract: Heteroaryl compounds are prevalent in chemical and medicinal industry. This study focuses on the modification of tropinone by adding a heteroaryl thiazole group at its a-carbon using a two-step reaction sequence: an NBS bromination of a ketone followed by a cyclization with thiosemicarbazide. Computer modeling software CCDC GOLD and drug discovery software ACD Percepta was utilized to analyze the crucial enzyme/inhibitor interactions and the drug-like properties of the resulting molecules. Undergraduate lab students collaborated as a class on this research to advance this project. The findings provide insights into potential aromatase inhibitors, which could help in breast cancer treatment.

Poster Number: 36
Cybersecurity Assessment of ChatGPT's Memory Feature
Vickey Ghimire
Informatics, School of Computing and Analytics, Computer Science
Bijay Dhungana
Informatics, School of Computing and Analytics, Computer Science
Jaljala Shrestha Lama
Informatics, School of Computing and Analytics, Computer Science

Mentosr: Nazmus Sadat & Nicholas Caporusso

Abstract: OpenAI's recent introduction of the "memory" feature in ChatGPT marks a significant enhancement, enabling the model to extract and store user information from conversations automatically to deliver more personalized responses. However, despite its potential benefits, this feature raises critical concerns regarding user cybersecurity and privacy. To investigate these issues, this study examines user awareness of ChatGPT's memory functionality, their attitudes toward its privacy implications, and the behavioral changes prompted by perceived risks. Using an assessment framework used in the healthcare and cybersecurity fields, a questionnaire was developed and distributed primarily among college students, and an analysis of the responses revealed that, while some users have a basic understanding of the feature, many remain unaware or uncertain about its operation, particularly regarding data extraction, storage, and management practices. These findings highlight the importance of enhancing transparency and providing users with greater control over memory features in ChatGPT and similar large language models, emphasizing the need to address privacy and security challenges associated with such advancements.

Poster Number: 37
Determining the Role of Yeast tRNA body Modifications in Protein Translation
Maira Faisal
Arts and Sciences, Biological Sciences, Biological Sciences & English
Alisha Detmer
Arts and Sciences, Chemistry, Chemistry
Julia Veroff
Arts and Sciences, Chemistry, Chemistry
Faith Meghrian
Health and Human Services, School of Nursing , Nursing
Drew Scot
Arts and Sciences, Chemistry, Chemistry

Mentor: Michael Guy

Abstract: Though the purpose of each is unknown, post-transcriptional modifications are critical for tRNA functionality and, therefore, protein translation. Nearly all modifications are conserved between the yeast Saccharomyces cerevisiae and humans. While yeast misexpressing tRNA body modifications have no obvious phenotype, humans incorrectly expressing the orthologs have issues ranging from lung cancer (DUS2) to intellectual disabilities (TRMT1 and NSUN2). We are quantifying the functional role of specific tRNA modifications in yeast mutants using a reporter system of fluorescent proteins (an RNA-ID system with red and green fluorescent proteins to act as a control and report translation, respectively).

Poster Number: 38
Investigating the Interaction between Yeast tRNA Modification Proteins Trm7 and Trm734
Maira Faisal
Arts and Sciences, Biological Sciences, Biological Sciences & English
Alisha Detmer
Arts and Sciences, Chemistry, Chemistry
Julia Verhoff
Arts and Sciences, Chemistry, Chemistry

Mentor: Michael Guy

Abstract: In the tRNAPhe anticodon loop, nucleotide G34 modification is fundamental for translation in eukaryotes. In yeast, G34 2'-O-methylation is done by the complex of Trm7 (methyltransferase) and Trm734 (auxiliary protein). The TRM7 human homolog is FTSJ1, and the TRM734, WDR6; in patients, FTSJ1 loss-of-function mutations causing loss of Gm34 result in non-syndromic, X-linked intellectual disability. To understand why Trm7 needs a binding partner to function, we observed growth of specific yeast mutants expressing Trm7 variant sequences. This revealed important binding residue differences between Trm7's complexes with Trm734 and Trm732 (its other auxiliary protein).

Poster Number: 39
Reliability and Validity of the Harm Reduction Acceptability Scale-2: Results from NKU Student Samples
Valerian Wagner
Arts and Sciences, Psychological Science, Psychology

Mentor: Perilou Goddard

Abstract: Harm reduction (HR) is an alternative to the War on Drugs as an approach to substance use disorders (SUD). Although attitudes toward HR influence support for evidence- based SUD policies, assessing those attitudes remains a challenge. This study examined the reliability and validity of the recently revised 25-item Harm Reduction Acceptability Scale-2 (HRAS-2) in a sample of 120 NKU students enrolled in Introductory Psychology or Drug Policy. Results indicate high test-retest reliability, internal consistency, and convergent validity (i.e., significant correlations between the HRAS-2 and other theoretically relevant measures), suggesting the HRAS-2 may be useful in future studies of HR attitudes.

Poster Number: 40
Assessing Energy Loss, Scattering, and Fragmentation in Air for TIGERISS Beam Calibration
Madan Pant
Arts and Sciences, Physics, Geology and Engineering Technology, Engineering Physics, Physics

Mentor: Scott Nutter

Abstract: The TIGERISS cosmic ray experiment will measure nuclei abundances from boron to lead aboard the International Space Station starting in 2027. Before launch, it undergoes beam calibration at Brookhaven National Laboratory using ionized species like Carbon-12, Silicon-28, Iron-56, Krypton-84, Xenon-129, Gold-127, and Bismuth-209, representative of cosmic-ray nuclei in space. Using the GEANT4 particle physics simulation software, we model a 5-meter air slab present during testing. This study evaluates how air passage affects energy, trajectory, and fragmentation of heavy ions by quantifying energy loss, scattering, and nuclear fragmentation to determine if air gaps should be mitigated or eliminated for accurate calibration.

Poster Number: 41
Synthesis and Characterization of Tropinone Derivates using Claisen-Schmidt Reaction (D5-I80-D5)
Mikki Rodgers
Arts and Sciences, Biological Sciences, Biology (Pre-Med)
Drew Scott
Arts and Sciences, Chemistry, Chemistry

Mentor: Lili Ma

Abstract: Tropinone derivates are molecules that have proven to have an important role in the fields of chemistry and medicine. The derivates of tropinone are thought to have potential antitumor activities, particularly adding an unsaturated ketone to the tropane scaffold. The reaction was solvent free, with the mixture being stirred at 0°C for 30 minutes to 7 days. NMR was used to characterize the product of the reaction A collaboration of undergraduate lab students spearheaded the research project. This study provides information on how to efficiently produce the tropinone derivatives, and the effectiveness of the tropinone derivatives as an oral drug.

Poster Number: 42
The Efficacy and Outcome of Triple Therapy in COPD Management: A Literature Review
Samarah Auxier
Health and Human Services, School of Allied Health, Respiratory Care

Mentor: Jackie Davis

Abstract: Chronic obstructive pulmonary disease (COPD) is a progressive lung disease that causes airflow obstruction and is often difficult to manage. This project will explore the most recent evidence-based literature, current guidelines, recommendations, and clinical effectiveness of triple therapy medication options for patients with COPD. Furthermore, Challenges and limitations with inhaler therapy, such as economic concerns and the need for educational requirements will also be discussed.

Poster Number: 43
Arrogance at Work? Measuring Excessive Entitlement in the Workplace.
Lauren Matakovich
Arts and Sciences, Psychological Science, Industrial and Organizational Psychology
Jenna Brady
Arts and Sciences, Psychological Science, Industrial and Organizational Psychology
Joey Dean
Arts and Sciences, Psychological Science, Industrial and Organizational Psychology

Mentor: Philip Moberg

Abstract: This study describes the initial development of a multidimensional measure of workplace entitlement. We describe the internal structure of entitlement using exploratory factor analysis of N = 266 then examine correlations of entitlement factors with external measures of perceived justice, counterproductive work behaviors, narcissism, emotional instability, and locus of control.

Poster Number: 44
How Trustworthy is Your Workplace
Michael McGimsey
Arts and Sciences, Psychological Science, Industrial Organizational Psychology
Makenzie Finneran
Arts and Sciences, Psychological Science, Industrial Organizational Psychology
Jackie Koopman
Arts and Sciences, Psychological Science, Industrial Organizational Psychology

Mentor: Philip Moberg

Abstract: The present study describes the development and validation of a new multidimensional scale to assess psychological safety in the workplace. We examine internal structure by conducting exploratory factor analysis and describe correlations with previously validated measures of job commitment, organizational citizenship behavior, self-esteem, self- efficacy, and turnover intentions

Poster Number: 45
The Economic Impact of DACA Recipients on the U.S. and Kentucky's Economy
Melanie Crespo
Arts and Sciences, Political Science, Criminal Justice and Organizational Leadership, Political Science

Mentor: Shauna Reilly

Abstract: Recent research suggests that rescinding the Deferred Action for Childhood Arrivals (DACA) program can do more economic harm than good. While previous studies have highlighted substantial financial losses at the national level, the specific economic effects on Kentucky remain largely unexplored. In the United States and in Kentucky, DACA recipients make significant contributions to the workforce, taxes, and the overall economy. This paper explores the cost and benefits of this program. The results suggest that lawmakers should review the economic contributions of DACA recipients and explore ways to maximize and support these individuals as working members of American society.

Poster Number: 46
Hallucination, Embodied Cognition, and the Conrad Tradeoff Principle in Generative AI
Tara Wilkinson
Informatics, Mathematics and Statistics, Data Science, Statistics

Mentor: Kevin Kirby

Abstract: This project offers a conceptual analysis of the phenomena of AI hallucination in large language models (LLMs), using a principle introduced by computer scientist Michael Conrad in the 1980s in his attempt to characterize biological computation. Conrad's computational tradeoff principle asserts that a system cannot simultaneously be evolutionarily adaptable, structurally programmable, and computationally efficient. Drawing on insights from embodied cognitive science, it is argued that for an AI "hallucination" to share more than superficial similarity with biological hallucinations, we should look for evidence of scale-free patterns over structural programmability.

Poster Number: 47
Spring Ephemeral Restoration after Removal of Invasive Shrubs
River Morfitt
Arts and Sciences, Biological Sciences, Environmental Science
Tate Judge
Arts and Sciences, Biological Sciences, Environmental Science

Mentors: Kristy Hopfensperger & Denice Robertson

Abstract: Maintaining a diverse plant community is essential for a functioning forest ecosystem. Spring ephemerals are an important asset for pollinators and offer food supply and nesting habitat earlier than other plants. By understanding the optimal growth conditions for spring ephemerals, restoration projects could be completed more effectively. This study monitored the growth of five spring ephemeral species by planting three life forms—seeds, plugs, and bare roots—in areas where invasive Amur honeysuckle had recently been removed. We studied 30 restoration patches, each with three replicate quad plots (4 treatments per plot), for a total of 360 subplots, and we monitored environmental and biological conditions affecting the re- establishment of spring ephemerals. Overall, we found plant height was greatest for plug and bare root treatments and that plant height responded to light and soil metrics. Interestingly, we are beginning to tease apart the influence of invasive ground cover on the restoration of spring ephemerals.

Poster Number: 48
Constructing RNR1 and RNR2 Tagged Strains to Investigate dNTP Regulation in sam2?/sam2? Cells
Abhishek Singh
Arts and Sciences, Biological Sciences, Biological Sciences

Mentors: Daisy Grove & Erin Strome

Abstract: Ribonucleotide Reductase (RNR) converts ribonucleoside diphosphates to deoxyribonucleoside diphosphates, regulating dNTP production. We found that sam2-deficient strains have higher dNTP levels without altered RNR1-4 expression. Since RNR is also regulated by localization, we aim to investigate if altered localization drives increased dNTPs. Here, we are creating two tagged genes, RNR1 & RNR2. These sequences are integrated in rnr1?/rnr1? rnr2?/rnr2? sam1?/sam1?, and rnr1?/rnr1? rnr2?/rnr2? sam2?/sam2? strains via a long flanking homology technique, to create our desired 3HA-RNR1 and 3Myc-RNR2 tagged strains. This approach will clarify RNR localization and its association with increased dNTP levels across strains

Poster Number: 49
Determination of the Effect on Translation of 2′-O-methylation at Positions 32 and 34 in Eukaryotic tRNA
Danika Maki
Arts and Sciences, Chemistry, Chemistry

Mentor: Michael Guy

Abstract: Post-transcriptional tRNA modifications are crucial for protein translation, with defects linked to human diseases. TRM7 mutations cause X-linked intellectual disability in humans and slow growth in yeast. Yeast Trm7, with Trm732 and Trm734, methylates tRNAPhe at C32 and G34, respectively. While loss of both modifications impairs growth, individual roles remain unclear. We are analyzing translation of Phe codons UUU and UUC using a GFP reporter in trm732? and trm734? yeast mutants. We are also analyzing UGG and UUA codons, which are decoded by other tRNAs modified by Trm7. This research helps us understand how TRM7-dependent modifications affect translation in eukaryotes.

Poster Number: 50
The Importance of the FGF Genetic Signaling Pathway for Craniofacial Development
Catherine Branch
Arts and Sciences, Biological Sciences, Neuroscience

Mentor: Emily Shifley

Abstract: Our goal was to determine the importance and developmental timing of the FGF genetic pathway to guide neural crest cells to populate the pharynx and develop craniofacial skeletal in vertebrate embryos. We manipulated the activation of the FGF pathway in Xenopus embryos through inhibition at varying stages to determine the gene pathways and stages that were crucial for craniofacial skeleton development. We found that certain neural crest gene expression patterns were reduced in FGF inhibited embryos, causing craniofacial defects. Mapping out important genes for craniofacial cartilage development will help us understand potential causes of certain human birth defects.

Poster Number: 51
Cognitive Effects of Prenatal Fentanyl Exposure in Male Mice
Logan Hein
FYRE Student, Arts and Sciences, Biological Sciences, Neuroscience

Mentor: Brittany Smith

Abstract: 7.2% of babies have been exposed to opioids prenatally (during pregnancy) in the U.S. Fentanyl use in on the rise and there is a lack of studies regarding the long-term effects of prenatal exposure to fentanyl. We studied these cognitive outcomes that are often overlooked via operant conditioning of prenatal fentanyl exposed mouse offspring. We chose mice to effectively study the long-term effects. Current data shows signs of compulsive behavior in fentanyl affected male mice. Statistically, males are at a greater risk of suffering cognitive effects of adverse prenatal exposures therefore we expect deficits with greater task difficulty.

Poster Number: 52
The Use of Hyperbaric Oxygen Therapy in the Treatment of Post-COVID-19 Syndrome: A Review of Literature
Abraham Heil
Health and Human Services, School of Allied Health, Respiratory Care
Lindy Browe
Health and Human Services, School of Allied Health, Respiratory Care
Patrick Konate
Health and Human Services, School of Allied Health, Respiratory Care

Mentor: Jackie Davis

Abstract: While current literature suggests that hyperbaric oxygen therapy (HBOT) may be indicated for the treatment of post-COVID-19 syndrome, little work has been done to evaluate HBOT compared to standard treatment. This literature review presents research into current trends, focusing on the mechanisms of action, effectiveness, and the limitations for use in the context of post-COVID-19 syndrome. Patients with post-COVID-19 may benefit from the results of this study since it offers a non-invasive and effective option with promising results.

Poster Number: 53
Effects of Prenatal Fentanyl Exposure on Executive Function in Female Mice
Maria Taylor
FYRE Student, Arts and Sciences, Biological Sciences, Biology

Mentor: Brittany Smith

Abstract: Every fifteen minutes, a baby is born with neonatal opiate withdrawal—forced to suffer the consequences of a decision they never made. As fentanyl is growing in popularity, the need for knowledge becomes increasingly pressing. Using a mouse model, we are observing the impact of prenatal fentanyl exposure on female offspring. We are studying this through a series of food motivated conditioning tasks, followed by reviewing metrics of cognitive performance including motivation and impulse control. Early testing shows no difference in rudimentary learning and motivation. We predict that as the study progresses, discrepancies may show when testing more complex behaviors.

Poster Number: 54
Makers In the Classroom
Annie Ortenzi
Informatics, School of Computing and Analytics, Library Informatics

Mentor: Hailley Fargo

Abstract: This poster outlines the capstone project that provides K -8th grade educators and school librarians with resources and tools to facilitate makerspaces and bring project-based learning to the classroom. Through a year of capstone research, organization of resources, and understanding community needs, the project focuses on the value of integrating both low and high-tech tools into a school makerspace to aid children's learning. It will contribute to the growing conversations about school makerspaces, focusing on resources to aid school staff Findings are presented on a website containing organized resources, making it easily accessible to educators and librarians.

Poster Number: 55
How Genetic Signaling Cascades Control Pharyngeal Development
Gabrielle Williams
Arts and Sciences, Biological Sciences, Biology

Mentor: Emily Shifley

Abstract: I am studying gene expression in developing Xenopus embryos to see how genes help guide the development of organs. The FGF genetic signaling pathway is important for the development of the pharynx, but the mechanism of its function is not known. We inhibited the FGF pathway in developing embryos and analyzed a set of genes to see if their expression patterns were altered. We found that some pharyngeal genes had reduced expression with FGF inhibition. We have discovered that the FGF pathway controls the expression of certain pharyngeal genes, which likely helps them form organs properly.

Poster Number: 56
Computational Investigation of Organic Chemistry Laboratory Target D7-I17-D
Morgan Daniel
Arts and Sciences, Chemistry, Chemistry
Natalie Creech
Arts and Sciences, Chemistry, Chemistry
Anabel Lillie
Arts and Sciences, Chemistry, Chemistry

Mentor: Patrick Hare

Abstract: Computational chemistry was used to determine the energy differences and thermodynamics for the reaction forming D7-I17-D7 that was carried out in CHE 311L this semester. In addition, vibrational spectra for the reactants and product were found to determine if the reaction progress could be monitored with Raman or IR. Finally, the bond occupancies of the formed bonds was studied to give information about the reaction.

Poster Number: 57
Computational Investigation of Organic Chemistry Laboratory Target D2-I17-D2
Son Do
Arts and Sciences, Chemistry, Chemistry
Anh Bui
Arts and Sciences, Chemistry, Chemistry

Mentor: Patrick Hare

Abstract: Computational chemistry was used to determine the energy differences and thermodynamics for the reaction forming D2-I17-D2 that was carried out in CHE 311L this semester. In addition, vibrational spectra for the reactants and product were found to determine if the reaction progress could be monitored with Raman or IR. Finally, the NMR and UV/VIS spectra of the compound were studied to give information about the reaction.

Poster Number: 58
Computational Investigation of Organic Chemistry Laboratory' Target D40-I80-D40
Jason Grothaus
Arts and Sciences, Chemistry, Chemistry
Madisyn Eads
Arts and Sciences, Chemistry, Chemistry
Olivia Pastin
Arts and Sciences, Chemistry, Chemistry

Mentor: Patrick Hare

Abstract: Computational chemistry was used to determine the energy differences and thermodynamics for the reaction forming D40-I80-D40 that was carried out in CHE 311L this semester. In addition, vibrational spectra for the reactants and product were found to determine if the reaction progress could be monitored with Raman or IR. Finally, the transition state of the molecule was investigated.

Poster Number: 59
Computational Investigation of Organic Chemistry Laboratory'Target D2-I80-D2
Casey King
Arts and Sciences, Chemistry, Chemistry
Khuyen Ho
Arts and Sciences, Chemistry, Chemistry
Raelyn Sanders
Arts and Sciences, Chemistry, Chemistry

Mentor: Patrick Hare

Abstract: Computational chemistry was used to determine the energy differences and thermodynamics for the reaction forming D2-I80-D2 that was carried out in CHE 311L this semester. In addition, vibrational spectra for the reactants and product were found to determine if the reaction progress could be monitored with Raman or IR. Finally, the transition state of the molecule was investigated.

Poster Number: 60
Computational Investigation of Organic Chemistry Laboratory Target D4-I17-D4
Kendra Baker
Arts and Sciences, Chemistry, Chemistry Amber Robertson
Arts and Sciences, Chemistry, Chemistry

Mentor: Patrick Hare

Abstract: Computational chemistry was used to determine the energy differences and thermodynamics for the reaction forming D4-I17-D4 that was carried out in CHE 311L this semester. In addition, vibrational spectra for the reactants and product were found to determine if the reaction progress could be monitored with Raman or IR. Finally, the transition state of the molecule was investigated.

Poster Number: 61
Computational Investigation of Organic Chemistry Laboratory Target D7-I80-D7
Eben Nikoi
Arts and Sciences, Chemistry, Chemistry
August Bozarth
Arts and Sciences, Chemistry, Chemistry
Trevor Lee
Arts and Sciences, Chemistry, Chemistry

Mentor: Patrick Hare

Abstract: Computational chemistry was used to determine the energy differences and thermodynamics for the reaction forming D7-I80-D7 that was carried out in CHE 311L this semester. In addition, vibrational spectra for the reactants and product were found to determine if the reaction progress could be monitored with Raman or IR. Finally, the charge distribution of the molecule was investigated for use in modeling studies.

Poster Number: 62
How Important was Geography to Pac-12 Rivalries Before the Conference's Implosion?
Brooke Kinney
Business, Marketing, Sports Business and Construction Management, Sports Business & Event Management

Mentor: Joe Cobbs

Abstract: This study measures the importance of spatial proximity as an ingredient to rivalry according to men's college basketball fans. Since the PAC-12 conference imploded in 2023, its member institutions have joined less regionally-based athletic conferences (i.e., more national) for future competition. For sports fans, spatial proximity is one of the most frequently identified ingredients to rivalry (Tyler & Cobbs, 2015). To address our title question, we accessed data from the Know Rivalry Project that measured fans' perception of the ingredients to rivalry from the Pac-12, Big Ten, and Big 12 conferences (n=836).

Poster Number: 63
X-ray Variability in the Swift Legacy Sample of Active Galactic Nuclei
Jordan Niemann
Arts and Sciences, Physics, Geology and Engineering Technology, Engineering Physics
Skie Pleshinger
Arts and Sciences, Physics, Geology and Engineering Technology, Physics
Cameron Easton
Arts and Sciences, Physics, Geology and Engineering Technology, Engineering Physics
Sam Deatherage
FYRE Student, Arts and Sciences, Chemistry, Biochemistry

Mentor: Dirk Grupe

Abstract: We are presenting a legacy sample of Active Galactic Nuclei (AGN) that was built by using the NASA Neil Gehrels Swift mission to study the long-term variability of AGN. The core of this sample contains about 130 AGN that Swift has monitored over the last two decades. In this poster we will describe the sample and present some preliminary analysis of the X-ray variability. In particular, we want to focus on the "softer when brighter" phenomenon, which is typically based on anecdotal evidence but has never been explored on a large AGN sample. The data were observed by Swift simultaneously in X-ray and ultraviolet. This simultaneity allows us to model the accretion disk spectrum in detail. The goal of this study is to research how the AGN variability links to other AGN properties, such as black hole mass and accretion rate.

Poster Number: 64
Development Issues within Northern Belizean Sugar Cane Farming Communities
Maria Stone
Arts and Sciences, Sociology, Anthropology and Philosophy, Anthropology
Ripley Winters
Arts and Sciences, Sociology, Anthropology and Philosophy, Anthropology

Mentor: Douglas Hume

Abstract: Students participating in the Ethnographic Field school in Belize explored community development issues within sugar cane farming communities through interviews. Research included access to healthcare, farmer relationships to associations and the profession, garbage disposal, effects of COVID-19 pertaining to job availability, substance abuse, climate change, and use of culturally significant home remedies. Data were gathered from interviewing 228 participants in San Estevan, San Jose, San Lazaro, and Yo Creek. The interviews revealed the need for community outreach and professional representation, presenting how intertwined communities in Northern Belize are with sugar cane farming. Results will inform future community development priorities

Poster Number: 65
Smart CNN agent for Chrome Dino Game
Ashok Gaire
Informatics, School of Computing and Analytics, Computer Science

Mentor: Yangyang Tao

Abstract: This research project explores the application of Convolutional Neural Networks (CNNs) to train an AI agent to play the Chrome Dino game. By leveraging deep learning techniques, the model processes game frames to extract features and make real-time decisions, allowing the agent to respond efficiently to obstacles. CNN learns to identify patterns in the game environment, optimizing its jumping and ducking actions for the maximum score. This study demonstrates the effectiveness of CNNs in visual-based game automation, highlighting their potential for real-time decision-making in dynamic environments without explicit rule- based programming. Through the project, we investigated the performance of the CNN model in various aspects. Through this project, we evaluate the CNN model's performance across multiple aspects, including accuracy, adaptability, and decision-making efficiency in dynamic gameplay scenarios.

Poster Number: 66
Brain Changes of Mouse Offspring from Prenatal Morphine vs Buprenorphine Exposure
Noah Raleigh
Arts and Sciences, Biological Sciences, Biological Sciences

Mentor: Brittany Smith

Abstract: The nucleus accumbens (NAc) is involved in rewarding and social behaviors and may be altered after prenatal opioid exposure. Prenatal morphine exposure can increase social interactions and risky reward-seeking behaviors while reducing cognition in mouse offspring. Buprenorphine (BUP) helps treat opioid use disorder and can reduce overdoses during pregnancy. In this study, we tested whether prenatal morphine increases cFos (indicator of neuron excitation) and reduces Parvalbumin (PV) (indicator of neuron inhibition) in the NAc after social interaction. We proposed BUP would not cause this. We used immunofluorescent labeling in the mouse brain and measured cell counts in the NAc core and shell.

Poster Number: 67
Impact of an Increased Minimum Wage Have on the Demand for Low-Wage Employment
Danish Khan
Business, Accounting, Economics and Finance, Economics and Statistics

Mentor: Linda Dynan

Abstract: This study explores the results from the literature of the impacts of minimum wage increase on low-wage employment. Classical economic theory predicts that raising wages reduces the demand for labor as businesses adjust to higher costs. However, empirical results are mixed. Some studies report job losses or slower employment growth, while others highlight minimal or even positive effects, such as increased worker productivity and higher consumer spending, which can drive job creation. This literature review highlights the need for further exploration of job demand and hiring patterns following wage hikes to better understand potential consequences for low-wage workers.

Poster Number: 68
Traumatic Brain Injuries and Respiratory Treatment Options in Adult, Neonatal, and Pediatric Patients
Madi Snapp
Health and Human Services, School of Allied Health, Respiratory Therapy
Savannah Lawless
Health and Human Services, School of Allied Health, Respiratory Therapy

Mentor: Jackie Davis & Alicia Ireton

Abstract: This literature review examines the role of respiratory therapy in managing traumatic brain injuries (TBIs) across adult, neonatal, and pediatric populations. Evidence-based respiratory interventions and strategies to improve patient outcomes will be discussed. The goal is to provide healthcare professionals with the latest insights and best practices in respiratory management, ultimately improving care delivery for all TBI patients

Poster Number: 69
Solvent Dependence on Photolysis and Hydrolysis Products of 6PPD and 4HDPA
Joshua Johnson
Arts and Sciences, Chemistry, Chemistry
Emily Wymer
Arts and Sciences, Biological Sciences, Environmental Sciences

Mentor: Patrick Hare

Abstract: 6PPD is a tire preservative used to combat ozonolysis, but its quinone derivative is toxic to fish. Investigation of UV and aqueous reaction pathways and identification of transformation products may help to mitigate environmental toxin creation. 4HDPA is a hydrolysis product of 6PPD, and they share many UV photolysis products. LCMS analysis of these products shows a heavy solvent dependence. A measured pH-dependence of aqueous 4HDPA spectra demonstrates that varying protonation states may influence reaction pathways of both 4HDPA and 6PPD. Transformation product identities and reaction pathways have been examined via mass spectrometry and computational modeling.

Poster Number: 70
The Integration of AI with Intrusion Detection Systems
Chase Reeves
Informatics, School of Computing and Analytics, Cybersecurity

Mentor: Cynthia Thomas

Abstract: Traditional Intrusion Detection Systems struggle with high false positive rates, limited scalability, and detecting sophisticated threats. Integrating Artificial Intelligence into IDS enhances detection capabilities, reduces human intervention, and improves security efficiency. AI techniques like machine learning, deep learning, and reinforcement learning process data, learn from patterns, and adapt to evolving threats in real-time. This paper explores how AI integration with IDS improves detection accuracy, speed, and adaptability. Some challenges of implementation are data quality, model interpretability, and sophisticated attacks. This paper concludes with insights into how AI can overcome traditional IDS limitations for a more effective security solution.

Poster Number: 71
How Effective is Your Trainer? Measuring Trainer Readiness at Work
Hannah Bishop
Arts and Sciences, Psychological Science, MS in Industrial and Organizational Psychology
Megan Groeschen
Arts and Sciences, Psychological Science, MS in Industrial and Organizational Psychology
Kendall Hyams
Arts and Sciences, Psychological Science, MS in Industrial and Organizational Psychology

Mentor: Philip Moberg

Abstract: The present study describes the development and preliminary validation of a new measure intended to assess trainer effectiveness in organizational settings. Based on prior research, we hypothesize four dimensions, will report results of exploratory factor analysis, and examine relations with three external constructs, trainer satisfaction, organizational support, and organizational commitment.

Poster Number: 72
Beyond the Logistics Performance Index: Evaluating the Determinants of Global Logistics Performance
Bitanya Shewangizaw Adane
Business, Management , Global Supply Chain Management

Mentor: Linda Dynan

Abstract: This research explores the literature related to the Logistics Performance Index (LPI) which serves as a critical benchmark for assessing the efficiency of global trade logistics. It seeks to assess whether the LPI components—such as customs efficiency, infrastructure quality, and shipment timeliness—are sufficient to fully capture the broader economic and institutional factors influencing logistics performance. It sets the stage to study the LPI created by The World Bank in comparison to practical on the ground measures currently in use. Based on existing literature, we will assess which variables from the world development indicators can theoretically explain logistics performance of countries.

Poster Number: 73
Pulsed Laser Ablation in Liquids for the Generation of Catalytic Bimetallic Nanoparticles
August Bozarth
Arts and Sciences, Chemistry, Physics and Chemistry

Mentor: Patrick Hare

Abstract: The catalytic potential of metallic nanoparticles makes them an incredibly useful tool for chemistry by making reactions more energy efficient and cost effective. However, tradition “wet” chemistry techniques for synthesizing nanoparticles often involve toxic surfactants and require labor intensive processes. Pulsed laser ablation in liquids (PLAL) allows for the production of nanoparticles by striking a metal target submerged in water with a high-powered laser beam. The presented research seeks to generate tunable Au decorated TiO2 bimetallic nanoparticles for the oxidative catalysis of biomass derivatives. Nanoparticles were generated in a two-step ablation process at 532nm laser wavelength and characterized using SEM.

Poster Number: 74
The Role of COMT rs4680 Genotype on Vagal Tone During Cognitive Load
Shreeukta Adhikari
Arts and Sciences, Biological Sciences, Neuroscience/ Psychology
Duong Pham
Arts and Sciences, Biological Sciences, Neuroscience

Mentor: Brittany Smith

Abstract: Rs4680 is a genetic variant that encodes COMT, an enzyme involved in dopamine metabolism. Vagal tone, measured by the maximum minus minimum heart rate, indicates parasympathetic activity and is linked to cognitive performance and stress resilience. This study explored whether the COMT genotype relates to vagal tone under cognitive load. We hypothesized that individuals with different COMT genotypes would show distinct vagal responses across trials. Our findings showed no significant effect of trial, rs4680 genotype, or their interaction on vagal tone. These results suggest that COMT genotype does not influence vagal tone under cognitive load, highlighting the need for further research into genetic and physiological factors in cognitive and emotional functioning.

Poster Number: 75
Correlation of COMT rs4680 Genotype with Stress and Heart Rate
Salem Welty
Arts and Sciences, Psychological Science, Psychology
Halie Newberry
Arts and Sciences, Psychological Science, Psychology

Mentor: Brittany Smith

Abstract: The COMT rs4680 genotype involves dopamine degradation. The AA genotype has lower COMT activity and higher dopamine than the GG genotype. We measured maximum and minimum heart rate using a transducer while performing N back testing, which quantified stress responses. Our hypothesis was that increasing test difficulty would elevate heart rate, regardless of genotype. Trial did not increase max or min HR, suggesting N-back testing was not a sufficient stressor. We found GG genotype had lower min HR compared to AG (but not AA), suggesting this is more complex. This exemplifies how stress could affect the COMT genotypes variation.

Poster Number: 76
Does COMT Genotype Relate to Emotional Regulation and Personality?
Ashley Sarbell
Arts and Sciences, Psychological Science, Psychology
Shayla Wheeldon
Arts and Sciences, Psychological Science, Psychology
Kennedy Challis
Arts and Sciences, Biological Sciences, Neuroscience

Mentor: Brittany Smith

Abstract: The COMT genotype influences dopamine regulation and may impact cognitive and emotional processes. This study explored how COMT genotype relates to frontal alpha asymmetry (FAA), Behavioral Activation/Inhibition Systems (BAS/BIS) personality scores when viewing emotional faces. FAA is associated with emotion regulation, while BAS/BIS measures approach or avoidance behavior. We hypothesized that the COMT genotype has greater left- sided FAA, higher BAS, and lower BIS scores. Participants completed EEG recordings while watching emotional faces and self-reported BAS/BIS measures. The results indicated no significant relationship between COMT and FAA, BAS, or BIS scores. This suggests that this one genetic factor may not affect emotion and personality.

Poster Number: 77
Identification of Potential Trails in Hawthorne Crossing Conservation Area with the Use of GIS
Leticia Munoz
Arts and Sciences, Biological Sciences, Environmental science
Anh Nguyen
Arts and Sciences, Biological Sciences, Environmental science

Mentor: Hongmei Wang

Abstract: Hawthorne Crossing Conservation Area, a 135-acre site near Alexandria, Kentucky, has been managed by Campbell County Conservation District since 2006. However, the area faces challenges, including a lack of public facilities, which limits accessibility. This project aims to design sustainable hiking trails that promote public engagement while preserving the environment. Using Geographic Information Systems (GIS), we analyze datasets on land cover, topography, and species distribution to identify potential trails that avoid ecologically sensitive areas. The study results will enhance native biodiversity, support eco-tourism, and contribute to long-term conservation efforts, aligning with the goals of Campbell County Conservation District.

Poster Number: 78
Evolving Simple Organisms using a Genetic Algorithm and Deep Learning
Mark Greene
FYRE Student, Informatics, School of Computing and Analytics, Computer Science

Mentor: Yangyang Tao

Abstract: This research explores the evolution of simple organisms controlled by neural networks using a genetic algorithm. Each organism, represented as an agent, navigates a simulated environment to locate and consume food, optimizing its survival over generations. Trained through evolutionary principles—selection, crossover, and mutation, the neural network improves its navigational strategies. By fine-tuning hyperparameters, we investigate the power of evolutionary algorithms in optimizing the behavior of an artificial intelligence. Additionally, coding the simulation provides a practical introduction to reinforcement learning, neural network training, and genetic algorithms.

Poster Number: 79
Determining the role of Trm7, Trm732, and Trm734 in tRNA Binding
Ashton Davey
Arts and Sciences, Chemistry, Data Science

Mentor: Michael Guy

Abstract: Modifications of the tRNA anticodon loop are important to translation. In Saccharomyces cerevisiae, protein Trm7 catalyzes methylation and Trm732 and Trm734 appear to position tRNAPhe for methylation at anticodon loop positions C32 and G34, respectively. Defects in the Trm7 human ortholog, FTSJI, causes intellectual disability. An experimental approach is being developed to determine whether individual Trm7, Trm732, and Trm734 can bind to tRNAPhe. Tagged proteins are pulled down, and their bound RNA is analyzed via Northern blot. This approach also includes determining if non-functional mutated variants of tagged proteins are still able to bind to tRNAPhe.

Poster Number: 80
Random Mutagenesis and Next Generation Sequencing to Identify Important Residues for Trm732 Function
Natalie Creech
Arts and Sciences, Chemistry, Biochemistry
Johannes Smal
FYRE Student, Arts and Sciences, Mathematics and Statistics, Data Analytics and Statistics

Mentor: Michael Guy

Abstract: Post-transcriptional tRNA modifications are crucial for efficient protein translation. In yeast, the Trm7 methyltransferase, with Trm732, modifies tRNAPhe at position 32. Defects in human TRM7 are linked to cognitive impairment, but Trm732's function remains unclear. We identified a key motif in Trm732 and now seek other essential residues. Randomly mutated Trm732 variants will be expressed in a sick strain lacking Trm732. DNA from these colonies will be sequenced before and after selective growth to track mutations quantitatively. Mutations that decrease in frequency or disappear indicate Trm732 functional importance. Identified mutations will then be tested for their impact on Trm732 function.

Poster Number: 81
Snake Game AI with Reinforcement Learning
Daniel Than
FYRE Student, Informatics, School of Computing and Analytics, Computer Science

Mentor: YangYang Tao

Abstract: This research project demonstrates the application of reinforcement learning techniques to develop an autonomous agent capable of playing the classic Snake game. By employing algorithms - Deep Q-Learning, the agent learns optimal strategies through trial and error, maximizing its scores by effectively navigating the game environment and avoiding collisions. This research project showcases the potential of reinforcement learning in training AI agents for complex tasks without explicit programming of behaviors. This approach highlights the adaptability and efficiency of reinforcement learning in developing intelligent systems capable of mastering dynamic environments. Through the project, we tested under different configurations, what would be the performance of the learning of the Deep-Q Reinforcement model.

Poster Number: 82
Effects of Early Life Acetaminophen on Cognitive Function in Juveniles and Adults
Bree Sweeney
Arts and Sciences, Biological Sciences, Neuroscience

Mentor: Lauren Williamson

Abstract: Acetaminophen is a commonly used fever reducer and analgesic for babies and children. We hypothesize that it affects cognitive function if given in early life and may correlate
with the increased incidence of autism spectrum disorder. We treated rat pups from day 4 to 10 with acetaminophen or saline. Then at day 24, we assessed cognitive function with the context object discrimination (COD) test. We further tested microglia morphology, plasma inflammatory markers, and hippocampal gene expression following behavior. Females showed better memory than males, and surprisingly, acetaminophen may have improved cognitive function. We will present behavioral, cellular, and molecular data.

Poster Number: 83
Effects of Fentanyl Exposure on Maternal Behavior in C57 Mice
Martin Powers
Arts and Sciences, Biological Sciences, Neuroscience

Mentor: Brittany Smith

Abstract: The opioid epidemic affects over 2.7 million Americans and includes 7.6% of U.S. pregnancies having opioid exposure. Pregnancy and postpartum are biologically and hormonally unique periods that significantly impact the mother and child. Infant-parent bonding is essential to human development. Substance use disorders can interfere with maternal-infant bonding; however, evidence is mixed, and most studies have focused solely on the infant. Depending on opioid used, animal models show deficits, improvements, or no change to bonding as measured by pup retrieval behavior. The synthetic opioid fentanyl is increasing in usage, so this study seeks to find differences in maternal behavior in mice exposed to fentanyl during pregnancy.

Poster Number: 84
Interaction Between Captive Bonobos and Humans
Daniel Reyes
Arts and Sciences, Sociology, Anthropology and Philosophy, Anthropology

Mentor: Monica Wakefield

Abstract: In zoos, many animals avoid contact with humans, however bonobos are notably interactive with humans, even initiating interactions. While these interactions could benefit the bonobos, I aimed to test if they come at a cost of reduced bonobo-bonobo interactions. I observed bonobos at the Cincinnati Zoo, recording their interactions with visitors and with each other. The bonobos vary in their tendency to interact with humans, but all consistently interact with each other with or without visitors present. Thus on balance, human interaction is an enriching activity that does not appear to negatively affect natural within-species social behavior.

Poster Number: 85
Using AI to Determine the Crucial Binding Sites of the Trm7-Trm732 Complex
Ruofei Ding
Arts and Sciences, Chemistry, Biochemistry
Ashton Davey
Informatics, School of Computing and Analytics, Computer Science
Alisha Detmer
Arts and Sciences, Chemistry, Biochemistry

Mentor: Michael Guy

Abstract: Post-transcriptional tRNA modifications by Trm7-Trm732 and Trm7-Trm734 protein complexes are crucial in protein synthesis. In humans, mutations in the Trm7 homolog (FTSJ1) lead to intellectual disabilities. We aimed to use AlphaFold3, an artificial intelligence (AI) driven structure prediction program, to guide the selection of key Trm7 residues that are crucial in Trm7-Trm732 binding interface for site-directed mutagenesis and cell assays. Initial screening with candidate Trm7 R14E showed moderate cell growth but no significant binding deficiency, proposing potential cellular disruptions that are beyond the scope of Trm7-Trm732 binding.
Further identifications and testing of Trm7 variants will be done through refined modeling.

Poster Number: 86
Differences in Reproductive Phenology Between Native and Invasive Plants and Their Responses to Climate Change
Allison Turner
Arts and Sciences, Biological Sciences, Biology
Bianca Turner
Arts and Sciences, Biological Sciences, Biology

Mentor: Yingying Xie

Abstract: Biological invasion can reduce ecosystem health and biodiversity. How invasive plants differentiate their timing of life events to facilitate competition with natives is under- researched. We tested three hypotheses behind invasive dominance: priority effects, niche breadth, and climatic plasticity. We investigated two invasive and two native shrubs using iNaturalist and specimen records. Phenology data were annotated from images; models estimated phenological sensitivity. Results suggest invasives had a faster advancement in flowering time over years than natives. We also found that in warm, stable climate regions, flowering phenologies of invasives were more sensitive to warming. These findings can aid conservation efforts.

Poster Number: 87
Spatial Variation of Sensitivity to Temperature Change of Wood Frog Breeding Phenology
Bianca Turner
Arts and Sciences, Biological Sciences, Biology
Allison Turner
Arts and Sciences, Biological Sciences, Biology

Mentor: Yingying Xie

Abstract: Amphibian population decline is associated with threats from anthropogenic climate change. However, little is known whether their responses from breeding time are consistent across species range. We hypothesized that wood frog (Lithobates sylvaticus) phenology varies in sensitivity to warming in early spring among ecoregions. Audio records/images from iNaturalist, FrogWatch, and natural history collections were used to determine phenology, while models estimated phenological sensitivities and temporal shifts . Results suggested significant spatiotemporal variations in advancement of wood frog phenology among ecoregions. Populations in colder, less stable climates were more sensitive to warming. Our findings suggest consideration of population-dependent conservation efforts.

Poster Number: 88
Comparisons between Nursing and Respiratory Care Curriculums Regarding Oxygen Devices
Kifah Sulub
Health and Human Services, School of Allied Health, Respiratory Therapy
Dayana Gutierrez
Health and Human Services, School of Allied Health, Respiratory Therapy
Leslie Seever
Health and Human Services, School of Allied Health, Respiratory Therapy

Mentor: Jackie Davis

Abstract: This review highlights inconsistencies in oxygen therapy education between Nursing and Respiratory Care programs at Northern Kentucky University (NKU). It aims to bridge gaps in technical training and clinical exposure by developing a standardized curriculum. The initiative will use shared learning materials, joint simulation training, and interprofessional collaboration to unify education on oxygen therapy devices. This approach seeks to enhance teamwork, communication, and competency among nursing and respiratory care graduates, ultimately improving patient outcomes through safer and more effective oxygen therapy practices.

Poster Number: 89
The Effect of Walking in Different Environments on Mood
Megan Bih
Arts and Sciences, Psychological Science, Psychology and Geology

Mentor: Kathleen Fuegen

Abstract: Numerous research studies have found that spending time in nature substantially improves overall mood. This study examines the impact of walking in different environments on affect. Using a within-subjects design, 23 participants completed two ten-minute walks, one outside near a lake and gardens, and one inside a dimly lit building. We expected the walk outside to have a stronger positive impact on mood than walking inside a building. Affect was measured using PANAS and EFI before and after each walk. Participants reported higher tranquility, positive engagement, revitalization, positive affect, and less physical exhaustion after walking outside compared to walking inside.

Poster Number: 90
Key Ingredients to Rivalries in the NFL
Bryanna Hall
Business, Marketing, Sports Business and Construction Management, Sports Business

Mentor: Joe Cobbs

Abstract: National Football League (NFL) rivalries shape the league's culture and fan engagement, but what makes them so intense? Dissecting rivalries helps league and team administrators promote authentic narratives while mitigating antisocial actions between rival teams' fans. This study examines key ingredients discerned from rivalries across many sports to determine their correlation to rivalry intensity in professional football. Using fan survey data from the Known Rivalry project, findings reveal that close competition, geographic proximity, and conspicuous moments fuel the strongest rivalries. Understanding these ingredients provides a deeper appreciation for what keeps NFL rivalries alive and thrilling for generations.

Poster Number: 91
Optimizing Female Athlete Performance: Training Recommendations Based on the Menstrual Cycle
Meghan Carl
Health and Human Services, School of Kinesiology, Counseling, and Rehabilitative Sciences, Exercise Science

Mentor: Jennifer Lape Kaiser

Abstract: Most female athletes experience hormonal fluctuations throughout the menstrual cycle that impact strength, endurance, injury, and recovery. However, many training programs overlook cycle tracking and fail to consider how women are more susceptible to injuries by menstrual phase. This project explores research-based training recommendations and the creation of an infographic designed for strength and conditioning spaces, offering quick and consumable education. The infographic breaks down the four phases of the menstrual cycle, providing training recommendations for each. By tracking your menstrual cycle and adjusting training accordingly, female athletes can optimize performance, reduce injury risk, and improve overall well-being.

Poster Number: 92
Measuring Bandura's Human Agency: Developing a Work-Relevant Scale for Managing Tasks
Megan Groeschen
Arts and Sciences, Psychological Science, Industrial Organizational Psychology
Hannah Bishop
Arts and Sciences, Psychological Science, Industrial Organizational Psychology
Kendall Hyams
Arts and Sciences, Psychological Science, Industrial Organizational Psychology
Jackie Koopman
Arts and Sciences, Psychological Science, Industrial Organizational Psychology

Mentor: Philip Moberg

Abstract: This study describes preliminary efforts to develop and validate a multidimensional measure of Bandura's concept of human agency applied to work settings. Exploratory factor analysis of N = 374 responses revealed the four hypothesized factors. Criterion relations with previously validated measures of self-efficacy, self-control, self-determination, and personal mastery are reported.

Poster Number: 93
Literature Review: Hypoglossal Nerve Stimulation vs. Continuous Positive Airway Pressure in the Treatment of Obstructive Sleep Apnea
Destiny Golden
Health and Human Services, School of Allied Health, Respiratory Care
Jenna Barnes
Health and Human Services, School of Allied Health, Respiratory Care
Porter Hedenberg
Health and Human Services, School of Allied Health, Respiratory Care

Mentor: Jackie Davis

Abstract: Obstructive Sleep Apnea (OSA) affects 30% of adults globally. While Non-Invasive Ventilation (NIV) is effective, poor patient compliance limits its use. This review compares NIV and Hypoglossal Nerve Stimulation (HNS) for OSA treatment, focusing on compliance, Apnea Hypopnea Index (AHI) reduction, and health outcomes. While studies indicate NIV improves ventilation, there is a low compliance rate for patients who are intolerant to the therapy. HNS is an alternative for NIV-intolerant patients by targeting airway muscle function. Understanding the effectiveness between HNS and NIV-intolerant patients can help determine better treatment options for patients with OSA.

Poster Number: 94
Novel DNA-based Vaccines for Hepatitis C Virus
Kenzi Vennefron
Arts and Sciences, Biological Sciences, Biology
Molly Eide
Arts and Sciences, Biological Sciences, Biology

Mentor: Joseph Mester

Abstract: This project focuses on the generation and characterization of novel DNA-based vaccines for hepatitis C virus (HCV). Currently, there is no available vaccine for HCV, highlighting the need for effective preventive strategies. The vaccines are being tested for their ability to express the HCV core protein in human cells. Additionally, their immunogenicity is being evaluated in human immune cell cultures. Results from these experiments will demonstrate the potential of DNA-based vaccines for stimulating protective immune responses against HCV.

Poster Number: 95
Fake it Till You Make it: Self-Perception in the Workplace
Mattie Maguire
Arts and Sciences, Psychological Science, Industrial-Organizational Psychology

Mentor: Philip Moberg

Abstract: This study aims to develop and validate a measure of Imposter Syndrome in the workplace, specifically through behaviors, cognition, or affect. The primary objective was establishing a new, theory-based measure of self-perceived IS and examining how the hypothesized dimensions interrelate and correlate with external constructs. Participants (N = 193) completed a survey of the new measure of imposter syndrome and validated measures of global imposter syndrome, job satisfaction, perceived stress, work self-efficacy, and neuroticism. Exploratory Factor Analysis revealed two factors: "Underestimating Contributions" (24 items, a = .946) and "External Validation" (5 items, a = .833), both positively correlating with neuroticism and global imposter syndrome.

Poster Number: 96
The Physiological Effects of Electronic Nicotine Delivery Systems (ENDS) on the Cardiopulmonary System
Sierra Hitchcock
Health and Human Services, School of Allied Health, Respiratory Care

Mentor: Jackie Davis

Abstract: Electronic nicotine delivery systems (ENDS) are widely used across the US. There is a common consensus that ENDS are safe due to their lack of tobacco and lower amounts of nicotine. While they do lack tobacco and can have less nicotine, they still contain a plethora of other chemicals that are not safe for the human body. In a vast review of current literature, ENDS have proven to cause numerous diseases and changes within the body. Studies on ENDS have proven that they are not harm-free and can compromise one's health.

Poster Number: 97
Mapping Buildings and Programs of Community Matters with GIS
Ashton Baxter
Arts and Sciences, Biological Sciences, Environmental Science

Mentor: Hongmei Wang

Abstract: Community Matters is a nonprofit organization located in the Lower Price Hill neighborhood of Cincinnati, Ohio, dedicated to empowering community members to achieve their goals. This project aimed to map Community Matters' buildings and programs within the neighborhood to visualize their impact from a new perspective. Using Geographic Information Systems (GIS), we developed a more accurate and functional map to enhance outreach efforts and provide essential information for community members. This map also offers valuable insight into the positive influence Community Matters has had on the neighborhood.

Poster Number: 98
Development of Regression Models in a Public Health Application
Abby Jones
Arts and Sciences, Mathematics and Statistics, Statistics

Mentor: Joseph Nolan

Abstract: Regression models are used to assess relationships between variables in a variety of real-world applications. Generalized linear models provide the tools to examine potential predictors of important outcomes. For example, simple and multiple linear regression models are used for quantitative outcomes, while ordinal logistic regression models can be used for ordinal (ranked) outcomes. This poster will focus on application of these methods within the context of public health application.

Poster Number: 99
GIS Analysis of Nonprofit Organizations Supported through Mayerson Student Philanthropy Projects between 1999 and 2024
Olivia Onodu
Arts and Sciences, Biological Sciences, Environmental Science
Jordan Clark
Arts and Sciences, Biological Sciences, Biology

Mentor: Hongmei Wang

Abstract: The Scripps Howard Center for Civic Engagement (SHCCE) connects NKU faculty and students with the community, particularly Northern Kentucky's nonprofit organizations (NPOs), through the Mayerson Student Philanthropy Project (MSPP). This project aims to help SHCCE analyze MSPP's impact on NPOs from 1999 to 2024. Using Geographic Information Systems (GIS), we generate maps illustrating the spatial distribution of NPOs funded by MSPP over the past 25 years. These maps highlight the geographic reach of SHCCE's community engagement efforts and provide valuable insights into how classroom learning translates into real-world impact.

Poster Number: 100
Growing up Baboon: Age-related Grooming Partner Preferences among Immature Male Olive Baboons
Ashley Adams
Arts and Sciences, Sociology, Anthropology and Philosophy, Anthropology
Natalia Muñoz
Arts and Sciences, Sociology, Anthropology and Philosophy, Anthropology

Mentor: Monica Wakefield

Abstract: Social grooming in primates is an indicator of strength of social bonds. Adult olive baboons (Papio anubis) display distinct sex differences in grooming partner preferences. We used two years of data on male juvenile and young subadult baboons to examine age related changes in grooming partner preferences. We calculated yearly dyadic grooming indices that included all bouts including a juvenile and subadult, and ran paired analyses to test for changes in each individual across years. We found that as the males aged, they significantly increased grooming on potential future sexual partners, but grooming with kin remained stable.

Poster Number: 101
Digital Archiving Black History
Christin Frederick
Informatics, School of Computing and Analytics, Library Informatics and International Studies

Mentor: Kami McDaniel

Abstract: This research is dedicated to creating a digital archive collection dedicated to preserving and sharing Black history in Northern Kentucky. The project focuses on documenting the experiences, cultural contributions, and historical narratives of Black communities in the region. By digitizing photographs and historical documents, the archive aims to provide a valuable resource for education, research, and community engagement. This presentation highlights the significance of preserving underrepresented histories and demonstrates the potential of digital archives to amplify marginalized voices in historical scholarship.

Poster Number: 102
The Pathology of Extra Skull Bones in Humans
Marissa Vestal
Arts and Sciences, Sociology, Anthropology and Philosophy, Anthropology
Abbie Coker
Arts and Sciences, Sociology, Anthropology and Philosophy, Anthropology
Natalie Brown
Arts and Sciences, Sociology, Anthropology and Philosophy, Anthropology

Mentor: Monica Wakefield

Abstract: Wormian bones are small, irregular bones formed within skull sutures. An excess number could indicate the presence of pathology or cranial abnormalities. Our aim was to test if the presence and number of Wormian bones correlate with cranial vault asymmetry, an indicator of developmental deficits. We noted the location, size, and number of Wormian bones present in 18 human skulls (NAGPRA compliant) and calculated the cranial vault asymmetry index (CVAI). We found no correlation between the number of Wormian bones present and the CVAI ($p > .05$). This study provides new results in the correlation of Wormian bones and asymmetry.

Poster Number: 103
Human Migration in Response to Drought in California
Cecelia Harner
Arts and Sciences, Biological Sciences, Environmental Science
Angelina Benjey
Arts and Sciences, Biological Sciences, Environmental Science
Ashley Denney
Arts and Sciences, Biological Sciences, Biology
Maddie Buroker
Arts and Sciences, Biological Sciences, Biology

Mentor: Hongmei Wang

Abstract: Climate change has affected temperature and precipitation patterns in California causing prolonged drought and forest fires in the state. The goal of this project was to observe a potential correlation between drought affected counties and human migration. Maps created using ArcGIS Pro software illustrated how changes in temperature, precipitation, drought susceptibility and water shortage vulnerability affected the human population by county in 2010 compared to 2020. Although there was no significant relationship between these factors and human migration, the resulting maps show a correlation between the most densely populated and the least drought susceptible areas.

Poster Number: 104
Lifetime Analysis of Estrogen Species
Jason Grothaus
Arts and Sciences, Chemistry, Chemistry
Saige Bradley
Arts and Sciences, Chemistry, Chemistry
Tessa Sangermano
Arts and Sciences, Chemistry, Chemistry

Mentor: Patrick Hare

Abstract: Humans and other animals excrete steroid hormones like estrone. These hormones can then become environmental contaminants. Estrone is regularly found in surface waters with concentrations high enough to have adverse effects on aquatic environments. Estrone reacts with UV light to form the epimer lumiestrone, thus lumiestrone has the potential to have similar adverse effects. Previous research showed that estrone has two fluorescence lifetimes, but a new fluorimeter has suggested it might have three, while lumiestrone only has two, which are different from estrone's. Estrone, lumiestrone, and other estrogen's lifetimes have been measured across their emission bands to understand this difference.

Poster Number: 105
Comparison of Error Types in N-back Test Between Different COMT rs4680 Genotypes
Minerva Shakya
Arts and Sciences, Biological Sciences, Neuroscience

Mentor: Brittany Smith

Abstract: The catechol-O-methyltransferase (COMT) genotype influences dopamine metabolism which helps with executive functions needed for goal-directed behavior. The N-back test is a working memory task that measures executive function via the number of omission and commission errors. This study aims to understand how increased cognitive load with the N-back test may impair executive function in different COMT rs4680 genotypes. We hypothesized that AA genotype participants would make more errors in the 3-back test than in the 1-back test. Results showed higher omission and commission errors in more challenging trials but no significant genotype effects or interactions.

Poster Number: 106
Prenatal Exposure to Fentanyl Affects Social Interactions in BXD Mouse Offspring
Minerva Shakya
Arts and Sciences, Biological Sciences, Neuroscience

Mentor: Brittany Smith

Abstract: Opioids are drugs that relieve pain and produce euphoria. Some examples include morphine, fentanyl, buprenorphine, etc. When humans are exposed prenatally (in utero), this can alter reward processing and increase risky and reward-seeking behavior later in life. Research shows that children born to parents using opioids have a greater risk of later opioid addiction. In mice, prenatal exposure to morphine enhances their social interaction which can be perceived as rewarding. In this study, we tested the hypothesis that prenatal fentanyl increases social behavior in male BXD mouse offspring by observing their social interaction videos with novel male DBA mice.

Poster Number: 107
An AI-Powered Wardrobe Assistant
Manogya Aryal
Informatics, School of Computing and Analytics, Computer Science

Mentor: Junxiu Zhou

Abstract: Struggling to put together the perfect outfit? Let AI do the styling for you! This project aims to build an AI-powered wardrobe assistant with the goal to provide users with personalized outfit recommendations based on their existing clothing collections. In this project, we first train a deep neural network system to recognize and categorize clothing items from user images. Once the clothing items are identified, the system will generate a few fashion suggestions for user to choose from. Thus, our AI-powered system eliminates the hassle of outfit selection, saving you time and effort.

Poster Number: 108
Real-Time Yoga Posture Recognition Using Deep Learning
Saumya Sharma
Honors, School of Computing and Analytics, Computer Science

Mentor: Junxiu Zhou

Abstract: Maintaining proper yoga posture during exercise is essential for health and injury prevention. This project aims to enhance yoga practice by promoting correct posture alignment, making it a valuable tool for fitness and wellness. This project presents a real-time yoga posture recognition system using the you-only-look-once deep learning model. The model is trained on posture key-points extracted from yoga images to recognize various yoga postures. Then, the system integrates with a web application that accesses a camera to provide yoga posture recognition result. As a result, our system can accurately recognize yoga posture and offer real-time feedback to users.

Poster Number: 109
Novel-based DNA Vaccines for Flaviviruses
Cassidy Martin
Arts and Sciences, Biological Sciences, Biology
Karra Hendrickson
Arts and Sciences, Biological Sciences, Biology

Mentor: Joseph Mester

Abstract: Flaviviridae are single-stranded, positive-sense RNA viruses capable of infecting humans, birds, and mammals. Notable flavivirus members include Hepatitis C, Dengue, Zika, and West Nile viruses. This project explores the development and characterization of novel DNA-based vaccines targeting human flaviviruses. These vaccines are designed to express viral structure proteins in human cells, with their efficacy assessed through expression studies and immunogenicity testing in human immune cell cultures. The findings will offer insights into the potential of DNA-based vaccines to induce protective immune responses, contributing to the advancement of next-generation vaccine strategies.

Poster Number: 110
Energy Drink Consumption in NKU Students
Farah Smadi
Arts and Sciences, Biological Sciences, Biology

Mentor: Justin Yates

Abstract: The purpose of this research study is to collect data on energy drink consumption in NKU students. This research will indicate how much energy drinks are consumed and why it is consumed to understand the major rise in energy drinks. The study will also assess how energy drink consumption potentially affects students' physical and/or mental health.

Poster Number: 111
Does rivalry intensity influence fan identification in the NFL and College Football?
Isabelle McCarthy
Business, Marketing, Sports Business and Construction Management, Sports Business and Event Management

Mentor: Joe Cobbs

Abstract: The purpose of this research is to test if the intensity of rivalries in professional and college football are correlated to higher fan identification. I expect the intensity of rivalries to enhance fan identification due to the us-versus-them social mentality made salient in rivalries. Moreover, college football fans are expected to be more highly identified, compared to NFL fans, due to the student/alumni potential connection. ANOVA and correlation analysis of the fan survey data from the Know Rivalry project will address these questions.

Poster Number: 112
Exploring the Power of Temporal Dynamics in Predicting Patient Outcomes
Brandon Brooks-Patton
Arts and Sciences, Biological Sciences, Neuroscience
Chris King
Informatics, School of Computing and Analytics, Computer Information Technology

Mentor: Junxiu Zhou

Abstract: Improving outcomes for patients experiencing cardiac arrest in the out-of-hospital setting requires timely prehospital interventions and early recognition by emergency medical technicians. However, resource limitations in the field and understaffing within emergency services present challenges in the prehospital setting. Scientific literature suggests a time- dependent effect on patient survival. Our work examines features within the NEMSIS database to identify predictors of favorable outcomes downstream of cardiac etiologies. It aims to enhance the accuracy of these predictions by evaluating different techniques and machine learning models. Our results could contribute to better understanding of underlying pathologies and potentially save lives.

Poster Number: 113
Effect of Maternal Helminths on Microglia Development in Offspring
Madeline Buroker
Arts and Sciences, Biological Sciences, Biology

Mentor: Lauren Williamson

Abstract: Early-life inflammation has a profound impact on microglia, brain immune cells. We examined the effects of maternal helminths, the rat tapeworm, on offspring brain development. Previous work showed that maternal helminths reduced infant hippocampal inflammation. We focused on microglia development. Mother rats received tapeworms or saline and pups received PBS or E. coli. We collected brains on days 1, 4, 5, 7, and 30. Brains were stained for Iba1 antibody for microglia. We exhaustively counted hippocampal microglia and categorized them into morphologies according to development: amoeboid/round, stout, thick long, and thin long processes.

Poster Number: 114
Team Spirit: A Quantitative Analysis of English Premier League Fan Discourse
Ben DeCuir
FYRE Student, Informatics, School of Computing and Analytics, Computer Science

Mentor: Alina Campan

Abstract: This study leverages data from Twitter (now X) to analyze the fan base discourse around EPL (English Premier League) matches. Using tweets collected from August to October 2022, we developed a systematic methodology to discover which team has the greatest number of active fans. This can support further analysis of how match results influence consumers' tweet activity, the degree to which marketing influences fan activity, with implications for sports analytics and fan engagement strategies.

Poster Number: 115
Maternal Helminth Treatment in Rats Alters Microglia Gene Expression: A Nextgen RNA Sequence Approach
Ben Coburn
Informatics, School of Computing and Analytics, Computer Science

Mentor: Lauren Williamson

Abstract: Inflammation-related disorders have been on the rise. Previous studies have shown that therapy with Hymenolepsis diminuta (rat tapeworm) in both mother and weanling Sprague-Dawley rats can prevent memory deficits and the associated neuroinflammation caused by a neonatal Escherichia coli infection. However, the effects of maternal helminth colonization alone are unknown. Previously, RNA Sequencing on hippocampal cells was used to sequence and identify differences in genes altered or regulated by maternal helminth inoculation and neonatal E. coli infection within 24 hours of infection on postnatal day (P)5. However, all gene expression from the previous work had high expression variation between individuals. For our current work, we will assess the genes altered by maternal helminth treatment and neonatal E. coli in the microglial cell population of the hippocampus rather than whole hippocampus. Our goal is to determine whether maternal helminth colonization alters pup microglia development and gene expression.

Poster Number: 116
The Portrayal of the Menendez Brothers
Emily Sisk
Informatics, School of Communication and Media, Journalism

Mentor: Stacie Jankowski

Abstract: The media often takes criminal activity and court cases and sensationalizes them with little regard for the facts. A prime example of this is the murder case of Lyle and Erik Menendez. In this project, we researched and analyzed Netflix's 2024 documentary and fictional series about the Menendez brothers to see how the two framed their innocence, looking for key differences between the two. I found that the series was more reckless and fact-based in its portrayal, which can be dangerous when younger generations base their knowledge of the case on such media depictions.

Poster Number: 117
The Northerner Year in Review: 2024-25
Emily Sisk
Informatics, School of Communication and Media, Journalism

Mentor: Annie Hammock

Abstract: Multimedia content dominated The Northerner this year, as we dove into the possibilities of sharing stories through interactive video, audio, web design, social media, photography and more. We produced a 30-minute documentary on the history of Newport's Sin City years, published news packages on the return of fine arts to the Corbett Theatre and started a weekly podcast for a reporter's view on current NKU events. In November 2024, we provided live story updates of the 2024 election. We reached our 1,000th post on Instagram and produced informative, engaging and sometimes comical content for our social media audiences.

Poster Number: 118
Refining Orbital Period Recovery: The Role of Periods, Semi-Amplitudes, and Epoch Count
Katelyn Judd
Arts and Sciences, Physics, Geology and Engineering Technology, Physics

Mentor: Nathan De Lee

Abstract: The Milky Way Mapper (MWM) survey uses the high-resolution APOGEE spectrograph to achieve radial velocity measurements with a precision of 30 m/s, enabling the detection and characterization of stellar companions and planetary systems. A key aspect of this is the analysis of Keplerian orbits, which are described by six orbital parameters, is the orbital period. The second most important orbital parameter is the semi-amplitude. In this study, we generate synthetic radial velocity curves based on known orbital parameters, allowing us to control for specific characteristics of the system. We then apply The Joker, a Monte Carlo-based orbit- fitting tool, to fit these parameters and evaluate how well the orbital period is recovered. Our focus is on assessing the impact of the number of radial velocity epochs on the accuracy of the orbital period recovery. By varying the number of observational epochs, orbital period, and orbital semi-amplitude, we aim to better understand the limitations and requirements for precise orbital period determination, which will inform future observations and analysis strategies for the MWM survey.

Poster Number: 119
Possible Effects of a Safer Alternative Opioid Treatment on the Prefrontal Cortex Responsible for Executive Function
Bolaji Akindiose
Arts and Sciences, Biological Sciences, Biology

Mentor: Brittany Smith

Abstract: Mice were prenatally exposed to three opioid treatment options: buprenorphine (BUP, a safer opioid alternative), morphine (MO), and control (CON, unexposed). Exposure was one week before pregnancy, during pregnancy, and lactation. Previous studies showed that BUP improves gestational and neonatal outcomes relative to MO. However, pediatric research suggests that prenatal BUP could have adverse neurodevelopmental and behavioral effects on offspring. This study aims to determine whether BUP changes the adolescent offspring brain in the late adolescent period. Immunohistochemistry labeled cFos, a marker of cell activation, and Parvalbumin (PV), a marker of inhibitory neurons, in the prefrontal cortex. Balance between neuron activation and inhibition is important for executive function.

Poster Number: 120
Stock Price Prediction Using RNN and Sentiment Analysis
Gaurab Upreti
Informatics, School of Computing and Analytics, Computer Science
Niraj Pandey
Informatics, School of Computing and Analytics, Computer Science

Mentor: Junxiu Zhou

Abstract: Stock price prediction is challenging due to its volatile and non-linear nature. In recent years, deep learning models have demonstrated success in forecasting complex patterns. In this paper, we used RNN models - LSTM, GRU, and SimpleRNN - to analyze stock price trends over an 11-year period and predict the stock price of Meta. For sentiment analysis, we scraped the NASDAQ news articles to get the META news and analyzed them using SVM model and TF-IDF feature extraction. At last, we evaluate the performance of our predictive model by integrating sentiment insights with historical price patterns.

Poster Number: 121
Exploring Neuronal Activity and Perineuronal Nets in Prenatal Opioid-Exposed Offspring
Boluwatife Osifalujo
Arts and Sciences, Psychological Science, Neuroscience

Mentor: Brittany Smith

Abstract: Approximately 7% of babies are exposed to opioids during the prenatal period, and this may impact brain development. Opioid exposure may alter perineuronal nets (PNNs), supported by our previous observation of increased PNNs in the amygdala of female opioid exposed offspring. This study aims to assess PNNs and neuron activity in adolescent opioid- exposed offspring, expecting changes in number of PNNs and a decline in neural activity levels. Throughout pregnancy and lactation, female mice were given either morphine, buprenorphine, or saline unexposed. We labeled cFos to evaluate neural activity in the offspring amygdala alongside markers for PNNs and parvalbumin neurons (PV). There were no differences in cFos, PNNs, or PV in male or female offspring.

Poster Number: 122
Arthropod Diversity Across Microhabitats of Northern Kentucky University's Research Education and Field Station
William Grube
Arts and Sciences, Biological Sciences, Biology
Josie Timmers
Arts and Sciences, Biological Sciences, Biology

Mentor: Allison Parker

Abstract: The goal of the study is to measure the diversity of arthropod orders in neighboring microhabitats. Specimens were collected from a forest, wetland, and disturbed habitat transect at NKU's Research Education and Field Station. Collection took place over 12 weeks from June to August 2024. Arthropods were identified to order and used to measure diversity correlations between microhabitats. Two thousand five hundred and fifty-five arthropods were collected from 13 orders. There was no significant difference for the total number of arthropods collected from the three microhabitats. This information can help landowners utilize microhabitats to help stabilize arthropod diversity.

Poster Number: 123
The Peopling of the Americas
Natalia Munoz
Arts and Sciences, Sociology, Anthropology and Philosophy, Anthropology

Mentor: Sharyn Jones

Abstract: The peopling of the Americas is one of the most fascinating and debated topics in anthropology. This project explores the migration of Homo sapiens into North and South America, challenging outdated models like the Clovis-first hypothesis and examining newer theories such as the Coastal Route and Ice-Free Corridor. By integrating archaeological evidence, genetic data, and Indigenous perspectives, this work highlights the resilience and achievements of Native American ancestors while debunking pseudo-archaeological myths like Atlantis and ancient aliens. Through a video series, the goal of this project is to make this complex topic accessible and engaging for a modern audience, particularly Gen Z and millennials, who are often exposed to misinformation on social media. The project emphasizes the importance of interdisciplinary research, ethical collaboration with Indigenous communities, and public education to combat the rise of pseudoscience and celebrate the rich history of the Americas.

Poster Number: 124
3D Printed Implants
Cassandra Tenney
Health and Human Services, School of Allied Health, Radiologic Science

Mentor: Jason Applegate

Abstract: Hip replacement surgery is one of the most performed orthopedic surgeries in the United States with over 350,000 occurring every year. There is a wide variety of materials that can be utilized for hip replacement surgery, including metals, ceramics, and polyethylene. This project aims to introduce new material and techniques for creating hip prosthetics, 3D printing. The world of technology is advancing at a rapid pace that the medical field cannot match. It can take years for the medical field to catch up with the times. This project aims to introduce 3D printed prosthetics into the operating room to make hip replacements more accessible to the general public. Having these materials would help reduce the time from injury to repair and be customizable for each patient.

Poster Number: 125
Predicting the daily temperature in December with Machine Learning
Ricky Carrier
Informatics, School of Computing and Analytics, Information Technology
Kadin Barnes
Informatics, School of Computing and Analytics, Computer Science
Chase Sweeney
Informatics, School of Computing and Analytics, Computer Science
Matthew Spitzley
Informatics, School of Computing and Analytics, Computer Science

Mentor: Junxiu Zhou

Abstract: In winter, weather can be unpredictable and dangerous. Conditions can shift each day depending on the temperature, so it is important to know what the temperature will be on a given day. We aim to solve this problem using machine learning, training a model to use past data to predict the temperature on a given day. We went about this by training our model on data from December 2024, which contains the high, low, and average temperature for every single day across all 50 states. With this model, we can accurately predict the temperature on a given day.

Poster Number: 126
Tick Species Distribution and Seasonality in the Northern Kentucky Region
Benjamin Richards
FYRE Student, Arts and Sciences, Sociology, Anthropology and Philosophy, Anthropology
Abilene Morgan
Arts and Sciences, Biological Sciences, Biological Sciences
Will Grube
Arts and Sciences, Biological Sciences, Biological Sciences
Trey Zinsmeister
Arts and Sciences, Biological Sciences, Biological Sciences

Mentor: Allison Parker

Abstract: This study aims to examine tick distribution and seasonality in the Northern Kentucky region. Since June 2022, ticks were sampled by dragging a drag cloth over a 500-meter transect. So far, 425 ticks from four species have been collected: 248 American dog ticks, 173 black-legged ticks, 3 Lone-star ticks, and 1 Gulf Coast tick. Ongoing sampling enables surveillance of new species, including the Gulf Coast tick. Understanding tick distribution and seasonality supports effective control strategies to prevent and reduce tick populations and tick-borne illnesses in the region.

Poster Number: 127
Pharmacy's Role in an Intensive Care Unit Expansion Project
Maddie Hubbart
Arts and Sciences, Biological Sciences, Biology

Mentor: Betty Russell

Abstract: In 2024, St. Elizabeth Hospital in Edgewood, KY, expanded its Surgical Intensive Care Unit (SICU) from 16 to 20 beds, necessitating inventory adjustments in the existing Pyxis automated dispensing system and the addition of a second unit. My project optimized medication stock, adjusted period automatic replenishment (PAR) levels, and replicated stock in the new Pyxis. A nationwide fluid shortage required further adjustments, temporarily adding antibiotics. Despite setbacks, the hospital's PAR recommendation program saw significant improvement, reducing recommendations from over 300 to 49 in five months, most of which were not feasible due to hospital policy.

Poster Number: 128
Newport's Glamor, Danger and Corruption as the Original "Sin City"
Emily Sisk
Informatics, School of Communication and Media, Journalism

Mentor: Annie Hammock

Abstract: Today, Newport, Ky is home to 13,000 people and boasts family-friendly entertainment. In the past, however, Newport was known as the Sin City of the South. From Prohibition to the mob, gambling, the Kennedys, the Beverly Hills Supper Club and much more, this project is a complete look at Newport's over-glamorized past. Through weeks of dedicated research, archive retrieval and sit-down interviews, The Northerner published this 30-minute
documentary and long-form magazine feature. My research presentation will look in depth on the reporting process and discuss our findings.

Poster Number: 129
Diversity and Output in Finance: How Varied Teams Boost Performance
Princess Nworah
Business, Accounting, Economics and Finance, Economics

Mentor: Linda Dynan

Abstract: In today's fast-paced finance industry, the power of a diverse workforce is emerging as a key driver of innovation and success. This study assesses the literature that explores how blending different backgrounds, skills, and perspectives can enhance the productivity of traditional financial organizations. My research reviews and organizes the literature that examines whether finance companies that nurture an environment where varied voices are heard, enhances overall decision-making and operational efficiency. This literature review sets the stage for empirical analysis of diversity within the finance industry

Poster Number: 130
Synthesis of a Novel Enediyne Amino Acid and Amino Acid Dehydrobenzoannulene
Joshua Shockey
Arts and Sciences, Chemistry, Chemsitry
Kian Daly
Arts and Sciences, Chemistry, Chemistry
Kryton Johnson
Arts and Sciences, Chemistry, Chemistry
Dane Larson
Arts and Sciences, Chemistry, Chemistry
Ethan Schneider
Arts and Sciences, Chemistry, Chemistry
Tyler Warner
Arts and Sciences, Chemistry, Chemistry

Mentor: KC Russell & Sam Thompson

Abstract: Annulenes are highly conjugated cyclic molecules whose applications include their use as precursors to polymers and semiconductors. Dehydrobenzoannueles (DBAs) are annulenes that also incorporate arenes into their framework. Common precursors in the synthesis of DBAs are arenediynes. Arenediyes have potential medicinal application through Bergman Cyclization as the enediyne functional group is found in a number of naturally occurring anticancer antibiotics. The purpose of this work is to prepare a novel amino acid possessing an arenediyne, L-3,4-diethynylphenylalanine, to incorporate the amino acid into aromatic and antiaromatic DBAs, and ultimately prepare DBA peptides. This poster will present the preparation of L-3,4-diethynylphenylalanine as a single enantiomer in five steps from commercially available L-DOPA. This poster will also discuss our progress in converting the amino acid into a DBA.

Poster Number: 131
Screening Crystallization Conditions for Chorismate Synthase from Neurospora crassa
Jamie Richey
Arts and Sciences, Biological Sciences, CMG
Julia Hageman
Arts and Sciences, Chemistry, Biochemistry
Anh Nguyen
Arts and Sciences, Biological Sciences, Environmental Science
Anthony Bloomer
Arts and Sciences, Chemistry, Forensics

Mentor: Catherine Shelton

Abstract: Chorismate synthase is the seventh enzyme in the shikimate pathway. It is the final step in the synthesis of the secondary metabolite chorismate, which is a required precursor for aromatic amino acids and electron carriers. Chorismate synthase from the bread mold Neurospora crassa is also able to act as an NADP+ reductase, and is therefore termed a bifunctional enzyme. To understand more about how this enzyme performs its dual functions, we are conducting crystallization screens to determine conditions to obtain single crystals for protein X-ray crystallography. Thermal shift assays are being conducted to inform crystallization conditions. Increased stability of the protein, evidenced by a higher melting temperature, indicates conditions that should result in improved crystallization.

Poster Number: 132
Adapting Protein Expression Conditions for Biochemical Research
Anthony Bloomer
Arts and Sciences, Chemistry, Forensics
Guinn Harler
Arts and Sciences, Chemistry, Biochemistry
Jessica Forebeck
Arts and Sciences, Chemistry, Biochemistry
Cate Reis
Arts and Sciences, Chemistry, Biochemistry

Mentor: Catherine Shelton

Abstract: Recombinant protein expression is a fundamental technique in protein biochemistry. Before conducting in vitro experimentation for biochemical studies, sufficient quantities of protein must be obtained. The expression of three different proteins is described, each using a non-pathogenic strain of Escherichia coli as the expression host. MenF is an isomerase enzyme that functions in the synthesis of the electron carrier, meniquinone. Chorismate synthase is the seventh enzyme in the shikimate pathway. Pyruvate carboxylase is an enzyme from gluconeogenesis that requires special adaptations in protein expression to account for the assimilation of the required cofactor, biotin.

Poster Number: 133
Next-Generation EMG-Controlled 3D-Printed Bionic Arm for Enhanced Mobility
Vu Tran
Arts and Sciences, Physics, Geology and Engineering Technology, Mechatronics Engineering Technology
Tyler Kobida
Arts and Sciences, Physics, Geology and Engineering Technology, Mechatronics Engineering Technology
Linnea Gault
FYRE Student, Arts and Sciences, Physics, Geology and Engineering Technology, Mechanical and Manufacturing Engineering Technology

Mentor: Mahdi Yazdanpour

Abstract: The Amputee Coalition estimates 2 million amputees in the U.S., with 56% of upper- limb amputees using prosthetics. The bionic arms available on the market are very expensive and inaccessible to many people. This multidisciplinary project, combining biomechatronics, robotics, and neurophysiology, focuses on developing an advanced 3D-printed bionic arm controlled by electromyography (EMG) signals and enhanced by cutting-edge Human-Robot Interaction (HRI) techniques. By employing advanced machine learning methods, our primary goal is to create an affordable, non-invasive, versatile, and responsive artificial prosthetic limb that seamlessly integrates with the user's muscle signals, which enables natural and intuitive movements.

Poster Number: 134
Synthesis and Purification of a pair of L-DOPA Oxacalixarene Diastereomers
Tyler Warner
Arts and Sciences, Chemistry, Chemistry and Jazz Studies - Saxophone
Joshua Shockey
Arts and Sciences, Chemistry, Chemistry
Kian Daly
Arts and Sciences, Chemistry, Chemistry
Kryton Johnson
Arts and Sciences, Chemistry, Chemistry
Dane Larson
Arts and Sciences, Chemistry, Chemistry
Ethan Schneider
Arts and Sciences, Chemistry, Chemistry and Biochemistry

Mentor: KC Russell & Samuel Thompson

Abstract: Oxacalixarenes are a niche subclass of calixarenes which replace the methylene bridges of calixarenes with oxygen atoms. While much work has been done with calixarenes, oxacalixarenes present a new opportunity to explore novel amino acids. As suggested by their 'calix' prefix, which is Latin for chalice, calixarenes fold to form a cup-like shape capable of holding ions or small molecules. The cyclic nature of the oxicalixarene creates a helical chirality where a substituent can be attached in either a clockwise or counterclockwise orientation. If the substituent has a single chiral chirality then a pair of diastereomers are produced. Diastereomers are expected to have different physical properties and thus should be separable. This poster will present the successful synthesis of diastereomeric oxacalixarenes in two steps starting from the neurotransmitter, L-DOPA. Efforts to separate the diastereomers by high performance liquid chromatography (HPLC) and crystallization will also be presented along with the characterization of the mixture and any purified compounds by proton NMR spectroscopy.

Poster Number: 135
A Security-Oriented Awareness and Training Framework using Dynamic and Adaptive Behavior Learning Models
Isha Nepa
Informatics, School of Computing and Analytics, Computer Science
Preshika Basnet
Informatics, School of Computing and Analytics, Computer Information Technology

Mentor: Rasib Khan

Abstract: The growing cybersecurity challenges across industries often arise from human behavior, such as lack of cyber awareness or naivety. To address this, we propose a unified model that adapts User and Entity Behavior Analytics (UEBA) to collect and analyze behavioral patterns, user interactions and classify their security behavior. A continuous feedback loop helps update user behavior employing methods like gamification, documentation, and training courses. Machine learning and pattern recognition, powered by Large Language Models (LLMs), form the framework, enabling dynamic adaptation to user. This dynamic model aims to mitigate human vulnerabilities, providing a holistic solution to strengthen organizational information security.

Poster Number: 136
NKU Stellar Spectroscopy: From Raw Images to One Dimensional Spectra
Joe Ghoulame
Arts and Sciences, Physics, Geology and Engineering Technology, Physics
Davy Lively
Arts and Sciences, Physics, Geology and Engineering Technology, Engineering Physics

Mentor: Nathan De Lee

Abstract: This study examines the reduction of stellar spectra using the Demetra software, with data obtained from the ALPY600 spectrograph, a compact, low-resolution system, tailored for visible wavelengths. Our aim is to refine raw spectroscopic data into a scientifically useable one-dimensional format, enabling the analysis of absorption lines. These absorptions lines can be used to determine astrophysical parameters such as effective temperature and elemental abundances. Demetra, a specialized software suite from Shelyak Instruments, streamlines this process by applying bias and dark frame subtraction, flat-field normalization, wavelength calibration via argon-neon emission lines, and aperture extraction to suppress systematic noise and optimize signal-to-noise ratios. The resulting stellar absorption features like the Ha and Hß Balmer transitions, as well as the Calcium II H and K, will allow quantitative evaluation of photospheric composition and kinematics.

Poster Number: 137
Climate Change Classification Using Machine Learning
Prakriti Ojha
Informatics, School of Computing and Analytics, Computer Information Technology, Cybersecurity Focus
Prajita Tandukar
Informatics, School of Computing and Analytics, Computer Information Technology
Sudikshya Rajbanshi
Informatics, School of Computing and Analytics, Computer Information Technology

Mentor: Junxiu Zhou

Abstract: With rising temperatures and shifting weather patterns impacting the ecosystem, climate change is becoming a major global problem. This project analyzes climate data and forecasts future trends using machine learning. We examine temperature variations across several locations using the FAOSTAT Temperature Change dataset (1961–2023). Our methodology entails data collecting, cleansing, and analysis to guarantee accurate forecasts. To find patterns, we begin with decision trees and linear regression. Later, we will use more sophisticated models like random forests, SVM, LSTMs, and ARIMA to improve forecasting. Our preliminary study demonstrates a direct correlation between rising temperatures and CO2 levels. Through better forecasting and an understanding of climate change patterns, this study will enhance environmental consciousness and decision-making.

Poster Number: 138
An AI-Driven Gym Buddy that Can Recognize Postures
Aaditya Khana
Informatics, School of Computing and Analytics, Data Science
Priyanka Pandit
Informatics, School of Computing and Analytics, Computer Science

Mentor: Junxiu Zhou

Abstract: Advanced computer vision systems provide promises framework for sophisticated gym posture recognition. This work aims to leverage this framework to facilitate real-time, exercise-specific feedback delivery. The proposed gym posture recognition system operates with dynamic adaptation to individual parameters, enabling personalized exercise feedback in real time. We train a posture classification model for complex multi-joint movements and deployed the trained model for a real-time application. Experimental results demonstrate the effectiveness of the model on classification accuracy and real-time feedback. This work can be served as a preliminary work to both theoretical classification methodologies and practical implementations with real-time fitness monitoring systems.

Poster Number: 139
Removing the Limitations of LLMs and RL Agents Using Infinite Memory Architectures
Sajan Poudel
Informatics, School of Computing and Analytics, Computer Science
Aryan Kafle
Informatics, School of Computing and Analytics, Computer Science
Niraj Pandey,
Informatics, School of Computing and Analytics, Computer Science
Jaljala Shrestha Lama,
Informatics, School of Computing and Analytics, Computer Science

Mentor: Junxiu Zhou

Abstract: Recent advances in AI have enhanced Large Language Models (LLMs) and Reinforcement Learning (RL) agents, boosting machine understanding and interaction. Yet, fixed "memory windows" constrain their capabilities. This work introduces Infinite Memory Architectures (IMA) to overcome this barrier. Inspired by human brain memory systems, IMA integrates deep learning, RL, and advanced text compression, achieving ~70% storage reduction while preserving meaning. By dynamically curating and scaling contextual knowledge, IMA enables machines to learn, adapt, and operate without limits, unlocking potential for applications like lifelong learning agents and real-time analysis of vast datasets.

Poster Number: 140
Labor Shortages in the Trucking and Logistics Industry Post-COVID-19: Challenges and Solution
Sneka Murugadass
Business, Management, Global Supply Chain Management

Mentor: Linda Dynan

Abstract: The COVID-19 pandemic had profound effects on global supply chains, exacerbating labor shortages in the trucking and logistics industry. These workforce deficits contributed to rising transportation costs, inefficiencies, and disruptions in supply chain performance. This paper explores the primary causes of labor shortages, including demographic shifts, regulatory challenges, and work-life balance concerns. It also examines the economic impact of these shortages, such as freight cost inflation and increased reliance on third-party logistics providers. Potential solutions discussed include policy reforms, technological advancements, and improved employment strategies. Addressing these challenges is essential for building a more resilient and adaptive logistics sector in the post-pandemic economy.

VIRTUAL PRESENTATIONS
(APRIL 23 – 24, 8 A.M. – 5 P.M.)
www.nku.edu/celebration

The Storytime Toolkit: Practical Tips for New Librarians
Emily Combs
Informatics, School of Communication and Media, Library Science

Mentor: Hailley Fargo

Abstract: A key part of library programming, story time helps young readers develop a love of reading and early literacy skills. However, organizing story time can be intimidating for new librarians without experience. This virtual presentation shares research-backed strategies, including selecting age-appropriate books, using expressive reading, and incorporating music and movement. It also explores methods for creating a welcoming, engaging atmosphere. Featuring insights from experienced story time librarians, the session provides practical tips and real-world examples. By applying these techniques, librarians can confidently lead interactive story time sessions that captivate young audiences and inspire a lifelong love of reading.

How has the TV show "19 Kids and Counting" framed the Duggar's perfect lives to promote their religion?
Jillian Kohls
Informatics, School of Communication and Media, Journalism

Mentor: Stacie Jankowski

Abstract: An audience might not get the full truth about a TV show family, group, etc. "19 Kids and Counting" was a TV show on TLC that presented a "perfect" couple with 19 children, and made their way of life seem simplistic and easy. Recently news has come out that the family is heavily based on the devout independent Baptists religion and was preaching their beliefs purposefully through the TV show. While watching every other season premier of "19 Kids and Counting" the family mentioned their religious practices 33 times without directly saying they were sharing religious practices.

Artificial Intelligence Powered Human Detection System Students:
David Pope
Informatics, School of Computing and Analytics, Computer Science
Arin Waichuli
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Informatics, School of Computing and Analytics, Computer Information Technology
Matthew Hornbach
Informatics, School of Computing and Analytics, Computer Information Technology

Mentor: Junxiu Zhou

Abstract: Security systems often struggle with power efficiency and accurate human detection. This project presents an AI-powered human detection system that uses a low-power security camera and machine learning algorithms to identify human presence. Upon detection, the system sends notifications via email or text. The objective is to enhance security while minimizing power consumption as well as reducing false positives (misidentifying animals as humans) and false negatives (failing to detect humans entirely). By integrating machine learning into everyday security applications, this project demonstrates its capabilities for improving real- time monitoring and accuracy in detection systems.

COLLEGE MOVIE FESTIVAL

Students:
Dakota Summer, Camilo Idrobo, Julez Swartz, Ella Rinehard, John Hensey, Brennan Bien, Yousef Naji, Nevan Wilmhoff, Liam Pergrem, Sierra Conner, Ethan Harris, Chloe Rachal, Tristan Pianovski, Hayden Hauke, Anthony Gentry, Ace Morgan, Austin Jameison, Blake Viox, Alexandro Santana Cruz, Fiona Moody, Nicole Fahey, Justin Accosta, Josey Phipps, Payton Simonson, Gianna Muro, Kaytlen Porter, Aidan Carmen, William Clayton, Emma Kollstedt, Aidan Young, Kaitlyn Beckwell, Tlyer Chambers, Kyle Maki, Eh'Zariah Gibson-Knighten, Ty Harwell, Lamberto Lukas Vargas, Mason Guy, Maxine Mason, Derek Dunn-Melvin, Leo Harmon, Aidan Steele
Informatics, School of Communication and Media, School of the Arts , Electronic Media and Broadcasting , College of Arts and Sciences, Theatre and Dance

Mentor: Chris Strobel & Corrie Danieley

Abstract: Each year students from the Electronic Media and Broadcasting and Acting programs make short movies as part of the College Movie Festival. The CMF features movies made by six area universities and culminates with a screening at a local movie theater and awards selected by professional moviemakers.

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