



# CELEBRATION

**OF STUDENT RESEARCH  
AND CREATIVITY**

**SPRING 2026**

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# LETTER FROM THE PRESIDENT



## To Our Celebration 2026 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 24th 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. Their success is our purpose, 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. It really shows how truly special our students are and it exemplifies the strength of our roots and reach in this region because 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,

A handwritten signature in black ink that reads "Cady Short-Thompson". The signature is written in a cursive, flowing style.

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

# LETTER FROM THE PROVOST



**Dear Celebration Participants,**

Welcome to the Northern Kentucky University 2026 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,

A handwritten signature in black ink that reads "Diana McGill". The signature is written in a cursive, flowing style.

Diana McGill  
Provost and Executive Vice President for Academic Affairs

# SCHEDULE OF EVENTS

## THURSDAY, APRIL 23

9 a.m.–5 p.m.

### Virtual Presentations

[nku.edu/celebration](http://nku.edu/celebration)

9–10 a.m.

### Oral Presentations

- Session 1 (Student Union 109)
- Session 1B (Student Union 108)

10–11 a.m.

### Oral Presentations

Session 2 (Student Union 109)

11 a.m.–noon

### Oral Presentations

- Session 3 (Student Union 109)
- Session 3B (Student Union 108)

12:30–2:30 p.m.

### Poster Presentations

Student Union Ballroom

Noon–1 p.m.

### Oral Presentations

Session 4 (Student Union 109)

1:40–2 p.m.

### College Movie Festival

Griffin Hall Digitarium

2–3 p.m.

### Oral Presentations

- Session 5 (Student Union 109)
- Session 5B (Student Union 108)

3–4 p.m.

### Oral and Creative Presentations

Session 6 (Student Union 109)

4–5 p.m.

### Oral Presentations

Session 7 (Student Union 109)

## FRIDAY, APRIL 24

9 a.m.–5 p.m.

### Virtual Presentations

[nku.edu/celebration](http://nku.edu/celebration)

## CREATIVE PERFORMANCES FROM NKU'S SCHOOL OF THE ARTS

(see [nku.edu/sota](http://nku.edu/sota) for tickets and details)

Tuesday, April 21

### Philharmonic Orchestra

7–8 p.m.

Thursday, April 23

### NKU Wind Symphony in Concert

7–8 p.m.

Friday, April 24

### Woodwind Area Recital

7–8 p.m.

Saturday, April 25

### NKU Prep Private Lesson Recitals

11 a.m.–2 p.m.

### NKU Youth Choir Concert

3–4 p.m.

Sunday, April 26

### NKU Youth Orchestra Youth Spring Concert

2–4 p.m.

### NKU String Project

4:30–6:30 p.m.

Monday, April 27

### Steel Band Ensemble

7–9 p.m.

Tuesday April 28

### Jazz Ensemble

7–8 p.m.

Thursday, April 30

### Spring Choral Concert

7–8 p.m.

May 1–3

### Dance '26: SHIFT

[nku.edu/tickets](http://nku.edu/tickets)

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**ORAL PRESENTATIONS SESSION 1  
(9–10 a.m., Student Union 109)**

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**Half the Population, Half the Potential**

Emma Rademacher

*Business; Accounting, Economics and Finance; Economics*

Mentor: Linda Dynan

Abstract: This study examines the effect of female labor force participation on economic growth. Females make up about half of the working-age population, yet their labor force participation rate varies significantly due to cultural, social, and structural barriers. Economic theory hypothesizes that a rise in labor force participation can cause a rise in economic growth. Using cross-country data, this student investigates whether increased rates of female labor force participation are correlated with economic growth. Using a regression analysis model, this study contributes to understanding how reducing the gender gap by increasing female labor force participation will affect economic growth.

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**The Economic Cost of Corruption:  
Growth and Inequality Across Countries**

Aidan Staley

*Business; Accounting, Economics and Finance; Economics*

Mentor: Linda Dynan

Abstract: Corruption is often linked to weak economic performance and unequal income distribution, but how strong are these relationships across countries? This study examines whether higher levels of corruption are associated with slower economic growth and greater income inequality. Using international data from Transparency International, the IMF, the World Bank, and the World Inequality Database, I estimate two regression models. One focused on growth and one on inequality. The project is currently in progress. The results will help clarify whether reducing corruption could promote stronger economic performance and more equitable income distribution worldwide.

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**Transportation Infrastructure Investment Effects  
on Unemployment Rates in OECD Countries**

Maddux Hoffman

*Business; Accounting, Economics and Finance; Economic*

Mentor: Linda Dynan

Abstract: Governments use transport infrastructure investment spending during economic downturns in hopes of supporting employment. This study examines how transportation infrastructure investment is associated with the unemployment rate in the 38 Organization for Economic Cooperation and Development (OECD) countries between 2020 and 2023. Specifically, it uses this balanced panel data to test the hypothesis that increased transport infrastructure investment leads to lower unemployment rates over time across the OECD countries. It uses a fixed effects to control for within country variation and a time trend to control for time-related events affecting all countries. The results may help policymakers move closer to full employment.

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**Effects of Trade in Professional and Business  
Services on U.S. Labor Force Participation**

Ayan Ahmar

*Accounting; Economics and Finance; Economics*

Mentor: Linda Dynan

Abstract: Recent research suggests that trade in professional and business services may influence labor market outcomes by altering the demand for skilled labor and the allocation of employment. Previous studies have focused largely on manufacturing, leaving the effects of services trade—particularly in high-skill sectors such as financial, legal, and consulting services—less explored. This study examines whether increased exports of U.S. financial services decrease employment and labor force participation in financial services. Using data on financial service exports, labor force participation rates, and real GDP, I estimate a multiple linear regression model while controlling for macroeconomic conditions.

**ORAL PRESENTATIONS SESSION 1B  
(9–10 a.m., Student Union 108)**

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**The Influence of Urban Fashion on Youth Culture**

Chyanne Rice

*Honors; Marketing, Sports Business and  
Construction Management; Entrepreneurship*

Mentor: Jeffrey Varrone

Abstract: Urban fashion shapes today's youth culture and identity. It is more than clothing or a statement piece; it reflects history, resilience, and the cultural challenges many Black communities have faced. From hip-hop to fast fashion, its influence is often overlooked. My research brings attention to these narratives and highlights the importance of emerging Black-owned businesses in shaping trends and driving innovation. It also explores how younger generations serve as the backbone of today's fashion movements. By combining cultural analysis with entrepreneurship, this project informs the development of my clothing brand, Chy Wear.

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**Long-term variability behavior of the Narrow-Line  
Seyfert 1 galaxy Fairall**

Marc-Ayméric Bogolo

*Arts and Sciences; Physics, Geology and Engineering  
Technology; Physics*

Mentor: Dirk Grupe

Abstract: I will present the long-term X-ray and UV monitoring of the Narrow-Line Seyfert 1 galaxy Fairall 303 with the NASA Neil Gehrels Swift mission. Swift observed Fairall 303 more than 40 times between October 2008 and January 2024. This dense light-curve allows for a variability analysis which for example enables us to see how the variability changes at different energies which are emitted from different parts of the accretion disk. I will also discuss color changes and how they are related to the changes in the luminosity of this Active Galactic Nucleus.

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**A Fault-Tolerant Hand Gesture Recognition System  
for Home Automation**

Elaina Hall

*Informatics; School of Computing and Analytics;  
Computer Science*

Mentor: Junxiu Zhou

Abstract: With the increasing use of smart home automation systems, there is a need to make these systems more accessible to those who have a disability preventing them from controlling these systems by speech. One novel solution to modify these systems is to use computer vision with machine learning in order to detect hand signals from the user to control a home automation system without using speech. In this project, we used an image-based machine learning model with a hand detection task to recognize hand signs for home automation system control.

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**ORAL PRESENTATIONS SESSION 2**  
**(10–11 a.m., Student Union 109)**

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**Infrastructure Development And Macroeconomic Stability: Evidence From Cross-Country Performance**

Princess Nworah

*Business; Accounting, Economics and Finance; Economics*

Mentor: Linda Dynan

Abstract: Infrastructure development is widely viewed as a foundation of economic growth and resilience. While governments often increase infrastructure spending during downturns to stimulate demand, less attention has been given to whether existing infrastructure capacity helps economies better withstand negative shocks. This paper examines the relationship between infrastructure development and macroeconomic stability across countries, focusing on recession periods. Using a cross-country panel framework, the study evaluates whether countries with stronger infrastructure experience smaller declines in GDP growth and more stable labor market outcomes during downturns, contributing to discussions about infrastructure as both a growth driver and potential shock absorber.

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**The Impact of Net Immigration on Youth Unemployment in OECD Countries**

Danish Khan

*Business; Accounting, Economics and Finance; Economics*

Mentor: Linda Dynan

Abstract: This study examines the impact of net immigration on youth unemployment (ages 15–24) across 38 OECD countries from 1990 to 2024. It hypothesizes that net immigration reduces entry-level opportunities, leading to higher youth unemployment. While immigration supports aging economies, young workers may face heightened competition in entry-level markets. Utilizing a panel data fixed-effects model, the research controls GDP growth, inflation, real wages, and tertiary education enrollment to isolate the effects of migration intensity. By focusing specifically on employment data for young people, this study evaluates labor supply shocks to inform balanced labor, education, and immigration policies.

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**How do minimum wage laws impact black unemployment in the California?**

Steven Snelbaker

*Business; Accounting, Economics and Finance; Economics*

Mentor: Linda Dynan

Abstract: Minimum wage laws are intended to help people in low-paying occupations earn a “livable” wage. Race has long been an extremely sensitive issue in the United States, with nonwhite minority populations earning lower incomes on average. An increase in the minimum wage rate cannot help people earn a livable wage if large portions of that population are displaced from their job. California is a state that has significantly increased their minimum wage rates over the past 20 years. This paper uses regression analysis to measure the impact that an increase in minimum wage rates have on black unemployment in California.

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**Is Lower Male College Enrollment associated with Lower Employment Growth in Male Heavy Occupations.**

Jonathan Marx

*Business; Accounting, Economics and Finance; Economics*

Mentor: Linda Dynan

Abstract: This study examines whether local labor markets with larger declines in male college enrollment rates experience reduced employment growth in degree-intensive, male-dominated occupations. I analyze labor market and male school enrollment data from 2010-2015, controlling for metro-level characteristics such as poverty rates, average income, population size for example. Using regression analysis, I test the hypothesis that metro areas with larger declines in male enrollment exhibit slower employment growth in male dominated, degree-intensive occupations. I also test the potential for reverse causality—that metro areas with lower employment growth in male dominated, degree-intensive occupations exhibit larger declines in male enrollment.

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**ORAL PRESENTATIONS SESSION 3  
(11 a.m.–noon, Student Union 109)**

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**How declining birthrates increase labor force participation among older workers?**

Rista Basnet

*Business; Accounting, Economics and Finance; Economics*

Mentor: Linda Dynan

Abstract: This paper examines whether declining birthrates increase labor force participation among older workers (ages 50–64) across countries. As fertility rates fall in many developed economies, fewer young workers enter the labor force, potentially increasing reliance on older workers. Using cross-country panel data and within country data, this paper links lagged total fertility rates to current older worker labor force participation. A fixed-effects regression framework will be used to estimate the relationship while controlling for macroeconomic conditions and country-specific disruptions. The analysis tests whether lower fertility is associated with higher participation among older workers. Results are forthcoming.

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**How Educational Reforms Impact Unemployment Level Across Countries.**

Cannon Reid

*Business; Accounting, Economics and Finance; Economics*

Mentor: Linda Dynan

Abstract: The Department of Education in the United States is going through a major change. I want to analyze countries that have gone through similar changes to predict what will happen to the unemployment in the United States after the current reform. I will be analyzing Sweden, Chile, and Germany's educational reforms five years before and after the reform took place. I predict that unemployment will fall after the reform took place in all three countries, and their quality of workers will rise as a result of these reforms. Thus, I predict that the United States unemployment level will decrease.

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**4-Year Universities or Community College, Which is Better?**

Lucas Moser

*Business; Accounting, Economics and Finance; Economics*

Mentor: Linda Dynan

Abstract: As a student at an accredited university with a 4-year degree program, I care about the returns from my educational investment. To assess these returns compared to other educational investments, I gathered time series data related to two types of schools—universities and community colleges. I analyze the data using regression analysis. My regression results will indicate whether my hypothesis that 4-year universities have better economic returns is supported. This research will assist future students in making well-informed decisions about the type of education that benefits them the most.

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**Natural Disasters and Their Effect on Economic Growth and Unemployment**

Rebecca Stanley

*Business; Accounting, Economics and Finance; Economics*

Mentor: Linda Dynan

Abstract: This study examines the economic impact that natural disasters have on unemployment and economic growth. As the frequency and intensity of these natural disasters increase, understanding long and short-term consequences has become more and more important for policymakers to make informed decisions. Using panel data across multiple regions and years this study will show how disasters exposure affects the labor market outcomes and real GDP growth. Natural disasters data combined with regional economical indicators and regression analysis is conducted using fixed effects models to control for time invariant regional characteristics and common economic shocks. The results are expected to show...

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**ORAL PRESENTATIONS SESSION 3B**  
**(11 a.m.–Noon, Student Union 108)**

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**Project Title: The Reaction Condition Study on  $\alpha,\beta$ -Unsaturated Ketone I17-D16MeO-I17**

Alex Adams

*Arts and Sciences; Chemistry; Biology*

Mentor: Lili Ma

Abstract: Claisen-Schmidt condensation is an important reaction that produces  $\alpha,\beta$ -Unsaturated carbonyl compounds, a class of molecules with significant applications in research labs and the medical industry. This project studies and optimizes the reaction parameters including solvents, time, temperature, and catalysts to maximize the yield for the compound I17-D16MeO-I17. This research allows for further understanding on the mechanisms of the Claisen-Schmidt condensation reaction and supports the synthesis of potentially bioactive  $\alpha,\beta$ -Unsaturated carbonyl compounds.

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**Software Design Patterns for Temporal Upscaling Compatibility and Performance in Real-Time Games**

Owen Newberry

*Informatics; School of Computing and Analytics; Applied Software*

Mentor: Samuel Cho

Abstract: Modern real-time rendering increasingly relies on temporal upscaling and AI-assisted frame generation techniques to achieve high visual fidelity at sustainable performance levels. However, the effectiveness of these techniques depends critically on how game software is structured. This research identifies the software-side constraints imposed by temporal upscaling methods such as FSR 2/3, DLSS, and engine-native temporal super resolution and proposes four concrete design patterns that help game developers produce the stable motion data, predictable timing, and clean rendering inputs these systems require. Through analysis of vendor documentation, engine implementations, and established game-programming patterns, this work bridges the gap between graphics-level upscaler requirements.

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**NomNom Safe: A Structured Approach to Allergen-Aware Food Service Provider Menu Communication**

Anna Dinius

*Informatics; School of Computing and Analytics; Applied Software Engineering*

Jeffrey Perdue

*Informatics; School of Computing and Analytics; Applied Software Engineering*

Mentor: Samuel Cho

Abstract: TFood allergies affect millions of people, yet menus often communicate allergen information inconsistently or ambiguously. NomNom Safe is software that explores a structured approach to managing and presenting menu safety information. The system treats menu data as safety-critical knowledge, enabling restaurants to explicitly link menu items with allergen signals and clear disclaimers. By separating internal menu knowledge from customer-facing presentation, NomNom Safe creates a more transparent and auditable communication process. This capstone project investigates how structured menu data and controlled ownership of safety information can reduce ambiguity for restaurants while helping customers with dietary restrictions make more informed decisions.

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**ORAL PRESENTATIONS SESSION 4  
(Noon–1 p.m., Student Union 109)**

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**Has the College Degree lost its protective effect against unemployment?**

Beckett Penrod

*Business; Accounting, Economics and Finance; Economics*

Mentor: Linda Dynan

Abstract: A college degree has traditionally reduced the risk of unemployment, but recent economic changes raise questions about whether the advantage has weakened over time. This study examines whether the unemployment gap between college graduates and non-graduates has narrowed across decades. Using labor market data, I analyze unemployment trends by education level to test whether the protective effect of a bachelor's degree has declined. This research contributes to debates about education policy, workforce planning, and individual decisions about investing in higher education.

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**Infrastructure Investment as a Driver of Economic Development: A Cross-National Analysis**

Hunter Taylor

*Business; Accounting, Economics and Finance; Economics*

Mentor: Linda Dynan

Abstract: This study explores whether investment in infrastructure contributes to economic development by increasing GDP per capita growth. Governments around the world invest large amounts of money in infrastructure projects, but the extent to which these investments drive economic growth is still an important question for policymakers. Using panel data from 20 developed and 20 developing countries between 2000 and 2022, descriptive statistics, graphs, and regression models are used to evaluate this relationship. The results are expected to show a positive connection between infrastructure investment and economic growth, especially in developing economies. The results could help guide policymakers in determining if infrastructure spending is justified.

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**The Influence of Social Media on Budgeting Efficacy: The Mediating Role of Impulse Buying in Tourism**

Becca Stanley

*Business; Accounting, Economics and Finance; Economics*

Wilfried Panlap

*Business; Accounting, Economics and Finance; Economics*

Mentor: Sami Al-Farhan

Abstract: This study investigates the relationship between social media influence and budget deviation among travelers in the United States and China. Using 1,301 responses and structural equation modeling (SEM) we examined how social media exposure affects budget deviation or operates indirectly through impulsive purchasing tendencies. Results revealed that social media influence on the deviation from the predetermined tourism budget was significantly mediated by impulsive buying. Implications for travel marketers and policymakers underscore the importance of managing impulsive behavior in digitally mediated tourism environments where preplanned budgets are easily disrupted.

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**Factors Influencing the Nationwide Teacher Shortage**

Charles Frey

*Business; Accounting, Economics and Finance; Economics*

Mentor: Linda Dynan

Abstract: Teacher shortages have become a key policy concern in recent years, yet there are little empirical studies examining the factors that contribute to such shortages. While existing literature suggests that teacher shortages are a key factor in student education adequacy and success, the factors that cause these shortages remain relatively unexplored. Through ordinary least squares and standardized regression methods, this paper seeks to examine how teacher salary, cost of living, and student disciplinary actions (measured with suspensions and expulsions) impact teacher shortages using state-level data.

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**ORAL PRESENTATIONS SESSION 5**  
**(2–3 p.m., Student Union 109)**

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**Missing White Women Syndrome**

Lilian Ramsey  
*Informatics; School of Media and Communication;*  
*Journalism*

Mentor: Stacie Jankowski

Abstract: For my true crime final project, I applied course concepts while conducting my own investigation into Missing White Women Syndrome. I created a documentary-style piece using interviews, independent research, and factual insight to explore how media patterns privilege certain victims. Incorporating techniques such as emotional music, storytelling imagery, and victim advocacy, I examined why society gravitates toward cases like that of 22-year-old Gabby Petito. Through campus interviews, I found that factors such as social status, resources, and visibility shape whose stories receive attention. In contrast, victims of color, LGBTQ+ individuals, and those facing poverty or marginalization are far less likely...

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**Analogues in Christian and Yoruba Mythology**

Fiona Gates  
*Honors; English; English*

Mentor: Tamara O'Callaghan

Abstract: This research paper discusses how cultural narratives and shared frameworks can help us to understand the people around us. An example of how the individual can connect to these cultural narratives is through literary analogies. Certain universal themes are present across multiple cultural narratives and creation myths, and by looking at these literary analogies, we can learn about the human experience and how deific figures are viewed. Christian and Yoruba cultural narratives share many similarities, and understanding those similarities and analogies can help form the basis of further human comprehension.

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**A Cold Case Investigation mixed with ethics**

Maria Holmes  
*Arts and Sciences; English; English*

Mentor: Stacie Jankowski

Abstract: Cold Cases Never Die (But we do) is a fictional story that explores the real-world implications of how we discuss true crime and how we treat victims. Within the scope of true crime, an important question to ask yourself is, "Am I being ethical?" It's unfortunate to see that many people cannot say yes to this question. With this project, specific issues (such as the wording used, jokes made, or the addition of ads in the middle of the story) were highlighted, with a focus on how they affect the victim of a crime.

**ORAL PRESENTATIONS SESSION 5B  
(2–3 p.m., Student Union 108)**

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**Molecular Modeling of Tropinone and Thiazole Products. Testing for Docking Capability with Aromatase**

Micah-Jonathan Cole

*Arts and Sciences; Chemistry; Chemistry*

Mentor: Lila Ma

Abstract: Tropinone-thiazole derivatives have been shown to have a high anti-proliferative activity against a variety of cancer cells. Some of those derivatives were found to exhibit high activity with human leukemia, human lung carcinoma, human breast carcinoma, and skin melanoma cancer cell lines. Further investigation of these derivatives can be done through molecular modeling with the software GOLD. In this study, docking compatibility for the various analogues of the tropinone-thiazole derivatives can be generated and ranked in order of highest compatibility to lowest. This information is useful in guiding the synthesis of bioactive tropinone-thiazole compounds.

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**Literature Review: Pregnancy in the Opioid Epidemic**

Bolaji Akindiose

*Arts and Sciences; Biological Sciences; Biology*

Mentor: Brittany Smith

Abstract: Opioids can travel through the placenta and have adverse effect on the baby, including neonatal opioid withdrawal syndrome. This review aims to understand the occurrence, distribution, and control of opioid exposure during pregnancy in the United States. Evidence indicates polysubstance use when opioids are used nonmedically. National guidelines now require reporting substances found in an infant's blood screen as child abuse. Some states have passed punitive policies and/or priority treatment policies (PTP) to address opioid use disorder (OUD) in pregnancy. Women in PTP states may have a better outcome, therefore federal policymakers should consider such policies to address...

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**CREATIVE AND ORAL PRESENTATIONS SESSION 6  
(3–4 p.m., Student Union 109)**

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**The Many Faces of Medicine**

Olivia Kennedy

*Arts and Sciences; Biological Sciences; Biology*

Mentor: Brad McCombs

Abstract: Art is powerful. It amplifies. It educates. It entertains, all while elevating the concepts represented within. In collaboration with NKU faculty and NKY community members, I will complete a multi-panel, painted art installation that represents the myriad people who have helped me on my academic and artistic journey. The duality of the representations is that each person has also been a patient, a healthcare professional, or has served the medical community. This project leverages my artistic abilities to elevate science and medicine—my formal area of study and my future profession—in a world where those disciplines are increasingly demeaned.

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**“Searching for Melville in Just Like Moby Dick by Terry Allen”**

Lucas King

*Honors; English; English*

Mentor: Robert Wallace

Abstract: Few works have been as prolifically referenced and interpreted as *Moby-Dick* by Herman Melville. The novel has been reworked and retold countless times across an expanse of mediums, and within all these varied and multitudinous works, a spark of Melville always resides. In no work is this as clear, yet so ungraspable, as Terry Allen’s alt-country album *Just Like Moby Dick*. Terry Allen is a musician and visual artist whose career has spanned half a century. In this presentation, I will uncover how his latest album is crafted with Melville’s spirit, even with the novel’s narrative absence.

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**Project Title: Reconstructing Samuel Rogers’ Art Collection and Home**

Alex Wallace

*Informatics; School of Computing and Analytics;  
Computer Science*

Mentor: Robert Wallace

Abstract: Samuel Rogers’ London residence contained one of the most influential private art collections of the nineteenth century. Writers and artists, including Herman Melville during his 1849 visit to London, viewed Rogers’s gallery. Scholars suggest that exposure to these artworks influenced Melville’s visual imagination in *Moby-Dick*. Because the collection was dispersed after Rogers’ death, the gallery can no longer be studied as a unified space. The project aims to restore access to this lost cultural space and highlight connections between visual art and literature by creating a digital archive of Rogers’ collection by developing a 3D reconstruction of his home.

**ORAL PRESENTATIONS SESSION 7  
(4–5 p.m., Student Union 109)**

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**The Importance of Forensic Nursing (Background, Evolution, and Importance)**

Katelynn Murphy  
*Health and Human Services; School of Nursing;  
Nursing Baccalaureate*

Mentor: Stacie Jankowski

Abstract: This project is based on the evolution of forensic nursing as well as the importance in a criminal justice setting. Topics in this presentation include: different types of forensic nurses, the timeline for forensic nursing, the importance, and the impact that trauma informed care has on a client. The main question reviewed is “Why is forensic nursing important?”. To answer this question, interviews were conducted by Katelynn Murphy, NKU Nursing student minoring in Criminalistics/ Honors College. These interviews include forensic nurses, coroners with a forensic nursing background, and victim-survivor advocates/ hospital advocates.

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**Nixon, Reagan, Bush, and Trump: The Four Horsemen of the Republican Divide**

Ben Grothaus  
*Arts and Sciences; History; History*

Mentor: Burke Miller

Abstract: Many republican presidents have similar presentation, policy goals, and reactions to scandals and events occurring in their presidency. Through a historical lens, looking at the campaign trails, the foreign policies, and the domestic conflicts of Richard Nixon, Ronald Reagan, George W. Bush, and Donald Trump, a comparison can be drawn: the Republican Party’s presidential leadership consistently strives for a legacy to be cemented as the best president. Each man carved a place for themselves in the legacy of the Republican Party, but those actions led to fissures fracturing the polls each election year.

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**Interrogating the Official Narrative: Tensions and Theories in the Death of Sam Cooke**

Ahmad Richardson  
*Honors; School of Media and Communication;  
Sports Business*

Mentor: Stacie Jankowski

Abstract: This project examines the enduring mystery of Sam Cooke’s death and the conspiracy theories that surround it. Motivated by Cooke’s dual legacy as a groundbreaking Black artist and civil rights advocate, the research explores why official accounts remain doubted. The scope focuses on two major theories: Allen Klein’s business motives and possible law enforcement involvement tied to Cooke’s activism. Using historical sources, eyewitness accounts, and cultural analysis, the project highlights contradictions in the narrative. The conclusion emphasizes Cooke’s lasting influence and how unresolved questions about his death reflect broader tensions in music, race, and power.

**POSTER SESSION**  
**(12:30–2:30 p.m., Student Union Ballroom)**

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**Poster Number: 1**  
**How to Pick a Winning Hackathon Project?**

Gaurab Baral  
*Informatics; School of Computing and Analytics;*  
*Data Science*

Mentor: Junxiu Zhou

Abstract: Hackathons produce thousands of projects each year, but few gain recognition or become startups. This study introduces a predictive pipeline combining Devpost metadata with AI-generated GitHub summaries using LLMs, analyzing 6,352 projects from 50 online hackathons (2020–2024). We benchmarked classical machine learning models, a fine-tuned BERT model, and large language models. Random Forest and RBF SVM performed best among traditional methods, while LLMs showed strong contextual understanding but overpredicted winners. To address this, we propose a multi-layer classification pipeline.

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**Poster Number: 2**  
**Truth in the Age of AI: Fine-Tuning LLMs for Reliable Fake News Detection**

Sajan Poudel  
*Informatics; School of Computing and Analytics;*  
*Computer Science*

Mentors: Nazmus Sadat, G. G. Md. Nawaz Ali

Abstract: Social media has become a primary source of news, increasing the societal risks posed by misinformation. This work investigates high-confidence fake news detection using fine-tuned large language models (LLMs). Using a large open-source news dataset, we fine-tuned both open-source and proprietary models to classify news articles as real or fake. Experimental results show that fine-tuned models, including RoBERTa and GPT, significantly outperform their pre-trained counterparts. Performance is evaluated using accuracy, precision, recall, and F1-score, along with training cost considerations. Our results demonstrate the effectiveness of fine-tuning and provide insights for developing reliable AI-based misinformation detection systems.

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**Poster Number: 3**  
**AI for PDF Forms Analysis**

Gaurab Baral  
*Informatics; School of Computing and Analytics;*  
*Data Science*

Mentor: Junxiu Zhou

Abstract: PDF forms have been widely used since the invention of the World Wide Web. Although many processes are now fully digital, PDF forms are still commonly used today, especially in fields such as healthcare, government, education, finance, and other administrative sectors. This poster discusses various machine learning techniques for detecting form fields like checkboxes, lines, and boxes. Our work acts as the initial step in automated form-filling processes, which can be followed by other techniques to fill out details. We evaluated YOLOv8+, OpenCV, Document Understanding Transformers, and a custom CNN model using 500 manually annotated forms for fine-tuning and testing purposes.

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**Poster Number: 4**  
**Evaluation of Prompt Injection Attacks in LLM-based Scholarly Review Systems**

Linh Nguyen  
*Business; Marketing, Sports Business and Construction*  
*Management; Marketing*  
Pam Pepper  
*Informatics; School of Computing and Analytics*

Mentors: Nicholas Caporusso, Nazmus Sadat, Andy Xing

Abstract: Large language models (LLMs) are increasingly used to support scholarly peer review, improving efficiency but introducing new risks. One emerging threat is prompt injection, where hidden instructions embedded in manuscripts manipulate AI reviewers. Authors have attempted to conceal such prompts in text, formatting, images, or metadata to influence outcomes. This study empirically evaluates the susceptibility of LLM-based review systems to indirect prompt injection attacks. We test varied injection strategies across multiple models and review settings, analyzing generated reviews, scores, and recommendations. Our findings aim to clarify risks and inform safeguards for more secure AI-assisted academic publishing systems.

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**Poster Number: 5****Will Advertising a Job as “AI-Free” Grow Applicant Pool? Role of AI Algorithm Aversion in Jobseekers**

Judah Martin

*Business; Accounting, Economics and Finance; Accounting*

Mentor: Cristiane Biazzin

Abstract: Artificial intelligence has recently become integrated into many aspects of work. However, many are averse to AI for some reason or another, with around 50% of Americans having some sort of reservation about it. This is unfortunate for very AI-forward firms, but research suggests it may also allow firms willing to reserve and advertise some jobs as “AI-free” to attract this large pool of averse jobseekers to gain an edge in the job market. Though it hasn’t been completed yet, I intend to survey the incoming workforce of Northern Kentucky University’s student body to ascertain if this is true.

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**Poster Number: 6****A General Overview of COVID-19 and Pandemics of the Future**

James McCurdy

*Health and Human Services; School of Allied Health; Respiratory Care*

Robert Sprouse

*Health and Human Services; School of Allied Health; Respiratory Care*

Luke Rauckhorst

*Health and Human Services; School of Allied Health; Respiratory Care*

Mentor: Jackie Davis

Abstract: This capstone project presents a comprehensive literature review focused on improving public preparedness for future global health crises. It examines three key aspects of pandemic response: the development, safety, and efficacy of COVID-19 mRNA vaccines and their future potential; the rapid spread of COVID-19, including the role of public behavior and airborne transmission; and a synthesis of interdisciplinary findings to draw broader conclusions. The project provides a balanced, evidence-based analysis to enhance public understanding of pandemic science and management.

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**Poster Number: 7****Effect of foliage cover on insect succession in decomposing rat carcasses**

Elizabeth Rose

*Arts and Sciences; Biological Sciences; Biology; FYRE*

Mentor: Allison Parker

Abstract: Forensic entomology is the study of insect succession in decomposing animals. This study will examine how foliage cover impacts the number of insects and rate of decomposition in rat carcasses. Rat carcasses will be placed at locations with different levels of foliage cover and will be monitored daily for insects and decomposition. Collected insects will be identified to Order. We hypothesize that carcasses under higher levels of foliage cover will have higher rates of decomposition due to increased number of insects. The results of this study will help increase our knowledge of forensic entomology.

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**Poster Number: 8****Bridging Donor Dependency: Exploring Sustainable Healthcare Financing Mechanisms in Afghanistan**

Elaine Chan

*Business; Management; Management*

Mentor: Jing Liu

Abstract: This paper examines the healthcare system in Afghanistan by analyzing its negative health outcomes and structural challenges, including donor misalignment and dependency, high out of pocket expenditures, low government involvement, and severe gender restrictions. It proposes evidence-based solutions informed by international comparisons and includes a desirability and feasibility assessment of strategies that Afghanistan’s healthcare system could implement to improve long-term sustainability.

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**Poster Number: 9****Where are They? Issues Surrounding Missing and Murdered Indigenous Women**

Tyler Burklow

*Arts and Sciences; Sociology, Anthropology and Philosophy; Anthropology; FYRE*

Melanie Parsons

*Arts and Sciences; Sociology, Anthropology and Philosophy; Anthropology*

Rayne Patton

*Arts and Sciences; Sociology, Anthropology and Philosophy; Anthropology*

Ashley Koenig

*Arts and Sciences; Sociology, Anthropology and Philosophy; Anthropology*

Mentor: Judy Voelker

Abstract: In the United States and Canada, issues of violence have disproportionately affected those within Native American communities. Indigenous women especially have felt the consequences of this, as they are ten times more likely to be murdered than other ethnicities. Evidence shows that Natives identifying as LGBTQ+ have also been greatly affected from this violence. Highlighting this issue, people including Jamie Black have brought awareness to gendered and ethnic violence through projects like REDress. Organizations such as the National Council of Urban Indian Health and National Congress of American Indians informed our research. This poster presents our findings on this topic.

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**Poster Number: 10****Quantifying Labor Shortages and Talent Surpluses in the Cincinnati Economy**

Dylan Fogt

*Business; Accounting, Economics and Finance; Economics*

Mentor: Janet Harrah

Abstract: This paper analyzes the Cincinnati Metropolitan Statistical Area (MSA) by comparing the annual degree completions from IPEDS (2019-2023) against 10-year employment projections provided by state Labor Market Information (LMI) agencies. Utilizing three talent gap metrics: the Simple Gap, Competing Gap, and Midpoint Gap, major shortages and surpluses are found across varying industries

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**Poster Number: 11****The Labor Market Effects of Internet Latency on Young Men**

Dylan Fogt

*Business; Accounting, Economics and Finance; Economics*

Mentor: Linda Dynan

Abstract: While existing literature consistently links improved internet infrastructure to positive labor market outcomes, recent findings suggest that advancements in video game technology have depressed the labor supply of young men by serving as a "leisure luxury." This paper adds to the existing literature by testing the hypothesis that countries with better internet infrastructure, which would be more conducive to addictive online gaming, results in lower youth male labor force participation rates. To account for potential endogeneity problems, I utilize a two-stage least squares framework to isolate the impact of internet quality.

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**Poster Number: 12****The Effect of tRNA Body Modifications on *S. pombe* Protein Translation**

Martin Ding

*Arts and Sciences; Chemistry; Chemistry*

Julia Verhoff

*Arts and Sciences; Chemistry; Chemistry*

Lexi Giordano

*Arts and Sciences; Chemistry; Chemistry*

Mentors: Madisyn Hayes, Michael Guy

Abstract: Post-transcriptional modifications must occur for tRNA to translate proteins properly. Previous research has shown that *Saccharomyces cerevisiae* (budding yeast) lacking certain tRNA<sup>Tyr</sup>(UUA) body modifications have decreased protein translation. The effect of these modifications in *Schizosaccharomyces pombe* (fission yeast) will be determined using a translation reporter system quantified by flow cytometry. Since *S. cerevisiae* and *S. pombe* genetically diverged 600 million years ago, similarities in tRNA modification requirements could indicate a conserved role in other eukaryotes like humans. This could help identify the defective tRNAs responsible for human diseases in individuals with mutations in homologous tRNA modification genes.

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**Poster Number: 13****Identifying Important Residues for Trm732 Function via Random Mutagenesis and Next Gen Sequencing**

Maira Faisal

*Arts and Sciences; Biological Sciences; Biology*

Johannes Smal

*Arts and Sciences; Chemistry; Chemistry*

Rylee Schurger

*Arts and Sciences; Chemistry; Chemistry*

Mentors: Michael Guy, Madisyn Hayes

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 cause cognitive impairment; though Trm732's mechanism as an auxiliary protein remains unclear, key motifs have been identified in the DUF2428 domain. We seek the essential residues within all of Trm732. For this, randomly mutated Trm732 variants were expressed in a sick yeast strain lacking Trm732. DNA will be sequenced before and after restrictive growth conditions to track mutations quantitatively. Mutations that decrease in frequency indicate Trm732 functional importance and will be identified for future testing.

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**Poster Number: 14****Red Fox Social Hierarchies: Exploration of Sex-Linked Dominance**

Katie Cox

*Arts and Sciences; Biological Sciences; Biology*

Mentor: Charles Acosta

Abstract: Red Foxes (*Vulpes vulpes*) are incredibly adaptable animals and serve a key role in maintaining the balance of the ecosystem. They often get labelled as "pests" and "nuisances", which undermines their importance. Red Foxes are adapting to urban environments, shown to thrive in cities, and build their dens in close proximity to humans. I observed seven Red Foxes at Redwolf Sanctuary, recording dominance behaviors between female and male foxes. Dominance in Red Foxes does not appear sex-linked and follow a nuclear family dynamic. Understanding their behavior gives us insights into how humans can successfully coexist with Red foxes.

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**Poster Number: 15****Determination of the effect on translation of 2'-O-methylation at positions 32 and 34 in eukaryotic**

Danika Maki

*Arts and Sciences; Chemistry; Chemistry*

Dipshika Rai

*Arts and Sciences; Psychological Science; Neuroscience*

Aaditi Bhat

*Arts and Sciences; Chemistry; Chemistry*

Mentor: Michael Guy

Abstract: Post-transcriptional modification of tRNA is vital for protein translation. Mutations in the yeast methyltransferase TRM7 cause intellectual disability and slow growth. Trm7 interacts with Trm732 and Trm734 to perform 2'-O-methylation at C32 and G34 on tRNAPhe. While loss of both modifications impairs growth, loss of one does not, leaving their individual roles unclear. Using a reporter system, we compare GFP expression in *trm732Δ*, *trm734Δ*, and wildtype strains containing added UUU, UUC, UGG, or UUA codons to determine how Trm7-dependent modifications influence codon specific translation. This research helps clarify how Trm7-dependent tRNA modifications affect translation in yeast and other eukaryotes.

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**Poster Number: 16**  
**Prioritization of Tree Planting Areas to Increase Urban Canopy**

Cecelia Harner

*Arts and Sciences; Biological Sciences;  
Environmental Science*

Ashton Baxter

*Arts and Sciences; Biological Sciences;  
Environmental Science*

Liam Barker

*Arts and Sciences; Biological Sciences; Biology*

Samuel Chapman

*Arts and Sciences; Biological Sciences;  
Environmental Science*

Garrett Maines

*Arts and Sciences; Biological Sciences;  
Environmental Science*

Mentor: Kristy Hopfensperger

Abstract: The urban tree canopy has many ecological and social benefits for cities, yet many neighborhoods lack trees. We studied five regional cities to determine priority tree planting areas, so that resources are allocated efficiently. Geographic Information System analysis of National Agriculture Imagery Program data assisted in determining current tree canopy, land usage, and potential planting sites. Suitable land types were filtered and merged with land resources of importance to find the highest priority areas. Our findings will be used by urban planners throughout the region to reduce the effects of urban heat islands and improve climate resilience.

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**Poster Number: 17**  
**Federated Recommendation System for Online Marketplaces**

Bijay Dhungana

*Informatics; School of Computing and Analytics;  
Computer Science*

Ayush Bhandari

*Informatics; School of Computing and Analytics;  
Computer Science*

Jaljala Shrestha Lama

*Informatics; School of Computing and Analytics;  
Computer Science*

Mentor: Junxiu Zhou

Abstract: Traditional recommendation systems centralize user data, raising privacy and compliance concerns. This project proposes a federated learning-based recommendation system where vendors train models locally and share only model updates with a central server. The backend manages aggregation and communication, while the frontend provides a marketplace interface and analytics dashboard. It addresses data sparsity, cold-start issues, and asynchronous updates. Our goal is to build a working prototype that demonstrates privacy-preserving, personalized recommendations in a multi-vendor marketplace using federated learning.

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**Poster Number: 18**  
**Predicting Types of Clothes Using a Convolutional Neural Network**

Zakaria Gouiss

*Informatics; School of Computing and Analytics;  
Computer Science*

Mentor: Junxiu Zhou

Abstract: Clothing image classification is important for applications such as e-commerce search, inventory management, and recommendation systems. This project investigates whether a convolutional neural network (CNN) can accurately perform multiclass classification of clothing images by predicting attributes such as garment type, color, and style. A CNN model was trained on a labeled image dataset using supervised learning and evaluated on a held-out test set. The model achieved strong classification performance across multiple categories. These results demonstrate that deep learning methods are effective for automated clothing attribute recognition and can support scalable fashion analysis systems.

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**Poster Number: 19****Human-AI Collaborative Creativity**

Mackenzie Glaser

*Informatics; School of Computing and Analytics;  
Computer Science*

Mentor: Junxiu Zhou

Abstract: The growing use of AI in education raises concerns about reducing students' sense of ownership. This project explores how structured human-AI collaboration can support learning while preserving student agency. We developed a Human-AI Collab system, an interactive learning environment with different AI guidance levels, such as a brief hint level and a Socratic questioning level. Then we studied the impact of users' intellectual rights while they were learning under different AI guidance levels. By studying the impact of different levels of AI guidance on students' learning processes, we can find a way to maintain strong learning ownership and autonomy.

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**Poster Number: 20****Investigating the Interaction between Visual and Olfactory Stimuli on Image Ratings**

Blaine McCarthy

*Arts and Sciences; Psychological Science; Psychology*

Mentor: Kathleen Fuegen

Abstract: Research shows that exposure to natural environments improves cognition and wellbeing, yet scant research examines how multiple senses interact to influence these outcomes. This study examines the interaction between visual and olfactory stimuli. Participants were randomly assigned to either a peppermint-scented room or an unscented control room and rated natural and urban images on pleasantness and perceived calmness. Results revealed a significant interaction effect between image type and scent condition for pleasantness ratings. For calmness ratings, only a main effect on image type was found. These findings suggest that multisensory input may alter environmental perception differently than single-sensory input.

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**Poster Number: 21****Measuring Novelty and Relevance in Iterative Prompting in Educational Content Generation**

Bijay Dhungana

*Informatics; School of Computing and Analytics;  
Computer Science*

Vickey Ghimire

*Informatics; School of Computing and Analytics;  
Computer Science*

Mentors: Nazmus Sadat, Nicholas Caporusso

Abstract: LLMs are increasingly used for educational content generation through iterative prompting, where users progressively refine outputs. While this enables incremental enrichment of instructional materials, it introduces critical challenges: redundancy and context drift. This paper presents a comprehensive framework for jointly evaluating novelty and relevance in iterative prompting. The proposed NOV metric quantifies genuinely new content versus paraphrased repetition, while cluster-based relevance scoring ensures alignment with instructional objectives using external ground truth references. Evaluation across 11 LLMs generating course outlines demonstrates the framework reduces manual review effort from 32.8% to 3.1%, enables systematic benchmarking, and provides criteria for determining model behavior in content generation.

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**Poster Number: 22****Time-to-Event Analysis**

Ian Blair

*Arts and Sciences; Mathematics and Statistics; Statistics*

Mentor: Joseph Nolan

Abstract: Healthcare studies often examine the time between intervention/occurrence and meeting a specific endpoint. When the endpoint always occurs within the time-frame of the study, standard analysis methods such as T-tests, ANOVA, chi-square tests, logistic regression, etc. may be used. Occasionally, the endpoint may not always occur during the study, leading to censored data and survival analysis. Pros and cons of these methods will be discussed within the context of an analysis of therapeutic data.

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**Poster Number: 23****Acid-Catalyzed Aldol Condensation of Cycloheptanone Derivatives as Pharmaceutical Candidates**

Dane Larson

*Arts and Sciences; Chemistry; Chemistry*

Mentor: Lili Ma

Abstract: Tropinone is a molecule known for its application in pharmaceutical industry, and cycloheptanone serves as its structural model due to their close resemblance. The dibenzylidenecycloheptanone derivatives of these molecules are typically synthesized using a Claisen-Schmidt condensation using base catalysis. However, strong bases can interfere with sensitive functional groups. In this study, a novel acid-catalyzed cycloheptanone-benzaldehyde condensation was investigated using concentrated HCl to catalyze the reactions in the presence of sensitive functional groups such as hydroxyl groups. Catalyzing the condensation under acidic conditions enables the efficient synthesis of a wider variety of drug candidates, particularly those with highly polar substituents.

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**Poster Number: 24****Spatial Modeling of Influenza Incidence in Kentucky Using Geographically Weighted Regression**

Tri Do

*Informatics; School of Computing and Analytics; Data Science*

Mentor: Nelum Hapuhinna

Abstract: Seasonal influenza varies geographically due to environmental, demographic, and mobility-related factors, making it important to understand local patterns for public health planning. This study examines spatially varying influenza patterns across Kentucky counties and local drivers of disease using geographically weighted regression (GWR). A global regression model was first estimated using key predictors, including vaccination coverage, insurance coverage, PM<sub>2.5</sub>, weather anomalies, and water surface area. While statistically adequate, the global model assumed spatially constant relationships, masking county-level differences. GWR improved performance by capturing spatially varying effects, showing that predictor associations differ across counties and demonstrating the value of spatially explicit modeling.

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**Poster Number: 25****Improving Microwave-Assisted Esterification of Secondary Alcohols**

Tessa Sangermano

*Arts and Sciences; Chemistry; Chemistry*

Maria Taylor

*Arts and Sciences; Biological Sciences; Biology*

Jamie Richey

*Arts and Sciences; Biological Sciences; Biology*

Mentor: Lili Ma

Abstract: Esterification between an alcohol and an acid produces an ester, an important chemical in pharmaceuticals and fragrances. In this study, reaction parameters were investigated using EDCI as a coupling reagent and DMAP as a catalyst under microwave irradiation at 100°C for 10 minutes. A TLC was performed to monitor the reaction progress and to guide the subsequent purification steps. NMR and IR data were analyzed to confirm the purity of the produced compound. The results can be used to improve esterification methods for the synthesis of pharmaceutical compounds.

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**Poster Number: 26****Course-based Undergraduate Research Experience in Organic Chemistry Lab Encourages Critical Thinking**

Riley Evans

*Arts and Sciences; Chemistry; Biology*

Rylie Gearding

*Arts and Sciences; Chemistry; Biology*

Jessica Forbeck

*Arts and Sciences; Chemistry; Chemistry*

Mentor: Lili Ma

Abstract: The main purpose of a laboratory is to experience the learning material hands-on. Northern Kentucky University offers a Course-based Undergraduate Research Experiences (CURE) option for the organic chemistry laboratory. Unlike a traditional organic chemistry laboratory, the CURE format provides more freedom, as students are not required to follow multiple predefined experiments. The laboratory emphasizes critical thinking as students work on the synthesis of molecules related to cancer research. This approach effectively challenges students to apply laboratory techniques to an original research project, collect and analyze data, and thoughtfully reflect on the observations and outcomes of the experiment.

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**Poster Number: 27**  
**Computer Modeling Study on  
Dibenzylidenecycloheptanone as  
Potential Aromatase Inhibitors**

Aaron Ressler  
*Arts and Sciences; Chemistry; Chemistry*

Mentor: Lili Ma

Abstract: Dibenzylidenecycloheptanone derivatives have promise as drugs capable of inhibiting the aromatase binding site. Discovering and developing aromatase-binding drugs will help treat patients suffering from breast cancer. Dibenzylidenecycloheptanone derivatives with phenyl, aniline, methoxy, nitro, or aryl halide substituents were examined with computer modeling programs (GOLD and PyMol). These substituents differ in their H-bonding, heme chelation, and hydrophobic interactions with the enzyme binding pocket. Evaluating the predicted characteristics of these molecules with modeling software provides vital information on the expected behavior of the molecules in the body, leading to more efficient distribution of time and resources to the best candidates.

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**Poster Number: 28**  
**Statistical Methods for Analyses of Survey Data**

Ethan Art  
*Arts and Sciences; Mathematics and Statistics;  
Mathematics*  
Gaurab Baral  
*Arts and Sciences; Mathematics and Statistics;  
Data Science*

Mentor: Joseph Nolan

Abstract: Survey data can be difficult to analyze due to ordinal level of measurement for most variables. Likert scales can be useful, but not as robust as quantitative data. In choosing statistical methods for these types of data, we often have to employ methods that are imperfect for the level of measurement. Such methods include simple and multiple linear regression, ANOVA, and ordinal logistic regression. In this poster, we address various assumptions that are made as we employ imperfect methods in an attempt to extract useful information from survey data. Examples from studies regarding youth alcohol consumption and leadership are given.

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**Poster Number: 29**  
**A Microwave Assisted Esterification of Alcohols  
and Acids**

Rylie Gearding  
*Arts and Sciences; Chemistry; Biology*  
Riley Evans  
*Arts and Sciences; Chemistry; Biology*  
Jessica Forbeck  
*Arts and Sciences; Chemistry; Chemistry*

Mentor: Lili Ma

Abstract: Esterification is an organic reaction with a wide application, ranging from medical to flavor industries. In this study, esters are synthesized from alcohols and carboxylic acids in the presence of EDCI catalysts. These reactions were performed under microwave irradiation at 100 to 110 C for 10 to 20 minutes. NMR and IR were used to monitor the reactions and to confirm the structures of the final purified products. This study provides information to help further the understanding of esterification reactions and the uses in pharmaceutical drugs.

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**Poster Number: 30**  
**A Green Chemistry Approach of Synthesis  
of Cycloheptanone and Aminobenzaldehyde  
via Claisen-Schmidt**

Cassie Morrow  
*Arts and Sciences; Biological Sciences; Biology*

Mentor: Lili Ma

Abstract: This project investigates a green chemistry approach for the reactions between cycloheptanone and amino benzaldehyde via a solvent-free Claisen-Schmidt condensation. A solventless reaction can help to create reactions that are more economical and minimize the number of hazardous byproducts. The reaction was performed using a mortar and pestle, to combine the aldehyde with the ketone. The reaction progress was monitored with infrared spectroscopy (IR and nuclear magnetic resonance spectroscopy (NMR). The results demonstrate the feasibility of a solvent-free Claisen-Schmidt condensation, providing a sustainable alternative to conventional solution-phase methodologies

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**Poster Number: 31**  
**Optimizing Esterification Reactions and Computational Evaluation of Ester Pharmaceutical Precursors**

Maria Taylor  
*Arts and Sciences; Biological Sciences; Biology*  
Tessa Sangermano  
*Arts and Sciences; Chemistry; Chemistry*  
Jamie Richey  
*Arts and Sciences; Biological Sciences; Biology*

Mentor: Lili Ma

Abstract: Esterification is an important reaction in many organic syntheses that enables an ester and a carboxylic acid to form more complex structures with potential for versatile properties. This study focuses on the reaction condition optimization and the full characterization of compound E31-J23Ph. Additionally, a percepta software was used to analyze the properties relevant to oral drug development, including predicted pharmacokinetic behavior and drug-likeness. By combining the synthesis with computational analysis, this study contributes to the knowledge regarding potential pharmaceutical precursors.

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**Poster Number: 32**  
**Synthesis of (2E,4E)-hexa-2,4-dien-1-yl 2-oxo-2H-chromene-3-carboxylate (E8-J41)**

Jessica Forbeck  
*Arts and Sciences; Chemistry; Chemistry*  
Rylie Gearding  
*Arts and Sciences; Chemistry; Biology*  
Riley Evans  
*Arts and Sciences; Chemistry; Biology*

Mentor: Lili Ma

Abstract: Esterification is an important process in the medical field for the development of pharmaceuticals. This study focused on the formation of an ester group from the reaction of carboxylic acid and alcohol. The reaction to form (2E,4E)-hexa-2,4-dien-1-yl 2-oxo-2H-chromene-3-carboxylate (E8-J41) was performed in chloroform with a catalyst of DMAP under microwave irradiation at 100-110 °C for 10-20 minutes. After the product was purified by a microscale extraction, it was characterized by <sup>1</sup>H NMR and IR spectroscopy. The results of this experiment contribute to the advancement of esterification and its applications in the medical field.

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**Poster Number: 33**  
**Utilizing Green Chemistry for Claisen-Schmidt Condensation in Undergraduate CURE Lab**

Isabella Blas  
*Arts and Sciences; Chemistry; Biology*

Mentor: Lili Ma

Abstract: Claisen-Schmidt condensation involves the reaction between a benzaldehyde and a  $\alpha,\beta$ -unsaturated ketone. The resulting bis-(benzylidene)cycloalkanone may be used in orally active drug molecules. Claisen-Schmidt is not traditionally a green reaction, as it uses a solvent in both the preparation and monitoring (TLC) phases. In this study, the reaction was performed by using a mechanochemistry method by grinding the benzaldehyde and ketone with sodium hydroxide, the catalyst, at room temperature and monitored using <sup>1</sup>H NMR spectroscopy. Refining green techniques can reduce waste for similar Claisen-Schmidt reactions in the future.

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**Poster Number: 34**  
**Dibenzylidenecycloheptanone Drug-like Property Prediction**

Maddux Bigam  
*Arts and Sciences; Chemistry; Biology*

Mentor: Lili Ma

Abstract: Claisen-Schmidt reactions have been found to produce  $\alpha,\beta$ -unsaturated carbonyl compounds, including chalcones and, dibenzylidenecycloheptanone, which exhibit many biological activities including anti-inflammatory and anticancer effects. In this study, two derivatives, D3MeO-I17- D3MeO and D4MeO-I17-D4MeO were synthesized and evaluated for their drug-like properties. The project compares how differences in methoxy substituent placement influence physicochemical characteristics. ACD Percepta, a software that can calculate the physicochemical properties of molecules, and Lipinski's Rule of Five were utilized to compare key molecular properties such as molecular weight, octanol-water partition coefficient, hydrogen bond donors, hydrogen bond acceptors, and polar surface area.

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**Poster Number: 35****Mercy Otis Warren: A Revolutionary Woman**

Kennedy Schraer

*Arts and Sciences; History; History*

Mentor: Andrea Sutherland

Abstract: Mercy Otis Warren was quintessentially a woman ahead of her time. Hailing from a prominent political family in Massachusetts, Warren grew up hearing the foremost debates shaping the fledgling United States, and she used her cultivated political knowledge to become an outspoken commentator and historian at a moment when both fields were largely devoid of female influence. This poster explores the life and work of this consequential woman in the era of America's founding and highlights how her perspective affirmed women's capacity to contribute meaningfully to both political commentary and historical writing.

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**Poster Number: 36****Impact of Stream Characteristics on Macroinvertebrates**

River Morfitt

*Arts and Sciences; Biological Sciences; Environmental Science*

Josie Timmers

*Arts and Sciences; Biological Sciences; Biology*

Abby Todd

*Arts and Sciences; Biological Sciences; Environmental Science*

Devin Moore

*Arts and Sciences; Biological Sciences; Environmental Science*

Liam Barker

*Arts and Sciences; Biological Sciences; Biology*

Mentor: Kristy Hopfensperger

Abstract: Macroinvertebrates are valuable bioindicators when determining stream health. Increased sedimentation, temperature, and flooding can decrease the diversity of aquatic macroinvertebrates. This study addressed the relationships between macroinvertebrate diversity and physical stream characteristics. The five study sites were located on two streams with differing watershed land uses including agriculture, exurban and forested. We sampled macroinvertebrate communities and performed the Qualitative Habitat Evaluation Index and Hydromodification Survey at all sites during fall 2025. We found low macroinvertebrate diversity at all sites. This data is the beginning of a multi-year study that will teach us more about climate change impacts on streams.

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**Poster Number: 37****An Agent-Orchestrated Framework for Adaptive Cybersecurity Intelligence**

Isha Nepal

*Informatics; School of Computing and Analytics; Computer Science*

Preshika Basnet

*Informatics; School of Computing and Analytics; Computer Info Technology*

Mentor: Rasib Khan

Abstract: Human behavior remains a critical factor in cybersecurity vulnerabilities, requiring adaptive, personalized, and continuously evolving security awareness solutions. This work proposes a multi-agentic framework that enhances organizational security awareness through distributed decision-making. Structured as an interactive input-process-output (IPO) workflow, the system orchestrates specialized agents responsible for data processing, machine learning and Large Language Model (LLM)-based analysis, output generation, and feedback processing. By decomposing awareness into coordinated agent-level functions, the framework enables scalable and context-aware adaptation to individual behavior. A continuous feedback loop dynamically adjusts awareness strategies, supporting intelligent and personalized security training within organizational environments.

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**Poster Number: 38****Statistical Models in Public Health Application**

Danish Khan

*Arts and Sciences; Mathematics and Statistics; Statistics*

Mentor: Joseph Nolan

Abstract: Statistical methods are widely applicable in healthcare. In this poster presentation, we review specific methodologies for evaluating the efficacy and safety of a clinical initiative. Both parametric and non-parametric statistical techniques are systematically applied based on the underlying distribution and level of measurement for patient outcome data. The analytical methodologies discussed include the Cochran-Armitage trend test, the Mann-Whitney test, Fisher's Exact Test, independent two-sample t-tests, and Analysis of Covariance. Ultimately, the appropriate application of these rigorous statistical methods allows for an accurate and comprehensive evaluation of critical clinical outcomes and patient safety measures.

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**Poster Number: 39****A Two-Step Green Approach to Pharmaceutically Relevant Chiral Diesters**

Johannes Smal

*Arts and Sciences; Chemistry; Chemistry*

Ethan Schneider

*Arts and Sciences; Chemistry; Chemistry*

Abigail Silvers

*Arts and Sciences; Biological Sciences; Biology*

Jasmyne Seacry

*Arts and Sciences; Biological Sciences; Biology*

Mentor: Lili Ma

Abstract: Organic synthesis offers many promising opportunities to build pharmaceutically important molecules. In this study, diester molecules were prepared from 1,3-acetonedicarboxylic acid using EDCI as catalyst. The reaction conditions were optimized to follow the green chemistry practice. The synthesized ester molecules were evaluated for their physicochemical properties to guide the purification process and to gain insights on their potential applications as orally active drug molecules.

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**Poster Number: 40****Use of Percepta and Lipinski's Rule to Determine the Drug Properties of Dibenzylidenecycloheptanones**

Paula Sogorka

*Arts and Sciences; Biological Sciences; Biology*

Miranda Smith

*Arts and Sciences; Biological Sciences; Biology*

Lily Zerhusen

*Arts and Sciences; Chemistry; Chemistry*

Mentor: Lili Ma

Abstract: Percepta is an advanced software platform that predicts the physicochemical properties of chemicals. It provides insight into the relationship between a molecule's chemical structure and its toxicological and physicochemical properties. The platform focuses on the research and developmental parameters needed to determine drug suitability for future production. In this project, derivatives of cycloheptanone and aldehydes, specifically 2,6-bis(2,4-dimethoxybenzylidene) cycloheptanone—are synthesized via Claisen-Schmidt condensation to form a cross-conjugated system. These derivatives were investigated using Percepta and Lipinski's Rule of Five to identify potential orally active molecules that may be used in cancer treatment.

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**Poster Number: 41****Synthesis of (2E,7E)-2,7-dibenzylidenecycloheptanone via Claisen-Schmidt Condensation**

Lily Zerhusen

*Arts and Sciences; Biology*

Miranda Smith

*Arts and Sciences; Chemistry; Biology*

Paula Sogorka

*Arts and Sciences; Biological Sciences; Biology*

Mentor: Lili Ma

Abstract: The molecules used in this study are benzaldehyde and  $\alpha,\beta$ -unsaturated ketones, which are important for syntheses of tropinone derivatives, with pharmaceutical implications. Green Chemistry uses microscale amounts of reagents to prevent waste and exposure to hazardous materials. The reaction was performed by carefully adding the aldehyde to the ketone/catalyst mixtures in ethanol solvent. The reaction was monitored by TLC, worked up by extraction, purified by recrystallization, and characterized by IR and NMR. This project yields valuable unsaturated ketones, a class of interesting molecules with reported bioactivities in cancer treatment research.

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**Poster Number: 42****Synthesis and Purification of a Potentially Bioactive Tropinone-Derived  $\alpha,\beta$ -Unsaturated Ketone**

Miranda Smith

*Arts and Sciences; Chemistry; Biology*

Paula Sogorka

*Arts and Sciences; Chemistry; Biology*

Lily Zerhusen

*Arts and Sciences; Chemistry; Biology*

Mentor: Lili Ma

Abstract: Cancer is characterized by uncontrolled cell division and affects over two million individuals in the United States annually.  $\alpha,\beta$ -Unsaturated ketones are important organic intermediates known for their potential antitumor activity. Incorporating  $\alpha,\beta$ -Unsaturated ketones into a tropinone scaffold may enhance these antitumor properties. This study aims to develop a more efficient synthesis and purification method for D2MeO-I17-D2MeO via Claisen-Schmidt condensation. The reaction involved the dropwise addition of an aldehyde to a sodium hydroxide ketone mixture. The reaction was monitored by TLC and the final product was fully characterized by spectroscopic techniques including NMR and IR.

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**Poster Number: 43****Claisen-Schmidt Condensation for the Synthesis of a Tropinone Derivative**

Hannah Bartley

*Arts and Sciences; Chemistry; Chemistry*

Mentor: Lili Ma

Abstract: The synthesis of tropinone in the early 20th century was a pivotal discovery in organic synthesis. Tropinone provides the core structure for tropane alkaloids. Modern pharmaceutical drugs use tropane alkaloids as starting materials. This reaction was performed by carefully combining the aldehyde mixture and the ketone mixture. This reaction mixture was then heated to speed up the reaction time. Thin layer chromatography was used to monitor the reaction progress. Recrystallization was used to purify the product. This study provides continued investigation into the use of tropinone derivatives as antitumor agents.

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**Poster Number: 44****Prediction Of Drug Properties**

Ethan Schneider

*Arts and Sciences; Chemistry; Chemistry*

Abigail Silvers

*Arts and Sciences; Chemistry; Biology*

Jasmyne Searcy

*Arts and Sciences; Chemistry; Kinesiology*

Johannes Smal

*Arts and Sciences; Chemistry; Chemistry*

Mentor: Lili Ma

ACD Percepta is a drug software used to evaluate the physiochemical properties of the small organic molecules. Esterification is an important organic reaction due to its role in medical, material and food industry. In this project, an EDCI catalyzed esterification is used to synthesize tropinone ester derivatives. ACD/Percepta is utilized to analyze and compare the physiochemical properties of different ester derivatives. This study provides useful information to understand the influence of aromatic and aliphatic substituents on drug-like properties and to guide the synthesis of bioactive ester molecules.

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**Poster Number: 45****Microwave-assisted NBS Bromination for Drug Discovery Applications**

Jeff Flores

*Arts and Sciences; Biological Sciences; Biology*

Guinn Harler

*Arts and Sciences; Chemistry; Chemistry*

Micah Cole

*Arts and Sciences; Chemistry; Chemistry*

Kian Daly

*Arts and Sciences; Chemistry; Chemistry*

Guinn Harler

*Arts and Sciences; Chemistry; Chemistry*

Micah Cole

*Arts and Sciences; Chemistry; Chemistry*

Kian Daly

*Arts and Sciences; Chemistry; Chemistry*

Mentor: Lili Ma

Abstract: Alpha-bromoketones are valuable pharmaceutical precursors used in the synthesis of biologically active cyclic compounds. This study focuses on the synthesis of C16-Br using alpha-bromination of the ketone C16 using N-Bromosuccinimide (NBS) and p-Toluenesulfonic acid (p-TsOH) as a catalyst in acetonitrile using microwave irradiation. The reaction conditions were optimized to improve efficiency and yield. The product was isolated by extraction with diethyl ether, then washed with 5% HCl, NaHCO<sub>3</sub>, and brine. IR and HNMR spectroscopy are then used to characterize the molecule. This work contributes to the development of alpha-bromoketone building blocks for potential drug discovery applications.

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**Poster Number: 46**  
**Scrolling Through Mental Health: How TikTok Frames Mental Health for College Students**

Gabrielle Morris

*Arts and Sciences; Political Science, Criminal Justice and Organizational Leadership; Law; FYRE*

Mentor: Stacie Jankowski

Abstract: TikTok plays an influential role in shaping how college students understand and discuss mental health. This project examines how TikTok frames mental health and the messages these frames communicate to college-aged audiences. Guided by framing theory, this study analyzes popular mental health-related TikTok videos to identify recurring themes and narrative patterns, including personal storytelling, humor, and wellness culture. Findings indicate that TikTok frequently frames mental health as normalized and relatable, which may reduce stigma and encourage openness. However, these frames can also simplify complex mental health experiences. This research highlights TikTok's role in influencing college students' mental health perceptions.

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**Poster Number: 47**  
**The Landrum Cats, an Anthropological Study of Human-Animal Entanglements**

Natalie Brown

*Arts and Sciences; Sociology, Anthropology and Philosophy; Anthropology*

Mentors: Sharyn Jones

Abstract: Animals play an important social role given their potential to connect humans with the environment and strengthen community bonds. Recently, the cats that live outside of NKU's Landrum Academic Center have started controversy and debate between students, faculty, staff, and the administration. Community members have come together to show support for the Landrum cats and voice their opinions through a growing online petition. These cats have brought people from many backgrounds together, bringing unity to a diverse community. This dispute highlights the importance of human-animal relationships and is analyzed from an anthropological perspective using the method of participant observation.

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**Poster Number: 48**  
**One-Pot Synthesis of Novel Tropinone-Derived Thiazole Compound with Potential Drug-like Properties**

Guinn Harler

*Arts and Sciences; Chemistry; Chemistry*

Micah Cole

*Arts and Sciences; Chemistry; Chemistry*

Kian Daly

*Arts and Sciences; Chemistry; Chemistry*

Jeff Flores

*Arts and Sciences; Chemistry; Chemistry*

Mentor: Lili Ma

Abstract: Recent investigations of thiazole molecules synthesized from tropinone, thiosemicarbazide, and bromoketones have demonstrated anticancer activity in preliminary bioassays. To contribute to drug discovery, in this study, the novel thiazole compound cycloheptanone, 2-(4-(4-chlorophenyl)-2-thiazolyl)hydrazine was synthesized from the reaction of cycloheptanone, thiosemicarbazide, and 2-bromo-3-methoxyacetophenone. Reaction conditions for preparation of the bromoketone and the tropinone-scaffold thiazole compound were optimized for yield and purity. The investigation of potentially bioactive molecules like tropinone-thiazole derivatives can lead to the development of new anticancer drugs and contribute to the field of cancer research.

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**Poster Number: 49**  
**A literature review of cystic fibrosis**

Sarah Houston

*Health and Human Services; School of Allied Health;*

*Respiratory Care*

Haley Snodgrass

*Health and Human Services; School of Allied Health;*

*Respiratory Care*

Jiya Dansby

*Health and Human Services; School of Allied Health;*

*Respiratory Care*

Mentors: Jackie Davis, Alicia Ireton

Abstract: Cystic Fibrosis is a genetic disorder caused by mutations in the CFTR gene, leading to thick secretions that affect multiple organ systems. In order to treat this disease process, respiratory therapists must use therapies and medications to treat the respiratory system while also acknowledging the other systems that are impacted by this disease, including the cardiovascular, digestive, reproductive, and urinary systems. This project will review literature related to cystic fibrosis and provide evidence-based practice recommendations for respiratory therapists to treat this disease.

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**Poster Number: 50**  
**Using Green Sinks as a Flood Mitigation Strategy in Northern Kentucky**

Austin Green  
*Arts and Sciences; Biological Sciences; Environmental Science*  
Leticia Munoz  
*Arts and Sciences; Biological Sciences; Environmental Science*  
Anh Nguyen  
*Arts and Sciences; Biological Sciences; Environmental Science*  
Chase Yunker  
*Arts and Sciences; Biological Sciences; Environmental Science*

Mentor: Kristy Hopfensperger

Abstract: The built environment in Northern Kentucky is vulnerable to flooding from heavy rainfall. Previous studies show flooding impacts water quality via high bacteria presence, high sedimentation and excess nutrients. A solution to these impacts is the placement of green sinks, vegetated areas that intercept stormwater. Using GIS, we determined where flooding is likely to occur in Northern Kentucky. Based on topography and stream patterns, we calculated the percentage of flood "risk-zone", which highlights where green sinks would be most suitable. For two watersheds, we found the subcatchment areas with the highest "risk-zones", to prioritize where flood-mitigation strategies should be developed.

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**Poster Number: 51**  
**StillCold: A Modular BLE-Based Environmental Monitoring Prototype**

Jeffrey Perdue  
*Informatics; School of Computing and Analytics; Applied Software Engineering*

Mentor: Samuel Cho

Abstract: StillCold is an educational IoT prototype designed to monitor temperature inside enclosed environments without requiring physical access or internet connectivity. The system collects environmental data and exposes it through a Bluetooth Low Energy (BLE) service, allowing nearby devices to retrieve live readings without disturbing the monitored space. A companion Flutter mobile application validates end-to-end functionality by discovering the device, connecting over BLE, and displaying real-time measurements. By emphasizing modular architecture, infrastructure independence, and observable data flow, StillCold demonstrates how embedded systems move real-world measurements from sensor to user-facing interface with clarity and reliability.

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**Poster Number: 52**  
**Urban Food Forests: A Strategy for Climate Resilience in Covington, KY**

Anna Chandler  
*Arts and Sciences; Biological Sciences; Environmental Science*  
Sarah Keeney  
*Arts and Sciences; Biological Sciences; Environmental Science*  
Logan Bollinger  
*Arts and Sciences; Biological Sciences; Environmental Science*

Mentor: Kristy Hopfensperger

Abstract: This study evaluates the feasibility of community food forests in Covington, KY, to mitigate greenhouse gas emissions under the Cincinnati Climate Pollution Reduction Grant. We used iTree for 20-year carbon sequestration estimates, ArcGIS for site mapping, and information from experts to develop an implementation framework. Outcomes included carbon dioxide reduction metrics, site-selection criteria, and native species selections. Our findings demonstrate that food forests can reduce the Urban Heat Island effect, enhance biodiversity, and mitigate food insecurity by bridging socio-economic gaps through sustainable local agriculture.

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**Poster Number: 53**  
**A Sociological View of Inaccessibility in Healthcare Research**

Jade Combs  
*Arts and Sciences; Chemistry; Chemistry*

Mentor: Rhonda Davis

Abstract: The discussion of inaccessibility in scientific research has been ongoing for decades, further amplified in mainstream media with the increasing misinformation/disinformation epidemic towards healthcare research. This project seeks to utilize sociological tools to discover the underlying causes of the growing disconnect between scientific communication and the general public.

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**Poster Number: 54****Microwave-Assisted  $\alpha$ -Bromination of Acetophenone Toward Thiazole-Based Drug Scaffold**

Kian Daly

*Arts and Sciences; Chemistry; Chemistry*

Jeff Flores

*Arts and Sciences; Biological Sciences; Biology*

Micah Cole

*Arts and Sciences; Chemistry; Chemistry*

Guinn Harler

*Arts and Sciences; Chemistry; Chemistry*

Mentor: Lili Ma

Abstract: Alpha-bromoketones are important intermediates for the synthesis of biologically active heterocycles, including thiazole derivatives with reported anticancer potential. In this study, acetophenone derivatives were synthesized via N-bromosuccinimide (NBS)-mediated  $\alpha$ -bromination in acetonitrile using p-toluenesulfonic acid as catalyst under thermal or microwave irradiation. Products were isolated by extraction, purified by flash chromatography, and characterized by IR and  $^1\text{H}$  NMR spectroscopy. These bromoketone intermediates provide useful building blocks for subsequent thiazole formation and potential bioactive compound development.

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**Poster Number: 55****Links between stream stability, habitat, and watershed characteristics**

Abigail Todd

*Arts and Sciences; Biological Sciences;**Environmental Science*

River Morfitt

*Arts and Sciences; Biological Sciences;**Environmental Science*

Devin Moore

*Arts and Sciences; Biological Sciences;**Environmental Science*

Josie Timmers

*Arts and Sciences; Biological Sciences; Biology*

Liam Barker

*Arts and Sciences; Biological Sciences; Biology*

Mentor: Kristy Hopfensperger

Abstract: Many factors were used to determine the quality and stability of stream ecosystems and to provide insight to ongoing channel evolution. Qualitative Habitat Evaluation Index, Habitat Assessment Survey, and Hydromodification survey were performed at five sites in Ohio. Study sites were located on two streams with differing land cover. Our results show steep slopes, loss of vegetation, and large variation in stream substrate. This can be attributed to land use, tree cover, and soil type in the area. Our data serves as the first in a multi-year study, where channel evolution can be determined.

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**Poster Number: 56****Optimization of Ester Synthesis: Enhancing Yield and Purity Through Recrystallization**

Abby Silvers

*Arts and Sciences; Biological Sciences; Biology*

Jahannes Smal

*Arts and Sciences; Chemistry; Chemistry*

Jasmyne Searcy

*Arts and Sciences; School of Kinesiology, Counseling**and Rehabilitative Sciences; Kinesiology*

EJ Schneider

*Arts and Sciences; Chemistry; Chemistry*

Mentor: Lili Ma

Abstract: Pharmaceutical manufacturing places importance on making drugs through high yield reactions. Often when making medications with chiral centers the configuration changes the drugs interaction causing side effects. Steglich Esterification is used in this study to synthesize compound E51-JJ5 under microwave irradiation. Reaction conditions were optimized following green chemistry guidelines. Final products were purified by recrystallization technique. Spectroscopic method including NMR was used to confirm the structure and identify the purity of the final compound.

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**Poster Number: 57****Computational Investigation of Organic Chemistry Laboratory Target D2-I17-D2**

Ashton Baxter

*Arts and Sciences; Biological Sciences; Environmental Science*

Leticia Munoz Revelo

*Arts and Sciences; Biological Sciences; Environmental Science*

Mentor: Hongmei Wang

Abstract: Urban development creates everlasting structures that leave negative environmental impacts on an area. This makes it highly important to support smart urban design that values implementation of sustainable practices. This study examines urban development and sustainability in Cincinnati between 2010 and 2022 using remote sensing analysis in ENVI. Sustainability factors, including green space and transportation accessibility, were mapped to provide insights to the city's urban design choices. Results indicate the need for a balance between increasing artificial surfaces and natural areas, and thoughtful incorporation of sustainable features. These findings demonstrate how urban design decisions impact environmental quality and resident well-being.

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**Poster Number: 58****Weather-Driven Patterns in Technically Related Rocket Launch Failures**

Julia Tyszkiewicz

*Informatics; School of Computing and Analytics; Computer Info Technology*

Renn Spigelmyer

*Arts and Sciences; Biological Sciences; Neuroscience*

Xander Murphy

*Informatics; School of Media and Communication; Applied Software Engineering*

Mentor: Junxiu Zhou

Abstract: Weather conditions are known to affect rocket launch success in both research and commercial space missions. This project investigates whether patterns in temperature, wind speed, and humidity correlate with technical-related rocket launch failures. A supervised machine learning model is trained on a dataset of weather conditions and historical rocket launches. Preliminary feature-importance analysis reveals that certain weather conditions may increase the likelihood of technical failures, supporting the hypothesis that adverse weather can exacerbate hardware vulnerabilities. The preliminary findings suggest this model can be further developed and implemented in improving rocket launch success.

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**Poster Number: 59****Assessing Wetland Mitigation Potential: Application of the GEMM Tool in Boone County, Kentucky**

Ashton Baxter

*Arts and Sciences; Biological Sciences; Environmental Science*

Mentor: Hongmei Wang

Abstract: Rapid development in Boone County, Kentucky, has placed increasing pressure on remaining natural areas, which leads to the need for effective conservation planning. Wetlands play essential roles in filtering pollutants, collecting excess stormwater, and providing habitat for aquatic wildlife. Therefore, they are among the county's most threatened natural resources. The Greenspace Environmental Mitigation Mapper (GEMM), a GIS-based decision-support tool, was used in this study to analyze spatial relationships among key land characteristics and identify areas suitable for future wetland mitigation projects. The results highlight priority zones for targeted conservation efforts aimed at protecting and restoring Boone County's wetland.

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**Poster Number: 60****Evaluating Qwen 2.5: Performance of a Distilled Model on the John O'Bryan Mathematics Competition**

Aaditya Khanal

*Informatics; School of Computing and Analytics; Data Science*

Gaurab Baral

*Informatics; School of Computing and Analytics; Data Science*

Mentors: Junxiu Zhou, Yangyang Tao

Abstract: Model Distillation transfers knowledge from a large "teacher" model to a smaller "student" model, preserving performance while greatly reducing size and computational cost. Since the release of DeepSeek, distilled models up to 10–100× smaller have achieved results comparable to their teachers. In this study, we evaluate Qwen 2.5 + distilled from DeepSeek-R1 on the John O'Bryan Mathematics Competition. Using 600 questions (2011–2025), we show that the smaller model maintains strong mathematical reasoning performance with improved efficiency. We also test distilled Qwen 2.5+ models on the MATH 500 dataset to assess mathematical reasoning performance across benchmarks.

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**Poster Number: 61**  
**Efficient Synthesis and Spectroscopic Characterization of Compound E12-J23PH via Esterification**

Jamie Richey  
*Arts and Sciences; Chemistry; Biology*

Mentor: Lili Ma

Abstract: This project investigates the esterification of E12 with J23PH to synthesize E12-J23PH. Ester formation is a fundamental transformation in organic chemistry with broad applications in pharmaceuticals and materials science. The reaction successfully produced the target ester, confirmed by proton NMR and IR spectroscopy, showing characteristic ester carbonyl absorption ( $\sim 1735\text{ cm}^{-1}$ ) along with new proton signals consistent with product formation. The disappearance of starting material signals ( $\sim 3300\text{ cm}^{-1}$ ) further supported conversion. These findings demonstrate efficient ester synthesis and reinforce esterification as a valuable model reaction in modern organic chemistry.

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**Poster Number: 62**  
**How Important is 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 ( $n=836$ ).

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**Poster Number: 63**  
**Microwave Assisted Synthesis of a Cyclic Diester from a Dicarboxylic Acid and Cyclohexanol**

Jasmyne Searcy  
*Arts and Sciences; Chemistry; Kinesiology*

Mentor: Lili Ma

Abstract: Cyclic diesters are important structural motifs in pharmaceuticals, biodegradable polymers, and functional organic materials. In this research study a dicarboxylic acid (JJ5) was reacted with cyclohexanol (E7) using EDC•HCl and DMAP in CDCl<sub>3</sub> under microwave radiation at 110 degrees for 20 minutes. This promoted both esterification and ring formation to produce the desired cyclic diester. The <sup>1</sup>H NMR and IR spectroscopy confirmed the formation of the diester by observing the disappearance of carboxylic acid signals and the appearance of ester resonances. This work shows an efficient method for synthesizing cyclic diesters using microwave-assisted organic synthesis.

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**Poster Number: 64**  
**Comparing Rivalry Dynamics Across Soccer Leagues**

Jake Leach  
*Business; Marketing, Sports Business and Construction Management; Political Science; FYRE*

Mentor: Joe Cobbs

Abstract: This project differentiates rivalries in two professional soccer leagues, Major League Soccer (MLS) and the English Premier League (EPL), using survey data that measure fans' perspective of the importance of ten key rivalry ingredients. This topic is important because rivalries increase fan interest, engagement, and economic demand while also carrying the potential for hostility. The results demonstrate that rivalry formation is driven by distinct combinations of competitive, geographic, and identity-based factors across leagues. Understanding what contributes to rivalry intensity is therefore critical for decision-making by investors, officials, and managers seeking to balance business growth and fan behavior.

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**Poster Number: 65****Mapping Potential Birds Habitats Around Airports with Using Remote Sensing Techniques**

Chris Bowman

*Informatics; School of Computing and Analytics; Computer Science*

Mentor: Hongmei Wang

Abstract: Bird strikes remain a significant threat to aviation safety, leading to loss of life, aircraft damage, and substantial economic costs. Effective mitigation depends on understanding environmental factors that attract birds to airport surroundings. This study maps potential bird habitats around multiple airports using remotely sensed imagery. Data are processed and classified into land cover types with ENVI software to identify potential birds habitats areas. The resulting high birds traffic maps are intended to inform pilots and airport managers, enhancing situational awareness and operational decision-making. Integrating geospatial analysis into safety planning may help reduce bird strikes and associated damages.

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**Poster Number: 66****Prediction of Drug-Like Properties in Methoxy-Substituted Dibenzylidenecycloheptanone Derivatives Us**

Mubassil Chaudhry

*Arts and Sciences; Biological Sciences; Biology*

Maddux Bigam

*Arts and Sciences; Biological Sciences; Biology*

Mentor: Lili Ma

Abstract: ACD Percepta software is used to analyze dibenzylidenecycloheptanone derivatives to predict their drug-like properties. This study aims to evaluate the drug-like properties of the proposed compounds using Lipinski's Rule of Five, and to evaluate the influences of mono-, di-, and trimethoxy substitutions on dibenzylidenecycloheptanone scaffold. Swiss Target Prediction will be utilized to identify potential pharmaceutical targets for dibenzylidenecycloheptanone derivatives, e.g., Epidermal Growth Factor Receptor (EGFR/ErbB1) which promotes tumor cell proliferation. Therefore, selecting derivatives with optimal properties helps prioritize synthesis of candidates that may have potential anti-cancer activities.

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**Poster Number: 67****Using Remote Sensing to Analyze Flood Changes in the Ohio River Valley**

Tiffany Frederick

*Arts and Sciences; Biological Sciences; Environmental Science*

Blake Kubicek

*Arts and Sciences; Accounting, Economics and Finance; Mathematics*

Mentor: Hongmei Wang

Abstract: Flooding along the Ohio River Valley presents increasing risks to communities, infrastructure, and economic activity as development expands near the river. This study analyzes changes in flood extent, high-risk areas, and vulnerable land types over the past 30–40 years using Landsat imagery, land cover data, and digital elevation models. Major flood events in 1997 and 2018 are mapped and compared to identify patterns of recurring or expanding inundation. The study results indicate greater flood exposure in developed and impervious areas, offering insights to support risk mitigation strategies and strengthen protection for riverside communities, businesses, and critical infrastructure.

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**Poster Number: 68****Impacts of Land Use Change on Flooding in Ohio River Valley Communities**

Cecelia Harner

*Arts and Sciences; Biological Sciences;**Environmental Science*

Anh Nguyen

*Arts and Sciences; Biological Sciences;**Environmental Science*

Mentor: Hongmei Wang

Abstract: Flooding along the Ohio River Valley has long affected communities situated in low-lying areas. This study uses remote sensing techniques to examine how land use changes have contributed to increased flooding dynamics over time. Landsat satellite images were processed and classified into various land cover types. They were used to evaluate spatial relationships between urban expansion and flood extent. Results show a strong correlation between increased impervious surfaces and higher flood stages. These findings demonstrate the importance of sustainable land use planning to mitigate future flood risks in the Ohio River Valley.

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**Poster Number: 69****Integrating Reinforcement Learning and LLM-Based Agents for Adaptive Intelligent Tutoring**

Abhishek Shah

*Informatics; School of Computing and Analytics;  
Computer Science*

Sajan Poudel

*Informatics; School of Computing and Analytics;  
Computer Science*

Mentor: Nazmus Sadat

Abstract: Intelligent tutoring systems (ITS) are computer programs designed to provide personalized instruction by adapting to individual learners. However, traditional ITS rely on fixed problem banks and predetermined rules, limiting their ability to respond dynamically to student needs. This project develops an innovative math tutor using reinforcement learning (RL), a machine learning approach where an AI agent learns optimal teaching strategies through trial and error. The proposed system integrates three key innovations: multi-factor difficulty scoring that considers inter-conceptual relationships, problem complexity, and prerequisites, a realistic student simulation framework based on a dual-agent architecture, and an RL-based tutor that maximizes student learning.

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**Poster Number: 70****Exploring the Relationship Between National Parks and Local Urbanization: Case Study of Mammoth Cave**

Samuel Chapman

*Arts and Sciences; Biological Sciences;  
Environmental Science*

Liam Barker

*Arts and Sciences; Biological Sciences; Biology*

Mentor: Hongmei Wang

Abstract: National parks impact nearby cities in many ways. This study investigates the relationship between local cities' growth and Mammoth Cave National Park, with a focus on correlations between park significance and local economic health. Using publicly available satellite imagery and the software ENVI, we analyze patterns of infrastructure expansion and settlement growth in surrounding cities over time. We hypothesize that increased cultural and recreational importance of the park drives growth in nearby cities. Understanding these dynamics could inform strategies to support economic development in small cities adjacent to National Parks. Findings may provide insights applicable to other park-adjacent communities nationwide.

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**Poster Number: 71****Long-term X-ray and UV variability of X-ray bright Active Galactic Nuclei**

Grace Wireman

*Arts and Sciences; Physics, Geology and Engineering  
Technology; Physics*

McKinley Tolley

*Informatics; School of Computing and Analytics;  
Data Science*

Grace Mongonza

*Arts and Sciences; Physics, Geology and Engineering  
Technology; Engineering Technology; FYRE*

Amara Baptiste

*Arts and Sciences; Physics, Geology and Engineering  
Technology; Physics*

Mentor: Dirk Grupe

Abstract: We are presenting the X-ray and UV analysis of a small sample of 10 AGN that stretch the black hole mass range between  $10^6$  to about  $10^9$  solar masses. These AGN are part of the legacy sample of Active Galactic Nuclei (AGN) that was built by using the NASA Neil Gehrels Swift mission in order to study the long-term variability of AGN. The core of this sample contains about 130 AGN which Swift has monitored over the last two decades. In this poster we will describe the sample and will present some preliminary analysis of the X-ray variability. In this poster we...

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**Poster Number: 72****Assessing Land Loss from Sea Level Rise in Fiji and Key West Using Remote Sensing**

Steven Ashworth

*Arts and Sciences; Physics, Geology and Engineering  
Technology; Geology Management*

Mentor: Hongmei Wang

Abstract: Rising sea levels pose a significant global threat to the sustainability of coastal communities. The goal of this study is to assess the extent and impacts of sea level rise on two island regions—Fiji and Key West. Using Landsat remote sensing data and change detection analysis, this study assesses land loss in these areas over time. The findings contribute to a better understanding of the accelerating effects of global warming and support future coastal management and adaptation strategies for vulnerable island communities.

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**Poster Number: 73**  
**Comparing Pediatric and Adult Asthma Management in Respiratory Care**

Nadia Oros  
*Health and Human Services; School of Allied Health; Respiratory Care*  
Andrea Martinez Del Bosque  
*Health and Human Services; School of Allied Health; Respiratory Care*

Mentors: Alicia Ireton, Jackie Davis

Abstract: Asthma is a chronic respiratory condition affecting both pediatric and adult populations and requires ongoing management to maintain disease control and prevent complications. Differences in triggers, treatment approaches, and education needs can impact patient outcomes across the lifespans. This literature review compares pediatric and adult asthma management protocols with emphasis on the respiratory therapist's role. Clinical guidelines and peer-reviewed research were reviewed to examine effective respiratory therapy interventions. Findings suggest that age-specific education, individualized management plans, and proper inhaler technique improve symptom control and reduce exacerbations and hospital readmissions.

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**Poster Number: 74**  
**Determining the Role of Yeast tRNA Body Modifications using LEU2 Stop-Codon Readthrough**

Alisha Detmer  
*Arts and Sciences; Chemistry; Chemistry*  
Drew Scott  
*Arts and Sciences; Chemistry; Chemistry*  
Faith Meghrian  
*Health and Human Services; School of Nursing; Nursing Baccalaureate*

Mentors: Michael Guy, Madisyn Hayes

Abstract: Post-transcriptional modifications are critical for tRNA function and are conserved between yeast and humans. Modification defects cause human diseases such as intellectual disability through unclear mechanisms. Cellular defects caused by loss of modifications on individual tRNAs can be investigated in yeast using tRNAs that read through stop codons in the LEU2 gene. Removing modifications important for tRNA function causes slow growth in media lacking leucine. Modification mutants that grow well under these conditions have acquired mutations that compensate for the modification defect. Identification of mutated genes in this manner may help identify specific cellular roles of modifications on individual tRNAs.

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**Poster Number: 75**  
**Investigating Cell Cycle Differences in SAM1 and SAM2 Knockout Strains in *Saccharomyces cerevisiae***

Yara Abdou  
*Arts and Sciences; Biological Sciences; Biology*

Mentors: Erin Strome, Daisy Grove

Abstract: In *Saccharomyces cerevisiae*, the SAM1 and SAM2 genes synthesize S-adenosylmethionine (AdoMet), an essential methyl donor and regulator of sulfur and methionine networks. Losses of these genes impact genome stability and AdoMet levels, with the loss of sam2 resulting in increased genome instability, a hallmark of cancer development. This project aims to utilize flow cytometry to determine cell cycle S-phase length and overall cell cycle progression differences that might result due to loss of SAM1 and SAM2. We seek to determine whether alterations in cell cycle progression may help explain the observed differences in genome stability across strains.

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**Poster Number: 76**  
**Identifying Best Practices for Teaching Anatomy to Blind and Low-Vision Learners**

Evan Welp  
*Arts and Sciences; Biological Sciences; Biology*

Mentor: Tamara O'Callaghan

Abstract: Anatomy is commonly taught through visual diagrams and models, which can create barriers for blind and low-vision students. This project explores best practices for teaching anatomical concepts through touch rather than sight. After reviewing research on tactile learning, inclusive pedagogy, and 3D printing in anatomy education, I identified strategies such as structured exploration, introducing one concept at a time, clear texture differentiation, and active reinforcement. These principles informed the design of a prototype 3D-printed model of the integumentary system intended to support effective tactile instruction and promote more inclusive STEM learning environments.

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**Poster Number: 77****How do genetic differences in the COMT rs4680 SNP impact working memory capacity and recall?**

Christina Gogzheyana

*Arts and Sciences; Biological Sciences; Neuroscience*

Taylor Easybuck

*Arts and Sciences; Biological Sciences; Biology*

Mentor: Brittany Smith

Abstract: The COMT rs4680 (Val158Met) SNP is important in dopamine degradation. Differences in this gene can impact an individual's predisposition to multiple mental disorders, which also impacts their regulation of mental response to cognitive pressure. The N-back test measures working memory capacity and recall. We hypothesized that individuals with the Val/Val genotype will have fewer omit, commit, and total errors on all trials of the N-back test. Our results revealed that commissions and total errors for the Val/Val genotype were significantly lower. This data suggests that the Val/Val genotype can better regulate their responses to cognitive pressures.

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**Poster Number: 78****COMT Genotype and Behavioral Approach Interactions on Frontal Alpha Asymmetry**

Dan Bui

*Arts and Sciences; Biological Sciences; Neuroscience*

Avah Fetzer

*Arts and Sciences; Biological Sciences; Neuroscience*

Emma Rose Fischer

*Arts and Sciences; Psychological Science; Psychology*

Mentor: Brittany Smith

Abstract: The COMT rs4680 genotypes (A- and GG) associate with different behavioral traits. Frontal alpha asymmetry (FAA) differentiates brain activity between right and left frontal areas and the behavioral approach personality traits (BAS)[BS1]. We hypothesize individuals with higher BAS scores have higher FAA. We used an EEG to study interactions between BAS and FAA while viewing emotional faces in different genotypes. We found significant interactions between genotype and BAS scores, with higher FAA in individuals that have higher BAS scores in the GG genotype. This suggests individuals with lower dopamine may have greater behavioral approach predicting greater left cortical activity.

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**Poster Number: 79****Photodegradation of the tire additive 6PPD and its hydrolysis product 4HDPA**

Emily Wymer

*Arts and Sciences; Biological Sciences; Environmental Science*

Taylor Adams

*Arts and Sciences; Physics, Geology and Engineering Technology; Engineering Technology*

Methmi Kasturiratna

*Arts and Sciences; Chemistry; Chemistry*

Joshua Johnson

*Arts and Sciences; Chemistry; Chemistry*

Mentor: Patrick Hare

Abstract: 6PPD is a chemical additive to tires which reduces ozonation and extends tire lifespans, and which enters the environment as tires wear down. However, it has been found in air and waterways, and its quinone derivative is toxic to certain species of fish. In water, 6PPD quickly transforms into 4HDPA. Both of these compounds undergo UV photodegradation. The photochemistry and photophysics of 6PPD and 4HDPA were studied in a variety of solvents and at several pHs. Both 6PPD and 4HDPA produce a variety of solvent-dependent products which are formed at different rates, with 6PPD generally photodegrading more slowly than 4HDPA.

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**Poster Number: 80****Computational Investigation of Organic Chemistry Laboratory Target E80-J32**

Martin Ding

*Arts and Sciences; Chemistry; Chemistry*

Cameron Easton

*Arts and Sciences; Physics, Geology and Engineering Technology; Engineering Technology*

Mentor: Patrick Hare

Abstract: Computational chemistry was used to determine the energy differences and thermodynamics for the reaction forming E80-J32 that was carried out by students 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.

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**Poster Number: 81****Computational Investigation of Organic Chemistry  
Laboratory Target E80-JJ5-E80**

Alisha Detmer

*Arts and Sciences; Chemistry; Chemistry*

Devin Flaughner

*Arts and Sciences; Chemistry; Chemistry*

Nina Kappes

*Arts and Sciences; Chemistry; Chemistry*

Mentor: Patrick Hare

Abstract: Computational chemistry was used to determine the energy differences and thermodynamics for the reaction forming E80-JJ5-E80 that was carried out by students in CHE 311L this semester. In addition, vibrational and NMR spectra for the reactants and product were found to determine if the reaction progress could be monitored with those techniques.

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**Poster Number: 82****The reality of the shieldmaiden - an examination of  
Viking age death culture and burials**

Sophie McEwen

*Arts and Sciences; Sociology, Anthropology and  
Philosophy; Anthropology*

Mentor: Sharyn Jones

Abstract: With the reality of warrior women in dispute, this project works to comprehensively combine the substantial evidence that exists, and compare it to mythological understandings of Viking women. This is done with a focus on an excavation in Birka, Sweden, but includes other regions in the Viking world. The role of women in society is too often assumed to be uniform throughout history and across cultures. Myth is taken as truth, telling the anthropologist about female roles and how much power women held. Although a strong mythology for shieldmaidens exists, the evidence is sparse. Nevertheless, it is worth examination.

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**Poster Number: 83****Computational Investigation of Organic Chemistry  
Laboratory Target E7-J31**

Zackary Beard

*Arts and Sciences; Chemistry; Chemistry*

Emily Forbes

*Arts and Sciences; Chemistry; Chemistry*

Matthew Maines

*Arts and Sciences; Chemistry; Chemistry*

Mentor: Patrick Hare

Abstract: Computational chemistry was used to determine the energy differences and thermodynamics for the reaction forming E7-J31 that was carried out by students in CHE 311L this semester. In addition, vibrational and NMR spectra for the reactants and product were found to determine if the reaction progress could be monitored with those techniques.

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**Poster Number: 84****Computational Investigation of Organic Chemistry  
Laboratory Target E31-JJ5-E31**

Saige Bradley

*Arts and Sciences; Chemistry; Chemistry*

Jade Combs

*Arts and Sciences; Chemistry; Chemistry*

Emily Neace

*Arts and Sciences; Chemistry; Chemistry*

Mentor: Patrick Hare

Abstract: Computational chemistry was used to determine the energy differences and thermodynamics for the reaction forming E31-JJ5-E31 that was carried out by students 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 absorption spectra of the molecules were modeled in solution.

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**Poster Number: 85****How Prenatal Fentanyl Exposure Affects Amygdala Development in Offspring**

Parker Byland

*Arts and Sciences; Biological Sciences; Biology; FYRE*

Mentor: Brittany Smith

Abstract: Fentanyl is the leading cause of opioid related deaths, responsible for over 90% of fatalities in 2021 (Gaither, 2023). This study investigates how prenatal fentanyl exposure affects offspring amygdala development. We predict increased myelin lesions and microglia presence in fentanyl-exposed mouse offspring, compared to control groups. 3D microscopy and image analysis was used to study fluorescent brain markers. It was expected that IBA1 and CD68 would increase, indicating greater microglial presence and activation, and reduced MBP, indicating myelin loss. This study aims to present information on the consequences of fentanyl usage during pregnancy and the lasting effects on brain function.

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**Poster Number: 86****ECG Heart Disease Detection with CNN and Transformer Models**

Simran Shrestha

*Informatics; School of Computing and Analytics; Computer Science*

Kriti Magar

*Informatics; School of Computing and Analytics; Computer Science*

Mentor: Junxiu Zhou

Abstract: Electrocardiograms (ECGs) are widely used to detect heart diseases, but manual interpretation can be time-consuming and requires expert knowledge. This project explores the use of deep learning to automate ECG classification and assist clinical diagnosis. We implement and compare two modern approaches: Convolutional Neural Networks (CNNs) and Transformer-based models. Both models are trained and evaluated using the PTB-XL dataset, a large and well-annotated collection of clinical ECG recordings. The goal is to analyze how effectively these architectures can identify different heart condition categories from ECG signals. By comparing their performance, this study aims to understand the potential of deep learning.

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**Poster Number: 87****The Effects of Prenatal Fentanyl Exposure on Executive Function in Mouse Offspring**

Salem Welty

*Arts and Sciences; Psychological Science; Psychology*

Mentor: Brittany Smith

Abstract: The emergence of fentanyl with the opioid epidemic has caused a drastic increase in overdoses and overdose related deaths. Prenatal opioid exposure has been shown to cause executive dysfunction in mouse offspring; however, fentanyl has been less studied. Previous pilot data regarding prenatal fentanyl exposure in mouse offspring using the five-choice serial reaction time task illustrated no effect on males and increased incorrect responding in females. A replication of this study showed similar results in which prenatal fentanyl exposure did not cause executive dysfunction in male offspring, although female offspring instead had reduced premature responding.

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**Poster Number: 88****Comparison of the Ingredients to Rivalry in the NBA and Men's College Basketball**

Brooke Kinney

*Business; Marketing, Sports Business and Construction Management; Sports Business*

Mentor: Joe Cobbs

Abstract: Grounded in Social Identity Theory, research has demonstrated the prominence of rivalries in producing demand for spectator sports, but what constitutes a rivalry and how such contests are authentically promoted remain important management decisions. This study measures the importance of ingredients of rivalry in a comparison between NCAA Men's College Basketball (MCBK) and the National Basketball Association (NBA). To address this question, I surveyed 1,162 MCBK fans and 803 NBA fans. By employing a published methodological framework, I compared and analyzed the importance of 10 different ingredients to rivalry using ANOVA to test for significant differences between basketball competition contexts.

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**Poster Number: 89****Building a newsletter brand: marketing strategies and performance metrics for growth**

Francesca (Frannie) Staley

*Business; Marketing, Sports Business and Construction Management; Marketing*Mentors: Abdullah Al-Bahrani, Sami Al-Farhan,  
Jose Saavedra Torres

Abstract: This project examines how a small newsletter can develop a marketing strategy to grow its audience and brand. I evaluate how targeted content and social media promotion influences audience engagement. I leverage content clusters, audience clusters, platform variation as growth tools. This research paper provides best practices and future strategies for growth.

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**Poster Number: 90****AI-Assisted Software Development: Developing the BeatSync Mobile Application**

Steven Weil

*Informatics; School of Computing and Analytics; Computer Science*

Mentor: Gary Newell

Abstract: Recent advances in artificial intelligence are increasingly influencing how software is designed, developed, and iterated throughout the software development lifecycle (SDLC). This project explores how AI-assisted tools can support development decisions, implementation strategies, and problem solving during application creation. We developed **BeatSync**, an iOS application that synchronizes an iPhone flashlight to music beats using real-time microphone input and signal processing. Throughout development, AI systems were used to assist with algorithm design, debugging, and architectural decisions. The resulting application serves as a case study demonstrating how AI can accelerate development workflows while still requiring human oversight, testing, and iterative...

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**Poster Number: 91****Effects of Ketamine Administration on Cognitive Flexibility in Rats**

Shreeukta Adhikari

*Arts and Sciences; Psychological Science; Psychology*

Coleman Neeley

*Arts and Sciences; Biological Sciences; Biology*

Emily Forbes Blanco

*Arts and Sciences; Chemistry; Chemistry*

Mentor: Justin Yates

Abstract: Ketamine is a dissociative hallucinogen with anesthetic and antidepressant properties; as such, ketamine use is increasing in both medical and recreational settings. While ketamine can improve cognitive functions in individuals with major depressive disorder, there is little research on the long-term effects of ketamine use in individuals who do not have a psychiatric disorder. In the present study, male and female rats were given an oral solution of either ketamine or saccharin during late adolescence/early adulthood before being tested in a reversal learning task, a measure of cognitive flexibility. Overall, ketamine did not alter cognitive flexibility.

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**Poster Number: 92****Microglia Changes of Mouse Offspring from Prenatal Morphine vs Buprenorphine Exposure**

Noah Raleigh

*Arts and Sciences; Biological Sciences; Biology*

Mentor: Brittany Smith

Abstract: The nucleus accumbens (NAc) is a brain region involved in reward-seeking and social behaviors. The NAc may be altered after prenatal exposure to opioids. Prenatal morphine exposure can increase social interaction and reward-seeking behaviors in mouse offspring. Buprenorphine (BUP) helps treat opioid use disorder and can reduce overdoses during pregnancy. Therefore, we tested whether prenatal morphine affects microglia-astrocyte interactions in the offspring's NAc and whether BUP will not have such an effect. Using immunofluorescent labels in the mouse brain, we found reduced microglia markers in female offspring after BUP and morphine exposure that could reflect impaired immune cell activity.

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**Poster Number: 93****AI-Enabled Vision-Based Autonomous Ground Vehicle for Flexible Manufacturing**

Dylan Robinson

*Arts and Sciences; Engineering Technology*

Sean Paizee

*Arts and Sciences; Physics, Geology and Engineering Technology; Engineering Technology*

Jackson Mixon

*Arts and Sciences; Physics, Geology and Engineering Technology; Engineering Technology*

Dave Rassche

*Arts and Sciences; Engineering Technology*

Mentor: Seyed Allameh

Abstract: Rapid advances in electronics and artificial intelligence have enabled the development of intelligent and cost-effective autonomous ground vehicles (AGVs). Unlike traditional systems that rely on magnetic guidance, the proposed AGV uses vision-based navigation, allowing flexible operation in factories where floor layouts may change frequently. AI-enabled microprocessors with powerful graphics processing, combined with LiDAR and 3D camera data, enable real-time mapping and navigation. Based on input from industry partners regarding speed, load capacity, functionality, and cost, a full-scale industry-relevant AGV is currently being designed. The project demonstrates how modern sensing, embedded computing, and AI support affordable autonomous material-handling solutions for manufacturing...

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**Poster Number: 94****Development of AI-Enabled Humanoid Robots for Hazardous Inspection and Educational Interaction**

Shariqa Tayabee

*Arts and Sciences; Physics, Geology and Engineering Technology; Engineering Technology*

Oluwamayokun Omeyele

*Physics, Geology and Engineering Technology; Engineering Technology*

Molly Eide

*Arts and Sciences; Physics, Geology and Engineering Technology; Engineering Technology*

Mentor: Seyed Allameh

Abstract: Humanoid robots are transitioning from research prototypes and hobby platforms to practical systems supporting industrial and educational applications. Advances in low-cost electronics, artificial intelligence, and 3D printing now enable development of affordable humanoid robots with improved mobility, sensing, and interaction capabilities. In collaboration with Duke Energy, this project focuses on designing humanoid robots capable of walking in hazardous environments to inspect equipment and verify safe process operation. Beyond industrial inspection, the robots will also support education by interacting with users, answering questions, assisting with problem solving, and serving as interactive guides during demonstrations and tours.

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**Poster Number: 95****Catechol-O-Methyltransferase (COMT) genotypes and alpha power during eyes closed and eyes open.**

Olivia Hughes

*Arts and Sciences; Psychological Science; Psychology*

Riley Baker

*Arts and Sciences; Psychological Science; Psychology*

Mentor: Brittany Smith

Abstract: The COMT polymorphism influences prefrontal cortical dopamine degradation, producing high-activity GG and low-activity A- genotypes. COMT may relate to neural responses such as restful alpha activity. We examined the COMT SNP (rs4680) and hypothesized that alpha activity would decrease with eyes open due to greater mental effort. Using EEG to track cortical alpha power, alpha activity was lower with eyes open than with closed, during the second trial. The A- genotype had lower alpha activity than the GG genotype overall in the second trial. This suggests A- genotypes may experience less restful activity during less stimulation than the GG genotype.

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**Poster Number: 96****The Balance of Academics and Athletics**

Chloe Browning

*Arts and Sciences; Biological Sciences; Honors; Biology*

Mentor: Shayla Myles-Aaron

Abstract: College students balance many responsibilities beyond academics including extracurricular activities, athletics, and employment. Yet the demands are not always well understood by most individuals. This study examines how much time students spend outside academics and how their commitments affect their responsibilities. Data was collected through a variety of Google Forms to survey students' questions about their extra curricular time and how it was spent. It is suggested by the results that student athletes report particularly high time commitment both to their sport and academics. These findings highlight the challenges student athletes face when balancing their life.

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**Poster Number: 97****Simulation Education and Social Media**

Sydney Oergel

*Honors; Biological Sciences; Biology*

Mentor: Rami Leventhal

Abstract: Simulation education is an important component of healthcare education and training, allowing students and professionals to practice clinical skills in a safe and controlled environment. However, many individuals are unaware of how commonly simulation is used in healthcare education. This project aimed to increase awareness of simulation education through a short TikTok video highlighting several simulation techniques, including the Anatomage table. After watching the video, participants completed an anonymous survey assessing their awareness and understanding of simulation education. Results suggested that viewers had limited prior knowledge, but the video positively improved their awareness and understanding of simulation education.

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**Poster Number: 98****Amygdala Myelin Volume in Mice Prenatally Exposed to Fentanyl**

Martin Powers

*Arts and Sciences; Biological Sciences; Neuroscience*

Mentor: Brittany Smith

Abstract: Despite a nationwide decline in opioid overdoses, thousands of infants are still exposed to opioids during pregnancy. Previous research in humans show white matter lesions and reduced amygdala volume after prenatal opioid exposure. However, there is a lack of controlled research regarding the specific impact of fentanyl on these areas. This study sought to investigate how fentanyl impacted major regions of the amygdala in mice exposed in utero. Using immunohistochemistry, two proteins were tracked (MBP and Olig2). The results showed that the neonatal exposure group had significantly higher myelin levels than the control group in adulthood, suggesting lasting effects.

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**Poster Number: 99****Passive Designs in Sustainable Construction**

Luke Armstrong

*Business; Marketing, Sports Business and Construction Management; Construction Management*

Hayden Thompson

*Business; Marketing, Sports Business and Construction Management; Construction Management*

Aaron Kirsch

*Business; Marketing, Sports Business and Construction Management; Construction Management*

Ben Stephens

*Business; Marketing, Sports Business and Construction Management; Construction Management*

Mentor: Boshra Karimi

Abstract: Passive designs can improve sustainability by reducing energy use and environmental impact. This study examines the effectiveness of passive design in the construction by comparing passive and non-passive methods. Passive design features are strategies passively worked into the project not costing more money, while non-passive methods are more cost heavy and impact the way the project is completed. The comparison is based on cost, energy consumption, and environmental impact. The findings prove it can reduce energy use and lifecycle costs while improving environmental performance. This shows that incorporating passive design can provide a practical approach to sustainable construction.

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**Poster Number: 100****Capturing the Experience of Digital Fatigue: Scale Development and Validation**

Hannah Dewald

*Arts and Sciences; Psychological Science*

Grace Riley

*Arts and Sciences; Psychological Science*

Carlos Matthews

*Educational Leadership; Education*

Mentor: Philip Moberg

Abstract: This study proposes a new measure of digital fatigue, a psychological health concern emerging from increased workplace technology use, and hypothesizes four dimensions: mental exhaustion, reduced productivity, physical strain, and constant connectivity. We report findings examining internal structure and linking dimensions to constructs of fatigue, stress, anxiety, and burnout.

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**Poster Number: 101****Drone Applications for Environmental Monitoring and Waste Reduction on Job Sites**

Mike Brankamp

*Business; Marketing, Sports Business and Construction Management; Construction Management*

Eli Crawford

*Business; Marketing, Sports Business and Construction Management; Construction Management*

Leticia Munoz

*Business; Marketing, Sports Business and Construction Management; Construction Management*

Koby Staples

*Business; Marketing, Sports Business and Construction Management; Construction Management*

Mentor: Boshra Karimi

Abstract: The construction industry is a major producer of waste, generating about 4-6 tons over the life cycle of a typical project and contributing to greenhouse gas emissions, non-renewable energy usage, and habitat destruction. This study investigates the use of aerial imaging and data analytics to track material usage, identify waste hotspots, and assess environmental risks. By implementing drone technology on construction sites, we expect to reduce the time, materials, and labor required for inspections, thereby lowering costs and improving data accuracy. This would significantly limit the need for workers' site exposure and promote sustainable construction management practices across the industry.

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**Poster Number: 102****Utilizing Universal Design to Create an Accessible Board Game for Blind and Low-Vision Learners**

Benjamin Lloyd

*Arts and Sciences; English; English*

Mentor: Tamara O'Callaghan

Abstract: Recent collaborations between NKU students and Clovernook Center for the Blind and Visually Impaired have shown a high interest in pedagogical material designed with the needs of blind/low-vision students in mind. Multiple studies point to the educational value of serious games, although many such games rely heavily on visual elements, a design choice which poses problems for blind/low-vision students. I designed a serious board game intended to be playable and enjoyed by all students, regardless of their visual ability. This board game employs narrative methods and gameplay mechanics to encourage critical thinking and to develop teamwork skills.

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**Poster Number: 103****Deep Learning-Based Prediction of IPL Match Outcomes Using Historical Data**

Yunish Bogati

*Informatics; School of Computing and Analytics; Computer Science*

Abhishek Siwakoti

*Informatics; School of Computing and Analytics; Computer Science*

Mentor: Junxiu Zhou

Abstract: The Indian Premier League (IPL) is one of the most competitive T20 cricket leagues in the world, where teams compete across different venues each season. Match outcomes depend on factors such as venue conditions, toss decisions, team performance, and past statistics. This study aims to predict IPL match winners using deep learning techniques. A Kaggle dataset containing match data from 2008 to 2025 is used to identify patterns influencing results. After data preprocessing and feature selection, a deep learning model predicts match winners and their probabilities. Logistic Regression serves as a baseline model to compare performance and evaluate prediction accuracy.

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**Poster Number: 104****Machine Learning Analysis of Students Sleep Patterns**

Yunish Bogati

*Informatics; School of Computing and Analytics;**Computer Science*

Astitwo Paudel

*Informatics; School of Computing and Analytics;**Computer Science*

Mentor: Junxiu Zhou

Abstract: Many university students suffer from poor sleep quality due to high academic stress and heavy reliance on electronic devices, often ignoring the long-term effects on their focus and emotional regulation. This study investigates how academic pressure and digital habits influence sleep patterns among students. Using a dataset of 500 students, we applied machine learning techniques to analyze the relationship between stress levels, technology use, and sleep quality ("Good" or "poor"). The findings highlight key factors that affect sleep quality and emphasize the importance of managing academic stress and digital device usage to improve student well-being and overall sleep health.

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**Poster Number: 105****Competition Design and Ranking Stability: The Old vs. New UEFA Champions League**

Rajani Khatri

*Informatics; School of Computing and Analytics;**Computer Science*

Nitish Baidya

*Informatics; School of Computing and Analytics;**Computer Science*

Mentors: Alina Campan, Traian Truta

Abstract: The recent restructuring of the UEFA Football Champions League (UCL) calls into question whether competition format changes affect competitive balance, team performance, and overall competitiveness. This study compares the new format of UCL against its predecessor using match data from the 2024/2025 and 2023/2024 seasons and team ELO ratings. We conducted numerical and visual data analyses, including stage progression plots, performance trend lines, correlation of ELO rating shifts to competition rankings, alongside network centrality analysis to map competitive dynamics. Through these approaches, the study aims to provide a clearer picture of how format changes shape competitiveness in elite club football.

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**Poster Number: 106****Analysis of Purine Biosynthesis and Salvage Pathway Genes and Their Contributions to Genome Stability**

Jeff Flores

*Arts and Sciences; Biological Sciences; Biology*

Mentors: Erin Strome, Daisy Grove

Abstract: Purines are essential nucleotides, building blocks of DNA, and disruptions in their synthesis or salvage pathways may compromise genome stability. We are deleting nine genes across these two pathways to determine whether they lead to altered instability rates. Gene deletions are created using knockout cassettes, and genome stability assays measure loss of an endogenous chromosome. The instability rate of each strain will be compared to a wildtype control to determine changes. This project will help determine which genes are involved in the maintenance of genomic stability and those can then be tested for additional downstream effects.

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**Poster Number: 107****Investigating the Roles of SET2, SET5, and DOT1 in Genome Stability in *Saccharomyces cerevisiae***

Lilly Ahmed

*Arts and Sciences; Biological Sciences; Biology*

Mentors: Erin Strome, Daisy Grove

Abstract: Genome stability arises from maintaining accurate DNA replication and chromosome segregation. Disruptions in genome maintenance can lead to abnormal chromosome numbers, a hallmark of many cancers. In *Saccharomyces cerevisiae*, the genes SET2, SET5, and DOT1 encode histone methyltransferases involved in chromatin regulation and transcription. These genes' function is influenced by SAM1 and SAM2, genes responsible for producing S-adenosylmethionine, the key methyl donor in histone modification. This project investigates how loss of SET2, SET5, or DOT1 might affect genome stability using gene deletion mutants. Understanding these mechanisms may provide insight into conserved pathways that influence genome stability in eukaryotic cells.

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**Poster Number: 108****Testing the Impact of S-Adenosylmethionine-Dependent Methyltransferases on Genome Stability**

Tuyet Do

*Arts and Sciences; Biological Sciences; Biology*

Mentors: Erin Strome, Daisy Grove

Abstract: SAM1 and SAM2 are genes that encode the protein that synthesizes S-AdenosylMethionine (AdoMet). AdoMet serves as the main methyl donor in all cells and is generated through the methyl cycle. Our lab previously discovered that the deletion of either SAM1 or SAM2 affects the concentration of AdoMet and alters genome stability, a hallmark of cancer. The mechanism by which altered AdoMet affects genome integrity has not been fully elucidated. This project aims to investigate the impact of AdoMet-Dependent MethylTransferases (ADMTs) on genome instability. We aim to individually knockout genes encoding ADMTs and then analyse genome instability rates.

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**Poster Number: 109****Synthesis of Novel Dehydrobenzoannulene Amino Acids**

Dane Larson

*Arts and Sciences; Chemistry; Chemistry*

Lilly Baumann

*Arts and Sciences; Chemistry; Chemistry*

Jewels Flege

*Arts and Sciences; Chemistry; Chemistry*

Tyler Warner

*Arts and Sciences; Chemistry; Chemistry*

Molly Eide

*Arts and Sciences; Biological Sciences; Biology*

Mentor: KC Russell

Abstract: Dehydrobenzoannulenes are large rings of benzene rings linked together by alkynes, forming a macrocyclic system. These molecules have a variety of uses in industry, including conductive polymers, organic batteries, and chemiluminescent sensors. Dehydrobenzoannulenes are formed from arenediynes, which can be created through Sonogashira coupling. By substituting one of the benzene rings within the macrocycle with an aromatic amino acid it may be possible to link several annulenes together using standard peptide chemistry. This poster will present the current progress using two different aromatic amino acids, 3,4-diethynylphenylalanine and 1,2,3,4-tetrahydroisoquinoline-3-carboxylic acid, both of which are derived from a commercially-available amino acid, L-DOPA.

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**Poster Number: 110****Feeling Isolated? Development and Validation of a Workplace Isolation Scale**

Dexton Berger

*Arts and Sciences; Psychological Science; Psychology*

Breanna Karon

*Arts and Sciences; Psychological Science; Psychology*

Kaitlyn Thompson

*Arts and Sciences; Psychological Science; Psychology*

Mentor: Philip Moberg

Abstract: This study describes preliminary efforts to develop and validate a multidimensional measure of workplace isolation, the extent to which individuals experience emotional, social, professional, and organizational exclusion in work settings. Utilizing EFA, we examine internal factor structure, then relations with external measures of sense of belonging, perceived organizational support, positive/negative affect, and loneliness.

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**Poster Number: 111****Legacy Collections and Ethics: Human Remains Care on University Campuses**

Sophie McEwen

*Honors; Biological Sciences; Anthropology*

Mentor: Mary Schilling

Abstract: Human skeletal collections have served as teaching tools in university anatomy and anthropology programs. As synthetic specimens become increasingly viable alternatives, institutions are reexamining the ethical frameworks governing the care and use of legacy remains. This project employs a mixed methods approach, drawing on peer-reviewed literature, expert consultation, and anthropological methodologies, to explore how shifting ethical understandings should inform collection stewardship. Findings suggest that universities currently lack standardized consent and curation protocols, leaving legacy skeletal collections without consistent ethical guidance. This poster proposes a framework for institutional standardization that honors the humanity of these individuals while supporting continued academic use.

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**Poster Number: 112****Exploring The Effect On Genome Stability Due To Deletion of Genes Of The Folate Cycle**

Nhyira Sarpong

*Arts and Sciences; Biological Sciences; Biology*

Mentors: Erin Strome, Daisy Grove

Abstract: The folate cycle interconverts one carbon folate/vitamin B9 compounds and has vital roles in DNA and RNA synthesis and links to the methyl cycle. AdoMet is the main methyl donor in cells, with the two lesser methyl donors produced in the folate cycle. Previous research from our group has shown that altered AdoMet levels correspond to genome stability changes. In this work, we aim to test for genome instability impacts due to the loss of folate cycle genes. Characterization of several gene deletions has shown increases in genome instability.

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**Poster Number: 113****The Phenotypic Plasticity of *Aulacoseira granulata* Based on Light and Temperature**

Corrine Burton

*Arts and Sciences; Biological Sciences; Biology*

Mentor: Joshua Cooper

Abstract: This study investigates how the freshwater diatom *Aulacoseira granulata* changes its morphology in response to varying temperature and light levels. Using a common garden experiment, we compared strains from Utah and Kentucky seeing if their responses are consistent across different populations or if their genetic background changes how they react. Cultures were acclimated under four combinations of temperature (14°C or 24°C) and light (100% or ~50%). We used Scanning Electron Microscopy to measure the diatom cell wall traits (pore size/density, cell size). This research helps us understand if diatoms adapt their morphology to changing climate, providing insight into diatom resilience.

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**Poster Number: 114****Claisen-Schmidt Synthesis of Aromatase Inhibitors: Substituent Effects on  $\alpha,\beta$ -Unsaturated Ketones**

Kennedy James

*Arts and Sciences; Chemistry; Biology*

Mentor: Lili Ma

Abstract: Aromatase inhibitors are drugs that prevent aromatase from converting androgens into estrogen, and act as effective adjuvant and neo-adjuvant means of ER+ breast cancer treatment. Claisen–Schmidt condensation is a simple yet effective method for synthesizing  $\alpha,\beta$ -unsaturated ketones, that function by coupling an aldehyde with a ketone under basic conditions. Solvent-free Claisen–Schmidt protocols have been shown to generate high yields of substituted cycloalkanone-based dibenzalacetone with minimal environmental impact. This project will examine cycloheptanone when reacted with three different benzaldehyde derivatives—p-methoxybenzaldehyde (p-MeO), p-methylbenzaldehyde (p-Me), and p-chlorobenzaldehyde (p-Cl), which will be systematically ranked through various factors, mainly, effectiveness and toxicity.

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**Poster Number: 115****Early Prediction of Student Dropouts**

Alykaa Salaah

*Informatics; School of Computing and Analytics;**Computer Science*

Idalia Martin

*Informatics; School of Computing and Analytics;**Computer Science*

Jacob Canada

*Informatics; School of Computing and Analytics;**Computer Science*

Mentor: Junxiu Zhou

Abstract: This project addresses the issue of student dropout, which negatively impacts academic outcomes and institutional performance. It focuses on utilizing deep learning techniques to predict early dropout risks based on behavioral and academic data. The study formulates the problem as a classification task using various features, such as study behavior and engagement indicators, to predict student retention. Multiple machine learning models will be implemented and evaluated to identify patterns within the dataset. The project's ultimate goal is to demonstrate how deep learning can facilitate timely interventions for at-risk students, enhancing data-driven support strategies to improve retention.

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**Poster Number: 116****Can exercise mitigate benzo[a]pyrene neurotoxicity in Cyp1b1(+/+) and Cyp1b1(-/-) knockout mice?**

Carson Padgett

*Arts and Sciences; Biological Sciences; Neuroscience; FYRE*

Hattie Hessling

*Arts and Sciences; Neuroscience*

Christins Gogzheyana

*Arts and Sciences; Biological Sciences; Neuroscience*

Taylor Easybuck

*Arts and Sciences; Biological Sciences; Biology*

Deaysha Fox

*Arts and Sciences; Biological Sciences; Biology*

Mentor: Christine Perdan Curran

Abstract: Benzo[a]pyrene (BaP) is a polycyclic aromatic hydrocarbon found in grilled foods, air pollution, car exhaust, and more. Exposure to BaP during early brain development can cause cognitive and behavioral deficits. Our experiment examined genetic differences in Cyp1b1(-/-) knockout and Cyp1b1 (+/ +) wild-type mice to see if BaP affects them differently. Pregnant mice were treated from gestational day 10 (G10) through postnatal day 25 (P25) when pups were weaned. Half of the offspring exercised for 30 days before neurobehavior testing in the Morris Water Maze. Our preliminary results indicate exercise had a modest protective effect against BaP developmental neurotoxicity.

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**Poster Number: 117****A GIS-Based Analysis of Environmental Justice in Minority Neighborhoods**

Leticia Munoz

*Arts and Sciences; Biological Sciences;**Environmental Science*

Mentor: Hongmei Wang

Abstract: Minority populations in the United States are often exposed to higher levels of environmental pollution because of residential patterns and income inequality. This study uses ArcGIS Pro to map pollution sources, including industrial facilities, landfills, and agricultural sites, and how close they are to minority neighborhoods in Northern Kentucky and Cincinnati. By combining demographic information with environmental data, the research highlights patterns of housing inequality and the public health risks connected to them. The results show the relationship between minority population distribution and pollution sources. These findings can support development of strategies to improve environmental health-awareness, especially within Hispanic communities.

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**Poster Number: 118****How Conditions Influence Car Crash Severity: A Predictive Modeling Approach in Cincinnati**

Jason Dartt

*Informatics; School of Computing and Analytics;**Cybersecurity*

Andrew Harasymchuk

*Informatics; School of Computing and Analytics;**Computer Science*

Joshua Osakwe

*Arts and Sciences; Mathematics and Statistics; Statistics*

Sri Maligireddy

*Informatics; School of Computing and Analytics;**Computer Info Technology*

Mentor: Junxiu Zhou

Abstract: In the past traditional methods have been able to identify historical "Crash corridors", these fail to consider how multiple factors can interplay into the severity of injuries in a crash. This study developed a machine learning model trained on 13 years of crash reports. Utilizing an unsupervised model to analyze the weather and other conditions reported in a crash to determine the severity of future injuries. Preliminary results show a 60% confidence in the predicted severity. These findings will offer a data-driven look at what areas could be improved to give the greatest benefit to cost ratio.

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**Poster Number: 119****Flow Cytometric Quantification of Suppressor tRNA Function Using RNA-ID**

Ruofei Ding

*Arts and Sciences; Chemistry; Chemistry*

Mentor: Michael Guy

Abstract: Post-transcriptional tRNA modifications are crucial for protein synthesis and are conserved from yeast to humans. Previous studies have shown that the absence of certain tRNA body modifications leads to translational deficiency. This study aims to quantify how tRNA<sup>Tyr</sup> body modifications affect gene expression in *Saccharomyces cerevisiae*. Suppressor tRNA<sup>Tyr</sup> constructs and GFP reporters were generated through site-directed mutagenesis to recognize premature stop codons. Using flow cytometry, the fluorescence signal restored by engineered suppressor tRNA<sup>Tyr</sup>s can be used to quantify defects in translational efficiency. The development of additional suppressor tRNAs and reporters will allow us to further explore modification-dependent tRNA function.

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**Poster Number: 120****Planned Deconstruction**

Michael Marquet

*Business; Construction Management*

Matthias Akindede

*Business; Construction Management*

Kaitlyn Billiter

*Construction Management*

Owen Frondorf

*Construction Management*

Aryana Nolden

*Construction Management*

Mentor: Boshra Karimi

Abstract: Traditional demolition methods prioritize speed and often result in large amounts of material waste and limited recycling. This project examines how planned deconstruction strategies can improve material recovery, safety, and waste reduction during building demolition. The study evaluates phased dismantling methods, selective material separation, and the use of specialized equipment such as sorting grapples and designated staging areas. Findings indicate that structured sequencing and coordinated crew operations significantly increase the recovery of reusable materials while reducing landfill disposal. These practices also support LEED construction waste management goals by improving recycling rates and documentation of diverted materials. Overall, planned deconstruction...

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**Poster Number: 121****Creating Novel AI Security Themed CTF Challenges**

Rita Ghimire

*Informatics; School of Computing and Analytics;*

*Computer Science*

Mentor: Ankur Chatterjee

Abstract: As AI continues to grow, so do concerns about misuse, ethical risks, adversarial attacks, and prompt manipulations. Yet many students use AI tools without fully understanding their security implications. This project addresses that gap by designing & developing unique real-life based adventure style AI security themed CTF challenges. Through a set of engaging scenarios, participants encounter real-world AI security topics, including AI vulnerabilities, risks, other issues, and learn how AI systems can be manipulated or misused, helping them build critical thinking, problem solving, online researching, clue cracking and out-of-the box situation handling skills necessary to defend against emerging AI threats.

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**Poster Number: 122****Addressing the Financial Needs of Student-Athletes in the NIL Era**

Ahmad Richardson

*Business; Accounting, Economics and Finance;*

*Sports Business*

Mentor: Abdullah Al-Bahrani

Abstract: This study examines the financial needs of college student-athletes in the evolving Name, Image, and Likeness (NIL) era. Building on research showing that student-athletes often exhibit lower financial literacy and face unique financial pressures, the project compares financial knowledge, confidence, and behaviors between athletes and non-athletes. The survey also assesses NIL familiarity to determine whether athletes encounter distinct financial challenges. Findings will identify gaps in preparedness and highlight areas where targeted financial education may be most needed. This work contributes to the limited existing research on how NIL and collegiate athletic participation shape financial readiness in higher education.

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**Poster Number: 123****Are Internships worth it?**

Zach Barth

*Business; Marketing, Sports Business and Construction*

*Management; Global Supply Chain Mgt*

Mentor: Jenny Gardner

Abstract: This study evaluates the effectiveness and value of internships for both students and employers at Northern Kentucky University (NKU). Data is collected from students who have completed internships and from organizational leaders who have hosted NKU interns. Student responses assess perceived impacts on career readiness, skill development, and employment preparation, while employer feedback evaluates intern preparedness and performance. By analyzing both perspectives, the study identifies strengths and potential areas for improvement within NKU's internship program. The findings aim to provide recommendations that enhance experiential learning and strengthen the connection between higher education and workforce development.

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**Poster Number: 124****Predicting Email Categories from Message Content Using Machine Learning**

Tracey Kayembe Kamwimbi

*Informatics; School of Computing and Analytics;**Computer Info Technology*

Dillon Bernard

*Arts and Sciences; School of Computing and Analytics;**Information Systems*

Mentor: Junxiu Zhou

Abstract: The study aimed to predict email categories based on message content using the 20 Newsgroups dataset, which contains approximately 20,000 documents across 20 discussion groups. The goal is to improve email systems by enabling accurate routing of messages to appropriate destinations. Data were obtained from the Scikit-learn dataset library and processed using machine learning classification techniques. The dataset was divided into training and testing subsets for model development and performance evaluation. During training, the models learned relationships between input features and target labels. Linear Regression and Support Vector Machine learning models to predict the category of incoming emails based on the message content.

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**Poster Number: 125****Semantic Voice Compression for LoRa Communication in Infrastructure-Less Environments**

Nathaniel Brewer

*Informatics; School of Computing and Analytics;**Applied Software Engineering*

Isha Nepal

*Informatics; School of Computing and Analytics;**Computer Science*

Mentor: Samuel Cho

Abstract: Infrastructure-less environments, such as disaster zones and remote communities, impose severe bandwidth and power constraints that prevent conventional systems from supporting human-scale voice communication. LoRa, a low-power wide-area radio technology, offers extended coverage but is limited to 11–242 bytes per packet at data rates as low as 293 bps, making raw audio transmission entirely impractical. We present a semantic voice compression architecture that encodes speech using EnCodec, a neural audio codec based on Residual Vector Quantization (RVQ), and transmits the resulting compact token payload over a peer-to-peer LoRa link. EnCodec operating at 48 kHz with two RVQ codebook layers produces 15,000 integer codes.

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**Poster Number: 126****Multimodal Deep Learning for Car Price Prediction Using Tabular and Image Data**

Elaina Hall

*Informatics; School of Media and Communication;**Computer Science*

Wyatt Bartels

*Informatics; School of Computing and Analytics;**Computer Science*

Mentor: Junxiu Zhou

Abstract: In recent years, there has been increasing interest among consumers to find reliable methods to determine accurate pricing for vehicles. One novel solution to car price prediction is the application of artificial intelligence techniques, specifically deep learning models, to vehicle datasets. For our project, we combined two distinct deep learning models, one trained on tabular data and one trained on image data, to achieve a model that predicts car prices based on the many features that buyers use when determining the value of a car, including aesthetics.

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**Poster Number: 127****Female Rats Show Enhanced Compulsive Cocaine Seeking and Resurgence of Cocaine Seeking**

John Neeley

*Arts and Sciences; Biological Sciences; Biology*

Emily Forbes Blanco

*Arts and Sciences; Chemistry; Chemistry*

Shreeukta Adhikari

*Arts and Sciences; Psychological Science; Psychology*

Mentors: Justin Yates, Emily Allgire

Abstract: Individuals with a substance use disorder (SUD) often use a substance despite negative consequences. While no pharmacotherapies exist for psychostimulants such as cocaine and methamphetamine, cognitive-behavioral interventions like contingency management are effective at reducing substance use. One major limitation of contingency management is that individuals often resume substance use after treatment has been discontinued. In the current experiment, we found that female rats are more willing to self-administer cocaine when paired with probabilistic foot shock (i.e., show enhanced compulsive drug seeking) and show enhanced resurgence of cocaine seeking after an alternative reinforcer (food) is no longer provided.

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**Poster Number: 128****Social and Structural Drivers of Frequent Mental Distress**

Kyle Roberts

*Arts and Sciences; Mathematics and Statistics; Statistics*

Conner Ferry

*Arts and Sciences; Mathematics and Statistics; Statistics*

Brett Owen

*Business; Accounting, Economics and Finance; Finance*

Charles Frey

*Arts and Sciences; Mathematics and Statistics; Statistics*

Mentor: Nelum Hapuhinna

Abstract: Frequent Mental Distress (FMD), defined as adults reporting fourteen or more poor mental health days per month, reflects both chronic and severe mental health issues in individuals and serves as an indicator of community well-being. Using aggregated Kentucky county-level data from County Health Rankings and Roadmaps, we examined how health behaviors, socioeconomic conditions, and social factors relate to FMD. Among 12 variables, percent disability, smoking prevalence, physical inactivity, average physically unhealthy days, and lack of social and emotional support were notably associated with FMD, with predictive modeling indicating percent disability and lack of social support as the strongest predictors.

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**Poster Number: 129****Developing Universal Vaccines for Highly Variable Viruses**

Brenna Wilson

*Arts and Sciences; Biological Sciences; Biologys*

Payton Hubbard

*Business; Biological Sciences; Biology*

Mentor: Joe Mester

Abstract: No vaccine exists for hepatitis C virus (HCV), and the current spike-based COVID-19 virus (SARS-CoV-2) vaccines need frequent updates. A universal vaccine for these highly variable viruses would protect against current and future variants. Novel vaccines targeting the conserved core protein of HCV and the conserved membrane protein of SARS-CoV-2 were developed and tested for expression and immunogenicity in human cells. Results from these experiments demonstrate the potential of universal vaccines for stimulating protective immune responses against HCV and SARS-CoV-2.

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**Poster Number: 130****Deep Learning-Based Plant Disease Detection Using Convolutional Neural Networks**

Chase Sweeney

*Informatics; School of Computing and Analytics;**Computer Science*

Mentor: Junxiu Zhou

Abstract: Plant diseases significantly reduce crop yield and threaten global food security, making early detection essential for effective agricultural management. Recent advances in computer vision and deep learning have shown promise for identifying plant diseases from leaf images. In this project, I used the PlantVillage dataset containing labeled images of healthy and diseased plant leaves. I developed a convolutional neural network (CNN) using Python and TensorFlow/Keras to automatically classify plant diseases. The model was trained using augmented image data to improve generalization. Experimental results show that the CNN achieves strong classification accuracy across multiple disease categories.

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**Poster Number: 131****Factors Affecting Adult Obesity Prevalence in Kentucky**

Eve Tittel

*Arts and Sciences; Biological Sciences; Neuroscience*

Mbaye Cisse

*School of Computing and Analytics; Data Science*

Cade Lederer

*Arts and Sciences; Mathematics and Statistics; Statistics*

Joshua Osakwe

*Arts and Sciences; Mathematics and Statistics; Mathematics*

Mentor: Nelum Hapuhinna

Abstract: High adult obesity rates remain a significant public health concern in the United States, with particularly high rates in Kentucky. This study examines which health, behavioral, socioeconomic, and demographic characteristics most strongly influence adult obesity in Kentucky. County-level aggregated data were obtained from County Health Rankings & Roadmaps, initially including 14 variables. Using predictive modeling, we identified frequent mental distress, exercise opportunities, unemployment rate, diabetes prevalence, and the proportion of residents aged 65 and older as key predictors of adult obesity rates. All predictors were significantly associated with adult obesity, with diabetes prevalence demonstrating the strongest positive relationship.

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**Poster Number: 132****Seeing Bone in a New Light: Utilizing New Methods to Better Understand the Growth of Dinosaurs**

Benjamin Fulmer

*Arts and Sciences; Physics, Geology and Engineering Technology; Geology*

Mentor: Julie Reizner

Abstract: Cutting open fossil bones and analyzing their preserved internal structure has informed paleontologists of the lives of long-extinct animals, including dinosaurs. Growth lines preserved in bone can indicate details of physiology, as well as an individual's age and body size at time of death. While descriptions of bone tissue of a species of horned dinosaur, *Einiosaurus procurvicornis*, have been previously reported, new methods utilizing cross-polarized light are employed in this study to produce the most accurate understanding of the growth of this animal to date.

## VIRTUAL PRESENTATIONS

(April 23, 9 a.m.–5 p.m. and April 24, 9 a.m.–5 p.m.)

[nku.edu/celebration](http://nku.edu/celebration)

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### **From Access to Opportunity: How Libraries Support Whole-Family Success**

Elizabeth Lewis

*Informatics; Library Informatics*

Mentor: Lily Murray

Abstract: This research examines ways in which public libraries extend their impact beyond early literacy programs to support whole-family development. Libraries are able to play a critical role in connecting guardians to parenting education, workforce development tools, higher education resources, and social services. The study shows how family-focused services connect guardians to resources that boost parental confidence, economic stability, and long-term success for the children. By analysis of programs and community resources, this project highlights the evolving role libraries play in fostering intergenerational growth.

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### **AI Creativity Judge**

Theo Helton

*Informatics; School of Computing and Analytics;*

*Computer Science*

David Pope

*Informatics; School of Computing and Analytics;*

*Computer Science*

Steven Weil

*Informatics; School of Computing and Analytics;*

*Computer Science*

Mentor: Junxiu Zhou

Abstract: As AI-generated text becomes widespread, understanding how large language models (LLMs) compare to human creativity is increasingly important. This project asks: can a neural network trained exclusively on human fiction learn to measure creativity? We build an automated rubric evaluating writing across five dimensions: vocabulary richness, sentence complexity, originality, imagery, and narrative structure and train a deep learning model on 300,000 human-written short stories. We then score fiction generated by ChatGPT, Claude, Gemini, Perplexity, and Copilot. Our results reveal measurable differences in creative ability across LLMs, highlighting where AI writing still falls short of human expression.

## COLLEGE MOVIE FESTIVAL

(April 23, 1:40–2 p.m. in Griffin Hall Digitorium)

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Mentor: Chris Strobel & Corrie Danieley

Abstract: These movies are made by NKU students for the College Movie Festival, a filmmaking event where students from area colleges make movies around a common theme and are screened at the AMC in West Chester. This will include the screening of three films before they make their debut at the festival.

