FOURTEENTH ANNUAL

CELEBRATION OF SCHOLARSHIP

TUESDAY • APRIL 21, 2026

Plenary Speaker- Heather Blackmore

WEDNESDAY • APRIL 22, 2026

Concurrent Sessions

Gallery Exhibits

Student Presenter Luncheon

Three Minute Thesis Competition

Br. Joel Damian Business Pitch Competition

Art Gallery Talk

Dr. Schlachter Award Finalist Presentations

Poster Presentations

Presentation of Awards

lewisu.edu/COS

Welcome to the 14th Annual Celebration of Scholarship at Lewis University!

Dear Lewis University Community,

Of the many noteworthy events sponsored by and hosted at Lewis each year, CoS is the one most directly connected to the circulation and promotion of undergraduate and graduate student research. Produced in response to rigorous instruction and through comprehensive research and effective writing, the panel, poster, and pitch presentations offered this year once again exhibit the intelligence, creativity, and imagination of students across all academic disciplines. The hope of the CoS planning committee is that those who participate in this great day of academic life—either as presenters or audience members—recognize the consequential value of university studies and the pursuit of learning.

In a time of uncertainty in higher education in the United States, the work produced by Lewis students exemplifies the singular importance of both the individual engaged in qualitative and quantitative investigations and the uniquely influential role that universities play as cultural institutions functioning as centers of knowledge and discovery. Whether students pursue deeper understanding of the structural forces that impact upon identity categories such as race, class, gender, and disability as found in literary texts, for example, or the study of the ways in which advancements in AI technologies bare upon labor markets, educational futures, and human social relationships, or the role that research in chemistry plays in combating antibiotic resistance in the human body, the findings and conclusions presented by Lewis students at this year's Celebration of Scholarship point to far-reaching implications for the future of human societies, implications recognized, outlined, or hypothesized by the work of students within the university.

In addition to highlighting student research, Celebration of Scholarship is also an annual celebration of the role that faculty mentoring plays in the cultivation of knowledge and, exemplifying our Lasallian history, how association functions as the lifeblood of Lewis University. No single influence within the university has a greater impact upon the production of quantitative and qualitative knowledge than the commitment to structured, thoughtful, and goal-seeking mentoring by faculty members. Impacting personal identity formation, career planning, professional development, and broad cultural understandings that extend well beyond students' years at Lewis, mentoring is the most profound contribution that faculty make to the world outside the walls and halls of the university setting, and we are pleased to recognize that contribution as part of CoS. While the peer-reviewed research of individual faculty and lab collectives powerfully contribute to our world, faculty mentoring of students is the embodiment of human curiosity and the desire to problem solve that continues in the lives of students as they become integrated into the broader social fabric of our shared world.

This year features the largest number of submissions included in the conference program, and the organizing committee is thrilled with the intellectual health and vibrancy that the continued success of CoS represents at Lewis. Featuring 54 panelists in the concurrent sessions portion of the program, 104 poster presentations, the well-crafted entries in the STEM and HASS slams, the business pitch competition known as "3MT" (or Three-Minute Thesis), and the presentations by those nominated to receive the Stephanie Schlachter Excellence in Undergraduate Scholarship Award, we invite the entire Lewis University community to engage with the work of our student presenters and to ask questions about the origins, implications, and future directions of their research. Often such questions provoke additional considerations of familiar established research findings, pushing students to continue their work in previously unthought of ways.

Finally, on behalf of the entire organizing committee, please enjoy with us our most promising academic day at Lewis University, the 14th annual Celebration of Scholarship.

Sincerely,

Dr. Mardy Philippian and Dr. Kari Stone Co-Chairs,
Celebration of Scholarship 2026

PROGRAM

TUESDAY, APRIL 21

TIME	*EVENT DESCRIPTION*	*PLACE*	*PAGE*
7 – 9 PM	**PLENARY SPEAKER: Heather Blackmore**	AS 158A	5

WEDNESDAY, APRIL 22

TIME	*EVENT DESCRIPTION*	*PLACE*	*PAGE*
8 – 11:30 AM	**Concurrent Sessions**	Academic Science Building	6
9AM – 9 PM	**Gallery Exhibits**	Wadsworth Family Art Gallery (Oremus Fine Arts Center)	30
11 AM – 12:30PM	**Student Presenter Luncheon**	Fieldhouse (JFK Student Recreation and Sports Center)	6
12 – 1 PM	**3MT Presentations**	Convocation Hall (St. Charles Borromeo)	26
1 – 2 PM	**Stephany Schlachter Award Presentations**	Convocation Hall (St. Charles Borromeo)	27
1 – 5 PM	**Business Pitch Competitions**	Flight Deck (St. Charles Borromeo)	28
2 – 3 PM	**Gallery Talk**	Wadsworth Family Art Gallery (Oremus Fine Arts Center)	30
2 – 3 PM	**Poster Sessions A**	Fieldhouse (JFK Student Recreation and Sports Center)	31
3:15 – 4:15 PM	**Poster Sessions B**	Fieldhouse (JFK Student Recreation and Sports Center)	41
Awards Program and Reception			
4:30 – 6 PM	**Presentation of Awards**	Fieldhouse (JFK Student Recreation and Sports Center)	

GENERAL INFORMATION

Lewis University proudly supports the 13th Annual Celebration of Scholarship, a symposium dedicated to spotlighting the scholarly and artistic work of both undergraduate and graduate students. Throughout two days of events, Lewis University students and recent alumni present their original work in various formats, such as oral presentations, posters, performances, exhibits, roundtable discussions, three minute rapid-fire talks, and business pitches, reflecting the richness of scholarly and creative endeavors across the university. These forums provide presenters an opportunity to showcase their research and creative projects, marking a key milestone in their academic careers and encouraging them to explore future opportunities for growth. Celebration of Scholarship highlights the diverse talents and intellectual contributions of the Lewis University student body from various disciplines, and all members of the community are welcome to attend.

The Lewis University Celebration of Scholarship will present scholarly work in the following formats:

CONCURRENT SESSIONS

Students will deliver 15-minute presentations on their research topics or papers, with each hour-long session featuring multiple student presentations. These sessions will take place in the Academic Science Center from 8 to 11:30 AM.

THREE MINUTE THESIS (3MT)

Science and scholarship can sometimes be seen as too technical and exclusive to those who do not study it, but it does not have to be that way! This presentation category is open to graduate students only. Students presenting in this format will present their original scholarship in 180 seconds, in a form that can be understood by individuals without any background knowledge in the research area, using only one presentation slide.

ART GALLERY TALK

Exhibits will be on display throughout the day with a special Gallery Talk featuring winners of the President's Art Exhibition from 2 to 3 PM.

BR. JOEL DAMIAN, FSC, BUSINESS PITCH COMPETITION

The Br. Joel Damian, FSC, Business Plan and Pitch Competition, hosted by the Lowell Stahl Center for Entrepreneurship and the College of Business, encourages entrepreneurship among students throughout the Lewis community. The College of Business recognizes that potentially successful business ideas can come from a wide range of disciplines and may originate from an individual or a group of individuals. Projects will be presented from 1 to 5 PM in Flight Deck (St. Charles Borromeo).

POSTER PRESENTATIONS

Scholarly posters will feature the results of research projects, internships and class presentations. Posters will be displayed in the Lewis Fieldhouse from 2 to 3:20 PM with the authors present at times as designated in this program.

PLENARY SESSION

TUESDAY, APRIL 21
7–9PM • AS 158A

Heather Blackmore

is the creator of *Here She Grows*, a gardening platform rooted in storytelling, education and real-life experience. An English major (University of Chicago) by training, Heather never set out to work in the garden world—but her love of writing opened doors she did not know existed, leading to bylines in *Better Homes and Gardens*, *Country Gardens* and other national publications. Over the past 25 years, she has scouted, styled, written and photographed garden stories, often wearing every hat along the way. Her work blends creativity with curiosity, showing how a foundation in language can shape careers far beyond the classroom. Today, she shares her garden and her words to inspire others to grow—on the page and in the soil.

CONCURRENT SESSION 1

8AM

AS-102-A

C34 Staying Safe in the Digital Gold Rush: Understanding Crypto Scams and Consumer Protection

As cryptocurrency becomes increasingly popular investors who are just starting out are exposed to a growing number of scams, including rug pulls, phishing schemes, and misleading celebrity-endorsed coins. This research aims to identify the most common types of crypto scams and provide practical strategies for protecting consumers. To achieve this, a mixed-methods approach was used: a review of 50 documented scam cases over the past five years was conducted alongside a survey of 200 cryptocurrency users to assess awareness and vulnerability to fraud. The study found that the majority of scams exploited users' lack of knowledge and reliance on social media influencers for investment guidance. Phishing attacks and fake tokens were the most frequently reported, while awareness of security best practices like using hardware wallets and verifying project legitimacy was inconsistent among participants. Based on these findings, a "Crypto Safety Guide" was developed, offering actionable advice for beginners to reduce risk and recognize red flags. The research highlights the urgent need for consumer education and policy interventions to protect vulnerable investors while supporting innovation in the crypto space. By systematically analyzing scam patterns and proposing concrete preventative measures, this study contributes to safer participation in cryptocurrency markets and informs both individual users and regulators about effective protective strategies.

Daniel Haber

Dr. Rami Khasawneh

C08 Hardened Cryptocurrency Wallet with AI-Driven Attack Detection

Hardened Cryptocurrency Wallet with AI-Driven Attack Detection Barbara Berry Lewis University Romeoville, IL 60446 Abstract Cryptocurrency wallet attacks continue to increase each year which is causing billions of dollars in loss. The blockchain protection currently used with cryptocurrency wallets provides traditional security, but does not protect against user error or software vulnerabilities. This project is to design and implement a hardened cryptocurrency wallet with AI-driven attack detection to decrease the threat of these dangers. It will use behavioral analytics along machine learning and deep learning to identify and contain potential risks. Using the STRIDE threat model, the project will assess how AI-driven anomaly detection can lower the risk of successful wallet attacks. The adversarial evaluation will use intentional wallet attacks to assess the resilience of the wallet to attacks. The hypothesis is that AI driven attack detection will successfully lower the risk of attack from spoofing or malware threats. By adding additional layers of defense, there will be a stronger protection for users of cryptocurrency wallets.

Barbara Berry

Dr. Rami Khasawneh

C28 Crypto Crime Exposed: How Criminals Do It and How They're Found

Many people believe that crimes involving cryptocurrency are hard to investigate as it's still relatively new. Since cryptocurrency crimes happen behind a computer and are often anonymous, it is misunderstood that experts have a hard time detecting these crimes and finding the criminals. Because of this, criminals take advantage and do all sorts of crimes like money laundering, theft, and online fraud. This research takes a look at how criminals use cryptocurrency to commit crimes and the methods they are able to do to move and hide money. This also explains how blockchain technology records transactions and how these records can be tracked. By looking at both the ways criminals commit crypto crime and how experts are able to track their moves, it shows that cryptocurrency is not as secret as people think.

Keyly Gonzalez

Dr. Rami Khasawneh

WEDNESDAY • APRIL 22

CONCURRENT SESSION 1

8AM

AS-106-A

C35 Crypto Scams and Consumer Protection

As crypto currency continues to make extraordinary headway in revolutionizing how currency is used without the need of a bank, new kinds of scams are popping up throughout the crypto community everyday. Some of the most notable scams in recent history involve celebrity coins, rug pulls, and phishing scams. Each with their own scam characteristics causing unknowing crypto traiders to lose large amounts of money in a blink of an eye. The good thing though is we know these scams exist, and can use this knowledge to increase consumer protection. By identifying the different crypto scams in a study, we can use this historical data to protect future consumers from falling into the same traps traders in the past have fallen victim to. Not only will this enhance consumer protection, but it will also increase confidence in the overall cryptocurrency market. More confidence equals a stronger pull to revolutionize the world into using crypocurrency for everyday money transactions by proving its safety and reliability. Afterall, cryptocurrency is the way of the future!

Lucas Forthofer

Dr. Rami Khasawneh

C50 Should Governments Issue Digital Currencies?

In recent history society has seen a shift away from traditional paper money to more digital currency. People are not holding paper money like was previously commonplace and instead are using their online banking platforms and credit cards to transact. While the use of physical cash has declined, inversely, the use and acceptance of cryptocurrencies and stable coins has grown tremendously. Governments have begun to take notice and some have begun to act in order to stay ahead of the curve or in fear of being left behind. China has issued a central bank digital currency (CBDC) and the European Union is continuing to research the potential of issuing a digital Euro. Central bank digital currencies offer the removal of intermediaries, a potential cash replacement, and all of this with being backed by the central bank of the issuing country. Adoption of such digital currencies could decrease the monetary and time cost of transactions, improve financial inclusion, ease the use of monetary policy, and increase transparency. While issuing an CBDC could attack some of these issues with our current banking system, it is not a perfect solution and some do not see it as a solution at all. Critics of the CBDC say that it is a solution looking for a problem and a CBDC has challenges of its own. Viewpoints like this are why the United States has yet to approve or issue a CBDC and is continuing to research the topic.

Cole Sweitzer

Dr. Rami Khasawneh

C19 SentinelVault – A Commercial-Grade Secure Cryptocurrency Wallet with AI-Driven Threat Detection

The rapid proliferation of cryptocurrency has democratized finance but has simultaneously introduced unprecedented security risks for retail investors. Phishing attacks, malicious smart contracts, and clipboard hijacking result in billions of dollars in losses annually. While numerous wallet applications exist on the Google Play and App Store, most prioritize ease of use over robust, active security, often leaving non-technical users vulnerable to social engineering and front-end attacks. This capstone project proposes the design and development of SentinelVault, a commercially viable, non-custodial cryptocurrency wallet application. Unlike traditional wallets that act merely as passive interfaces for signing transactions, SentinelVault integrates an active, AI-driven security layer. The application operates on a ""freemium"" commercial model: basic wallet functionality is free, while a premium subscription—processed via a secure credit card payment gateway unlocks real-time transaction risk scoring and advanced fraud protection. Developed primarily using AI-assisted tools (Replit AI) to demonstrate modern rapid-prototyping capabilities, the project will focus heavily on security architecture. The core deliverables include a secure mobile-ready application, a comprehensive threat model using the STRIDE framework, an administrative dashboard for threat management, and a payment processing system. The project concludes with a ""purple team"" simulation, where the developer will attempt to exploit the application using adversarial techniques to validate the implemented defenses.

Vennela Reddy Pareddy, Sai Eswar Kalyan Gadde,,

Dr. Rami Khasawneh

WEDNESDAY • APRIL 22

CONCURRENT SESSION 1

8AM

AS-150-A

C25 Using P. putida Biogenic Manganese Oxides to Remediate Azo Dye Waste

Mn-oxidizing microorganisms oxidize environmental Mn(II) producing Mn(IV)-oxides. Pseudomonas putida MnB1 is a widely studied organism for the oxidation of manganese (II) to manganese (IV) by a multicopper oxidase. The biogenic manganese oxides (BMOs) produced by MnB1 and similar organisms have unique properties compared to non-biological manganese oxides. Along with an amorphous, poorly crystalline structure, previous studies have indicated that BMOs have high surface areas and high reactivities. Azo dyes are dye compounds that contain a C−N=N−C linkage in their structure. They are widely used in textiles, but are often toxic and commonly pollutants. Abiotic Mn oxides have been shown to degrade azo dyes, and have the ability to remediate them from aquatic environments. P. putida MnB1 is grown and transferred to media containing Mn (II) salts to produce the BMO, and the BMO product combined with various azo dyes. Concentration of dye is quantified at addition and at time points, in order to observe the remediation of dye molecules by the BMO over time. Results will be discussed.

Kate Green

Dr. Kari Stone

C26 Structural and Functional Implications of the N220L Active-Site Mutation in the Metallo-β-Lactamase NDM-1

Metallo-β-lactamases (MBLs) represent a critical global health threat due to their ability to hydrolyze a broad spectrum of β-lactam antibiotics and the current absence of clinically effective inhibitors. Among these enzymes, New Delhi metallo-β-lactamase-1 (NDM-1) is particularly concerning because of its rapid dissemination and broad substrate profile. The catalytic activity of NDM-1 depends on key active-site residues that coordinate zinc ions and facilitate β-lactam hydrolysis. In this study, we investigate the structural and functional consequences of substituting asparagine 220 with leucine (N220L), a mutation located within the enzyme's active site region. Characterizing the N220L variant provides insight into residue-specific contributions to catalysis and may inform future inhibitor design strategies targeting NDM-1.

Cole Johnson

Dr. Kari Stone

C27 Metal Adsorption using Pseudomonas putida MnB1 Biogenic Manganese Oxides

Pseudomonas putida MnB1 is a bacterium that uses a multicopper oxidase to catalyze manganese oxidation. MnB1 forms biogenic manganese oxides (BMO), which uptake Mn(II) and facilitates oxidation of Mn(II) into Mn(IV) oxide particles. BMO-mediated adsorption of various metals in aquatic environments has demonstrated its capacity to remediate heavy metals in water, an ongoing problem that threatens human health and water quality. BMOs can adsorb a variety of metal ions, thereby removing metal contaminants in water. In this study, MnB1 was cultured and transferred to growth media to produce BMOs. The metal content of water remediated by BMO was analyzed using atomic absorption spectroscopy. Results will be discussed.

Genesis Dennis

Dr. Kari Stone

WEDNESDAY • APRIL 22

CONCURRENT SESSION 1

8AM

AS-155-A

C03 Zero-Trust Network Security Architecture for a Multi-Site Small Business Using Sophos Firewall and Secure VPN Connectivity

Due to a lack of funding and resources, small and medium-sized enterprises are more vulnerable to sophisticated cyber threats. In modern situations, where remote access, decentralized locations, online services, and insider threats are widespread, traditional perimeter-based security methods are becoming ineffective day by day. It is already known that a lot of secure environments adapt to a Zero-Trust network architecture in both on-premises and cloud servers. In a secure network environment, a Zero Trust Network Architecture (ZTNA) refers to how the network is designed and configured that no person, device, or connection is trusted by default. Network segmentation and isolated segmentation are required, with each segment having its own firewall rules and policy. As a result, user privilege is restricted, and lateral movements are closely regulated and monitored. In a Zero-Trust arrangement, users and devices are linked via a secure gateway, such as a site-to-site VPN, with limited user access, and user activity is actively tracked for behavioral analysis. This project proposes the development and implementation of a Zero-Trust network architecture for a multi-site business using Sophos firewall and encrypted VPN connectivity. The design prioritizes strict network segmentation, identity-based access control, and secure communication between sites. Each business location is handled as a separate trust domain and is protected by a dedicated firewall. Site-to-site IPsec VPN tunnels provide secure encrypted communication between locations via the public Internet. The internal network at each location is segmented into virtual local area networks (VLANs) to separate users, servers, point-of-sale systems, CCTV equipment, and guest Wi-Fi. This framework prevents unwanted lateral movement and mitigates the impact of any security incident. In following Zero-Trust principles, the design requires least-privileged access, constant traffic inspection, and explicit verification of all network connections. Remote access is protected by OpenVPN's certificate-based authentication and robust encryption techniques. All communications are monitored and controlled using traffic inspection capabilities such as intrusion prevention and firewall policy enforcement. The primary goal of cybersecurity is to ensure confidentiality, integrity, and availability. A secure environment begins with building security and extends to server security, which requires network connection maintenance and configuration. Any misleading configuration or human error could result in significant damage to the organization, ranging from losing confidential information to ransomware attackers to shutting down operations for several days. This project aims to implement a secure environment using cost-efficient tools while simulating attack scenarios to evaluate the effectiveness of Zero-Trust network architecture by analyzing how the architecture responds to attempted breaches. The study demonstrates the merits and limits of Zero-Trust principles for preventing unwanted access and limiting lateral movement. The findings show that a well-implemented Zero-Trust model improves network resilience, decreases attack impact, and offers an affordable and scalable security method for current enterprise systems. 1.

Mohammad Dawaghreh, Buyanzaya Davaadorj

Dr. Rami Khasawneh

C11 Cybersecurity as Service: A User-Focused Approach to Web Risk Detection

Smart contracts are increasingly used to manage digital assets without intermediaries, yet design and implementation flaws continue to result in significant security failures. This project proposes the secure design and validation of a blockchain-based escrow smart contract using invariant-based security reasoning and automated analysis techniques. Rather than relying on full formal verification, which is often impractical in applied development environments, the project adopts a lightweight and realistic approach aligned with contemporary smart contract security practices. The proposed system implements a minimal escrow application deployed on an Ethereum test network, allowing users to deposit and withdraw funds through well-defined and auditable state transitions. Security is treated as a primary design requirement from the outset. Core security invariants, such as fund conservation, authorization enforcement, prevention of double withdrawal, and effective emergency controls, are explicitly defined and enforced within the contract logic. A structured threat model based on the STRIDE framework is developed to identify relevant adversarial behaviors, trust assumptions, and abuse scenarios unique to decentralized systems. Automated static analysis tools, including Slither, are used to assess the contract for common vulnerabilities and to support validation of the defined security properties. To demonstrate adversarial reasoning, an intentionally vulnerable version of the contract is implemented and analyzed, after which the contract is redesigned and patched to mitigate identified issues. The project deliverables include a deployed smart contract, a minimal web-based interface for interaction, automated analysis artifacts, and a concise security report. Overall, this proposal demonstrates applied smart contract security engineering within a constrained, practical, and academically grounded scope.

Aaileen Sarwar Syed

Dr. Rami Khasawneh

C12 Invariant-Driven Secure Escrow: Design, Exploitation, and Verification of a Smart Contract

Smart contracts are increasingly used to manage digital assets without intermediaries, yet design and implementation flaws continue to result in significant security failures. This project proposes the secure design and validation of a blockchain-based escrow smart contract using invariant-based security reasoning and automated analysis techniques. Rather than relying on full formal verification, which is often impractical in applied development environments, the project adopts a lightweight and realistic approach aligned with contemporary smart contract security practices. The proposed system implements a minimal escrow application deployed on an Ethereum test network, allowing users to deposit and withdraw funds through well-defined and auditable state transitions. Security is treated as a primary design requirement from the outset. Core security invariants, such as fund conservation, authorization enforcement, prevention of double withdrawal, and effective emergency controls, are explicitly defined and enforced within the contract logic. A structured threat model based on the STRIDE framework is developed to identify relevant adversarial behaviors, trust assumptions, and abuse scenarios unique to decentralized systems. Automated static analysis tools, including Slither, are used to assess the contract for common vulnerabilities and to support validation of the defined security properties. To demonstrate adversarial reasoning, an intentionally vulnerable version of the contract is implemented and analyzed, after which the contract is redesigned and patched to mitigate identified issues. The project deliverables include a deployed smart contract, a minimal web-based interface for interaction, automated analysis artifacts, and a concise security report. Overall, this proposal demonstrates applied smart contract security engineering within a constrained, practical, and academically grounded scope.

Aaileen Sarwar Syed

Dr. Rami Khasawneh

WEDNESDAY • APRIL 22

CONCURRENT SESSION 1

8AM

AS-156-A

C18 Secure Hybrid payment gateway with AI-Driven fraud detection.

As e-commerce continues to evolve, merchants increasingly require versatile payment solutions that accept both traditional fiat currencies and decentralized cryptocurrencies. However, integrating these dual payment rails introduces complex security vulnerabilities, including double-spending attacks, payment API manipulation, and cross-site scripting (XSS) in merchant dashboards. This project proposes the development of a secure, commercial-grade hybrid payment gateway application capable of processing credit card transactions and cryptocurrency payments on a test network. The application will feature a robust merchant admin interface for product management, transaction monitoring, and API key generation. Developed and deployed using the Replit cloud IDE, the project will leverage AI coding assistants to accelerate secure code generation and automated vulnerability scanning. The security architecture will be grounded in a rigorous STRIDE threat model, focusing on preventing race conditions in payment processing and securing sensitive API endpoints. Furthermore, the project includes a red-team phase where AI agents will be utilized to simulate sophisticated attacks against the gateway to validate its resilience. The final deliverable will be a fully functional, mobile-responsive web application that demonstrates how secure design principles can be applied to modern financial software.

Sankeerth Thalloju, Taduru Bhavani

Dr. Rami Khasawneh

C21 End-to-End Incident Response and Exploit Simulation in a Vulnerable Blockchain System

Blockchain-based systems are usually assumed to be resilient due to their decentralized nature and cryptographic foundations. However, vulnerabilities in smart contracts, wallet logic, and supporting infrastructure continue to enable exploitation. This project presents an end-to-end incident response and exploit simulation involving an intentionally vulnerable blockchain-based cryptocurrency system. The system is designed to emulate realistic security flaws, which are identified and exploited through a red-team engagement to demonstrate attack paths, impact, and adversarial techniques. Following the initial exploitation, a blue-team response is conducted to detect any malicious activity, perform a forensic analysis, contain the breach, and implement corrective patches. The project focuses on core security operations including intrusion detection, blockchain forensics, responsible vulnerability analysis, and patch management. By incorporating offensive and defensive security workflows, this app will show common weaknesses in blockchain implementations and demonstrates practical methods for improving system resilience. The results provide insight into how structured exploit simulations can strengthen incident response capability and inform secure development practices in decentralized environments.

Nicolas Paredes

Dr. Rami Khasawneh

C30 Driver Alcohol detection system

Drunk driving is still considered one of the biggest reasons behind road accidents and fatalities, thereby threatening road safety. While many techniques, such as breath analyzers, can be easily employed for detecting alcohol consumption, they require significant involvement and can only measure alcohol for a specific interval of time. Keeping such issues in mind, this paper focuses on developing a Driver's Alcohol Detection System using sweat detection sensors, thereby ensuring the overall process is effortless. Sweat of any human being can act as an alcohol detector as it is found to contain trace levels of ethanol in the same quantity as that found in blood. In the proposed system, there are sweat alcohol sensors that are integrated with commonly touched vehicle parts, like the steering wheel. Very person releases certain amount of sweat which will be useful for the sensors to automatically sense ethanol content using the driver's skin, negating the need for manual tests. The data obtained by the sensors is processed by a microcontroller that constantly compares the sensed data with a predetermined limit. If the sensed data shows an alcohol level that surpasses a predetermined limit, the system triggers an action by restricting the vehicle's engine start and flashing a warning signal. The system is designed for real-time operation, thereby facilitating quick identification and reaction to improper driving conditions. Other components have also been added to provide information to the individual concerning the detected levels of alcohol. For instance, the system employs the use of sweat-based detectors to minimize chances of false identifications due to alcohol vapors. This allows for constant monitoring to be carried out during the driving sessions. Overall, this Driver's Alcohol Detection System appears to present an effective, affordable, and user-friendly solution to curtailing or reducing driving under the influence of alcohol. Its adoption in modern vehicles will definitely play an important role in reducing accidents, promoting road safety, and increasing road responsibility.

Pooja Gopi Chetti

Dr. Rami Khasawneh

WEDNESDAY • APRIL 22

CONCURRENT SESSION 1

8AM

AS-157-A

C20 Secure Crypto Payment Gateway With Double-Spend Detection and Fraud Controls

Cryptocurrency payment systems are increasingly adopted by merchants due to their decentralized architecture, low transaction costs, and global accessibility. However, fast-pay or zero-confirmation cryptocurrency transactions introduce significant security risks, particularly double-spend attacks, where an attacker broadcasts conflicting transactions to defraud merchants before blockchain confirmation occurs. This project proposes the design and implementation of a secure crypto payment gateway that integrates blockchain-aware fraud detection with enterprise-grade application security controls. The system includes a merchant checkout application, product management, administrative dashboard, and secure payment processing using a blockchain test network. The core security mechanism is inspired by the IEEE research paper Countering Double-Spend Attacks on Bitcoin Fast-Pay Transactions, which introduces observer-based techniques for detecting conflicting transaction inputs. A formal threat model using the STRIDE framework will guide system design, and adversarial exploits such as double-spend attacks and application-layer abuse will be demonstrated and mitigated. The project aims to translate academic blockchain security research into a commercially realistic and security-focused payment application.

Kranthi Venkat Dasari

Dr. Rami Khasawneh

C23 Secure DeFi Smart Contract Platform

Decentralized Finance (DeFi) platforms introduce unique security challenges as they have fixed smart contracts, autonomous execution, and exposure to adversarial blockchain environments. This project aims to design and develop a secure DeFi smart contract platform. This platform will be deployed on a test network. This platform will introduce a robust security-first architecture and formal validation practices. The application will apply staking, escrow, or governance, like basic decentralized financial functions, and emphasize protection against unauthorized access, logic flaws, and manipulation, like common smart contract vulnerabilities. The project will apply a structured threat-modeling approach to examine risks throughout the contract logic, user interactions, and administrative controls. The project will use static analysis tools to identify weaknesses and apply controlled adversarial testing. With this approach, the project will ensure proper design decisions. The project integrates secure coding practices, validation mechanisms, and abuse-case handling to show how security engineering can protect and build trust and robustness in DeFi systems, and also maintains flexibility for future enhancement.

Ambala Alekhya, Gracy Mallipeddi

Dr. Rami Khasawneh

C15 Evaluating Current Technological Frameworks: Capabilities and Limitations

Evaluating Current Technological Frameworks: Capabilities and Limitations The rapid evolution of digital technologies has produced a wide range of frameworks designed to support modern computing needs across industries such as healthcare, education, business, and data science. This study evaluates several widely used technological frameworks, examining their core capabilities, architectural strengths, and practical applications. The analysis focuses on three major categories: software development frameworks, data processing ecosystems, and cloud-based infrastructures. Through comparative assessment, the study explores how these frameworks enable scalability, efficiency, and innovation while also identifying constraints related to performance, interoperability, and implementation complexity. Findings highlight recurring challenges such as security vulnerabilities, integration barriers, and the need for continuous updates to keep pace with emerging technologies. By outlining both the advantages and limitations of current frameworks, this research provides valuable insight for developers, organizations, and decision-makers seeking to select or optimize technologies for their operational needs. Ultimately, the study contributes to a broader understanding of how technological frameworks shape modern computing environments and where future improvements may be most impactful.

Praveena Chinnareddygari

Dr. Rami Khasawneh

WEDNESDAY • APRIL 22

CONCURRENT SESSION 1

8AM

AS-158-A

C17 Crypto in Sports & Entertainment

With the rise of cryptocurrency and blockchain technology the sports and entertainment industry have been influenced significantly over the past several years. During these times professional sports teams, stadiums, and esports organizations have adopted crypto in various forms, including sponsorships opportunities , boosting engagement through fan tokens and non- fungible tokens (NFT's), or cryptocurrency payments. These emerging technologies and opportunities have created new revenue streams, increased fan engagement, and attracted new investors into both the traditional and digital sports markets. This paper explores the role of cryptocurrency in sports, focusing on the evolution of making money through the adoption of new technologies and crypto based sponsorships, which include partnerships with crypto platforms and sports betting sites. The ease of use of crypto has streamlined financial transactions and enabled global wagering, making crypto based betting more appealing to sponsors around the world. Additionally, younger more digitally fluent audiences represent a new market that closely aligns with the crypto based ecosystems. By analyzing current trends and real world examples, this research evaluates how the adoption of cryptocurrency has increased revenue opportunities in both traditional sports and esports. The paper considers whether cryptocurrency represents sustainable long term transformation in increased revenue or a temporary boost with new technology.

Theodore Kwasigroch

Dr. Rami Khasawneh

C14 Secure Communication in Decentralized Messaging Systems

Confidentiality is a fundamental requirement for secure digital communications. This project proposes the design and evaluation of a secure communication system for decentralized messaging environments. The purpose is to explore how strong security and privacy can be achieved in messaging systems that may operate across heterogeneous or unreliable networks. The project will focus on applying secure design to protect the confidentiality, integrity, and authenticity of communications. Furthermore, multiple pre-existing solutions will be examined to determine the security and potential weaknesses of their decentralized peer-to-peer architecture, with the goal of identifying improvements or mitigations. Finally, a functional prototype will be developed to showcase secure message exchange, with an analysis of potential vulnerabilities and threats.

Colin Parker

Dr. Rami Khasawneh

CONCURRENT SESSION 2

9:15AM

AS-102-A

C16 Crypto Regulation Around the World

Crypto Regulation Around the World Gabriela Lasak Lewis University Romeoville, IL 60446 This study will examine and show the various nations that govern cryptocurrencies, causing them to have a balance between innovation needed with consumer protection and financial system accuracy. Since cryptocurrencies have become part of the world economy, regulators must negotiate complicated problems while tackling fraud, money laundering, price manipulation, and systematic risks related to them. The primary legislative approaches among the leading nations are the U.S., E.U., China, and other developing economies as well as legal basis, enforcement methods and views on decentralised finance (DeFi) and stable coins are assessed in this study. The findings show that while some countries have adopted flexible, innovation-focused policies to promote innovation and create protective systems at the same time, many others have chosen to impose stringent prohibitions or extremely severe limits on cryptocurrencies. Effective rules for cryptocurrencies, this study finds, call for, international cooperation, a definite differentiation between other assets and digital ones and regulations that may be readily adjusted to enable innovation as technology advances. Ultimately, the results of this study reaffirm that fair rules enable protective measures and enable the ongoing development of cryptocurrencies around the world.

Gabriela Lasak

Dr. Rami Khasawneh

C31 Should Governments Issue Digital Currencies (CBDCs)?

Central bank digital currencies (CBDCs) are a proposed digital form of government-issued money. Supporters argue that CBDCs can improve payment efficiency and expand access to financial services. However, critics warn about risks to privacy, security, and financial stability. This paper examines whether governments should issue CBDCs by weighing these potential benefits against their possible drawbacks. It argues that while CBDCs might offer certain advantages, the adoption of these digital currencies would require careful design and oversight.

Luca Fischer

Dr. Rami Khasawneh

WEDNESDAY • APRIL 22

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9:15AM

AS-106-A

C24 Worldwide Regulations on Cryptocurrency

This presentation explores different laws and regulations surrounding digital currencies. Since the beginning of Bitcoin in 2009, cryptocurrency has emerged as a strong, meaningful addition to our money, and could prove to be the future of wealth. This is an investigation of the different ways the world tries to control the trade and manufacture of digital currencies. Regulation for cryptos is important to protect against illegal activities, just like any other currency. But some of the inherent qualities of cryptos is what makes them desirable to consumers. One of the main ideas behind Bitcoin is to take trust out of the equation. However, some governments like the CCP rely on control and cryptocurrencies take away dependance on institutions, so it was banned. Conversely, the EU allow cryptos and created standardized rules across Europe that requires authorization of exchanges and wallet providers, creating safety for consumers and digital currencies. This analysis highlights the unique ways different nations address cryptos, or the lack of clear infrastructure to do so. The goal of the presentation is to educate the audience on the possibilities of cryptocurrencies and the implications of governments trying to regulate this decentralized money.

Clement Raj

Dr. Rami Khasawneh

C32 Cryptocurrency Exchanges

Cryptocurrency exchanges can be defined as online platforms where people can buy, sell, and trade their respective digital currencies. The subject matter for this paper includes an in depth explanation about exchanges, their concept, the process involved, and finally the way in which they can be used by the average person. Exchanges are categorized into two main types: centralized and decentralized exchanges. Centralized exchanges are run by companies that act as intermediaries and manage user accounts. Decentralized exchanges allow users to trade directly with each other using blockchain technology, without a central authority. Furthermore, this paper seeks to shed more light on the basic procedures involved in making a trade on these platforms, while also delving into some of the common risk factors, which can make users skeptical about these exchanges. Overall, this paper will serve as a foundational resource with the aim to provide a clear introduction to cryptocurrency exchanges and their role in the growing use of digital money. It is directed particularly for readers seeking to know more about this topic, as well as more experienced users who already make use of these exchange platforms.

Kacper Parobi

Dr. Rami Khasawneh

C33 Wallet Security

In the crypto world, one wrong click can mean that your money is gone for good. What I have written examines cryptocurrency scams through a cybersecurity and consumer protection lens and argues that most losses do not come from criminals hacking the blockchain. Instead, there are scams due to attackers exploiting people through social engineering, weak account security, and unclear steps for securing accounts. From the beginning of money, with just paper, to having digital banking, new trails are being created. This is the rise of common phishing scams. There is a way to reduce it by having strong authentication to ensure the safety of cryptocurrency. In the end, safer crypto choices depend on building strong consumer protection into security from the start.

Michael Griffin

Dr. Rami Khasawneh

WEDNESDAY • APRIL 22

CONCURRENT SESSION 2

9:15AM

AS-150-A

C45 Examining the Antimicrobial Properties within Osage Orange (Maclura pomifera) Extract Against Clinically Relevant Bacterial Strains

Extracts from various components of the Osage orange tree (Maclura pomifera) have been shown to inhibit the growth of several microbial species. This group explored the ability of the extracts from the fruit to inhibit the growth of microbes, including fungi and Gram-positive and Gram-negative bacteria, while characterizing properties of the antimicrobial agent within the extract. The current objective is to assess extracts from the fruit of the Osage orange tree for antimicrobial activity against clinically relevant microbial species. An extract was prepared from an orange pulverized into a paste and then subjected to a standard ethanol extraction protocol. Various concentrations of the extract were added to sterilized tubes containing liquid growth media, which were also inoculated with select species of microbes. These samples were then incubated at 37°C for 18 hours. Sample turbidity was measured using a spectrophotometer after the incubation period to assess microbial growth. Minimum inhibitory concentration analysis demonstrated that higher concentrations of extract yielded lower sample turbidity, with a concentration of 0.66% extract demonstrating the most significant reduction in growth. Findings indicated that the extract was effective in limiting the growth of clinically relevant Gram-positive species, including L. monocytogenes and multiple strains of antibiotic-resistant S. aureus, while Gram-negative species and fungi were unaffected. These results are promising, as the extract demonstrated significant inhibitory effects against clinically relevant Gram-positive bacteria, supporting its potential as a possible therapeutic candidate.

Ashley Miller, Maciej Zalinski, Shaylin Roark, Ethan Brooks

Dr. Jerry Kavouras, Dr. James Rago

C52 Slurry Enhancement for Low-Stress Chemical Mechanical Planarization (CMP) Processes of Diamond Substrates

According to Moore's Law, the number of transistors on an integrated circuit (IC) must double every two years to accommodate the ever-growing demand of computing capabilities. Wide band gap (WBG) substrates such as diamond are emerging as the optimal candidates to meet the rising technological requirements due to their intrinsic abilities (i.e., high capacitance, thermal stability, and wear resistance). In the effective manufacturing of IC devices, each layer of the utilized substrate must be atomically flat. To achieve this, the synergy created between chemical interactions and mechanical forces are used in the chemical mechanical planarization (CMP) process. The advantages of these WBG substrates prove to make CMP difficult as the hardness of the material requires aggressive chemistries such as harsh oxidizers to obtain the desired material removal rates (MRR). The industry standard to achieve this oxidation and MRR is potassium permanganate (KMnO4); however, this is harmful to the substrate and generates defects due to high sheer forces previously measured. To avoid the damaging side effects, hydrogen peroxide (H2O2)-based slurries show promise as alternatives, but they cannot reach the necessary MRR on their own. H2O2-based slurries can be catalyzed to increase the generation of reactive oxygen species (ROS). ROS can interact with the slurry, pad, and substrate to modify the surface chemistry, weakening bonds allowing for the removal of the material. These aspects create a tunable CMP process, resulting in increased MRR while reducing defects on the substrate.

Kiersten Smith

Dr. Jason Keleher

CONCURRENT SESSION 2

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AS-155-A

C48 Asteroid Surface Observation Mission

The Asteroid Surface Observation Mission (ASOM) is a small spacecraft flyby mission intended to characterize the physical properties of near-Earth objects (NEOs). ASOM targets small (10 - 100 m diameter) NEOs and will perform close-approach (~50 km) observations, complemented by ground-based astrometry data. A major scientific motivation is to improve constraints on the parameters governing non-gravitational forces such as the Yarkovsky effect. The Yarkovsky effect is a phase-delayed thermal-recoil force which contributes to the secular time-evolution of the semimajor axis of NEOs. Currently, the Yarkovsky effect is inferred primarily through astrometric drift measurements. Predictive modeling requires assumptions regarding surface temperature distributions, thermal inertia, spin state, and surface morphology and composition. This work investigates the extent to which these parameters, particularly spin state, could be constrained by an in-situ mission concept, and develops detection models linking equipment limitations to achievable science return. Ground-based lightcurve observations of 10-100 m NEOs are typically obtained in Vis-band using 1-4 m aperture telescopes during close-Earth approaches (0.01-0.1 AU). Small NEOs (H≥22) generally have a photometric uncertainty of 0.1-0.5 magnitude, corresponding to signal-to-noise ratios < 50, depending on telescope aperture and atmospheric conditions. ASOM flybys will occur at distances four to five orders of magnitude closer, which will result in a ten order of magnitude increase in photon flux. Combined with the absence of atmospheric noise and the ability to match spin state, this will enable an uncertainty two orders of magnitude better than ground-based observations which corresponds to a signal-to-noise ratio > 1000.

David Rodriguez

Dr. Joseph Kozminski

C51 Genetic Algorithm–Based Energy Storage Scheduling Under TOU and Demand Charges

This project focuses on using a Genetic Algorithm (GA) to help a home battery system save money on electricity. Many electric companies now use Time-of-Use (TOU) pricing, where electricity costs more during busy hours and less during quiet hours. They also charge extra based on the highest amount of power a home uses in a month, called a demand charge. A Battery Energy Storage System (BESS) can help reduce these costs by storing energy when it is cheap and using it when prices are high. Traditional methods for controlling batteries follow simple rules, such as always charging at night and discharging in the evening. However, these methods do not always work well when the load changes or when electricity prices vary. To solve this, this project uses a Genetic Algorithm, which is a type of smart optimization method inspired by natural selection. It searches for the best charging and discharging schedule while respecting battery limits and reducing wear on the battery. The GA was tested using a real 24-hour residential load profile from San Francisco. It was compared to two other cases: no battery and a simple rule-based schedule. The results show that the GA reduces total electricity cost by 27.3% compared to having no battery and provides 7.5% more savings than the rule-based method. It also lowers peak demand by 22.7%, which reduces demand charges. Overall, the GA approach is fast, practical, and effective for day-ahead battery scheduling. It offers a strong foundation for future improvements such as multi-day planning, solar integration, and real-time control.

Amreen Kahkashan

Dr. Yazan Alsmadi

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AS-156-A

C01 AI Skin Analyzer & Dermatologist Appointment Assistant

Skin health is essential, yet early detection of dermatological issues is often delayed due to lack of awareness or access. This project demonstrates Glow AI, an AI-powered skin analyzer that evaluates user-uploaded skin images to detect potential conditions and connects users to dermatology appointments. Using computer vision techniques, the model identifies visual patterns associated with common skin conditions and assigns a severity score. The session includes a live demonstration of the tool, showcasing how AI can provide accessible, early-stage health guidance while seamlessly integrating with healthcare services. Evaluation metrics and example analyses will illustrate the model's accuracy and practical applications. This project highlights the potential of AI to bridge the gap between personal health monitoring and professional care, providing tangible benefits to everyday users. Attendees will gain insights into both the research process behind the AI model and its application as a real-world solution.

Hajira Sultana

Dr. Safwan Omari

C02 AI, Kids, and Society: Trust, Ethics, and the Need for Policy

Artificial intelligence is increasingly shaping the lives of children, from educational apps to online entertainment, yet its rapid adoption raises critical questions about trust, ethics, and societal impact. This panel explores how AI affects children and the broader implications for society, emphasizing the need for responsible design, transparency, and policy. Panelists will examine how AI systems can assist humans without replacing essential judgment, the risks of bias and inequity in AI decision-making, and strategies to ensure that children's data is protected and used ethically. Real-world examples, such as AI-powered educational platforms, digital health tools like Glow AI, and recommendation systems, will illustrate both the benefits and potential pitfalls of AI in contexts where youth are involved. The discussion will also address the importance of policy and regulation to safeguard young users, highlighting current gaps in legislation and emerging standards that aim to protect privacy, promote fairness, and ensure accountability. Audience members will be invited to participate actively, sharing perspectives, posing questions, and debating strategies for building trustworthy AI systems that serve children and society responsibly. By the end of the session, participants will gain a holistic understanding of how AI impacts youth, the ethical considerations developers and educators must navigate, and actionable insights for creating policies and technologies that foster safe, equitable, and transparent AI use. This conversation underscores the societal responsibility of AI innovation and the importance of collaborative dialogue among technical, educational, and policy communities

Hajira Sultana

Dr. Safwan Omari

C04 The Effectiveness of Sports Teams' Use of Social Media to Engage Fans

Social media has become an essential part of sports marketing, specifically changing how professional teams connect to their fans. Instead of relying only on the traditional media landscape, teams now use social media platforms to create a more direct and interactive relationship with fans. As more teams focus their time on social media, fan attention has increased greatly. However, there is no official playbook for effective social media marketing especially across different platforms. This study examines how professional baseball teams use social media to engage fans by focusing on three research questions: (1) which social media platforms are the most effective for fan engagement, (2) what types of content receive the highest engagement, and (3) how social media engagement influences attendance and sales. A mixed-methods approach is used by combining social media analytics from three to five professional sports teams with surveys from fans and industry professionals. Early findings suggest that highly interactive and authentic content leads to higher engagement than strictly promotional posts. Although the study is still in progress, patterns are showing that a strong social media engagement exemplifies the loyalty between fans and teams. Overall, this research highlights the role of social media in shaping fan engagement in the sports industry.

Gianna Ciaccia

Dr. Hayley Miller

CONCURRENT SESSION 2

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C54 From Policy to Practice: How Secondary Teachers Sensemake and Enact the Illinois Comprehensive Literacy Plan

This research investigates the systemic misalignment in adolescent literacy, where instructional support often diminishes just as disciplinary texts become more complex. It explores secondary teachers enactment of the Illinois Comprehensive Literacy Plan (ICLP), specifically probing the gap between state policy and the realities of discipline-specific classrooms. This qualitative study utilizes a dual-lens framework to capture the complexity of policy enactment. Cognitive Sensemaking (Spillane; Coburn) is employed to explore the internal, cognitive filters of the teacher, while Policy Enactment (Ball et al.) is used to analyze the external, contextual dimensions of the school environment. The research design focuses on semi-structured interviews and the collection of instructional artifacts analyzed as "material traces" of the teacher's interpretive process. Preliminary analysis of the ICLP and current scholarship reveals tension between abstract state-level goals and the structural realities of secondary schools. To address this, the study resulted in a research design that investigates four critical dimensions of enactment: (1) Teacher Sensemaking and the influence of disciplinary identity; (2) Instructional Materialization, focusing on the artifacts and resources that emerge as physical evidence of labor; (3) Professional Agency, exploring how teachers negotiate their roles as policy actors; and (4) Contextual Mediation, identifying the conditions necessary for sustaining enactment. These conceptual findings establish a framework for documenting the material artifacts of teacher labor that have previously gone unrecorded in policy research. This work offers a socio-material account of policy enactment that informs targeted, discipline-specific professional development and promotes systemic instructional coherence across the educational continuum.

Stamatina Asiouras-Hernandez

Dr. Erica Davila, Dr. Elvira Pichardo

C56 Shifting the narrative on mid-career teacher phases

Much of the research and dialogue around the phases of mid-career teaching categorizes educators into labels that are centered around negative language. These labels such as "disengaged," "plateauing," and "dissatisfied" do not always represent the labels teachers use about themselves or reflect how they would describe their professional careers, and may lead to administrators treating them accordingly. This research examines the language used through the lens of Social Construct Theory and explores ways that teachers and administrators can shift these deficit-based labels to center mid-career teachers' voices and expertise to provide more opportunities to encourage and sustain engagement. The research interviews for this dissertation are forthcoming; however, current research centers on the ways that career phases have been categorized, what descriptors tend to make up those phases, and what obstacles are faced. The research then focuses on elements of teacher leadership, initiatives, and professional development as outlets for engagement and the benefits and barriers that exist in high school systems to sustain these roles. The research will also highlight an ongoing, voluntary, before-school cohort of mid-career teachers at a suburban high school throughout the seven sessions they have met over the last two years. I will share the structure of these sessions and some of the insights provided by the teachers. Each of the elements of this session will help inform administrators and mid-career teachers with insights into adjustments that could be made to already existing frameworks in mentoring mid-career teachers without adding "one more thing" to their workload.

Kim Miklusak

Dr. Davila Erica

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AS-158-A

R02 Shakespeare Studies: Politicizing Disability in Shakespeare's Coriolanus and Measure for Measure

Shakespeare's plays often pose questions about what bodies are deemed socially acceptable and why. Reading Coriolanus and Measure for Measure through a disability studies lens highlights early modern fears that bodies that are wounded, engaged in illicit sexual activity, or unlawfully reproductive are active threats to the political order. Scholars such as Alice Equestri argue that disability during the Renaissance period was not only based on real, physical, or mental disability but also on strict societal expectations. Rosemarie Garland-Thomson poses the interesting question, "Why do we stare?" suggesting that bodies can become disabled through prolonged, severe public scrutiny. In this essay, I use a disability approach to highlight how Shakespeare examines the idea of 'creating disability' through societal expectations of conformity. More specifically, I focus on Coriolanus and Measure for Measure as they offer two different yet corresponding viewpoints on political powers demanding physical and cognitive obedience.

Shannon Tierney, Matthew Czaja, Chloe Torres, Katharine Svehla]

Dr. Mardy Philippian

WEDNESDAY • APRIL 22

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10:30AM

AS-102-A

C05 Cryptocurrency and Crime: Fiction and Fact

Cryptocurrency and Crime: Fiction and Fact Izabella Ibarra Lewis University Romeoville, IL, 60446 There is the belief that cryptocurrency is only used in crime, which would be considered fiction, not fact. A fact would be that both cash and cryptocurrency can be used for crime, but they may not necessarily be used for that purpose. Cryptocurrency is a digital currency that can be used without having to go through an online banking system, it is independent from online banking. This could be for a number of reasons, including if the person does not trust online banking for fear of losing their money or because they do not want their bank holding onto their money and asking questions about its legitimacy. The same could be said for cash. Cash is untraceable and does not need to be kept in a bank, perhaps for the same reasons. It would be unfair to assume that cryptocurrency is only used in crime, so in this presentation, I will research the ties between cryptocurrency and crimes, seeing what is considered myth and fiction as well as what is considered fact and reality. The question I will strive to answer is, "Is crypto mainly used for illegal activity?" I will be comparing cash and traditional banking systems as well to answer the proposed question and find out if cryptocurrency is indeed mainly used for illegal activity.

Izabella Ibarra

Dr. Rami Khasawneh

C10 How cryptocurrency is marketed to young people

Cryptocurrency is marketed to young adults on many different social media platforms including instagram, tiktok, snapchat, facebook, etc. Influencers use these platforms to show off their lavish lifestyles and influence young adults to invest their time and money in cryptocurrency. Instagram and tiktok platforms have short "reels" or videos where influencers can post videos and show off their life and how cryptocurrency changed their lives while on youtube, these influences can make longer videos explaining the process of cryptocurrency and how these influencers successfully made money. These videos are often oversimplified and include misinformation to attract the attention of young people. It often ignores the facts of risk, and only includes the success of cryptocurrency. These influences also include slogans like 'buy it before its gone' or 'make money fast' to get the attention of young people. Influencers also often do not include that these videos are paid promotions or advertisements for cryptocurrency companies.

Emilia Gorz

Dr. Rami Khasawneh

C09 Crypto winners and losers

Participating in cryptocurrency exchanges demonstrates significant inequality, despite the fact that cryptocurrency markets are frequently presented as decentralized and democratizing alternatives to traditional finance, By analyzing the distinctions between early and late adopters, institutional investors, and individual players, this study explores who benefits and loses within the bitcoin ecosystem. This study compares market access, risk exposure, and investment advantages across various categories using a comparative quantitative approach, with particular attention to entry timing, cash availability, and information and technology access. According to the data, late adopters face higher prices, more volatility and fewer chances for significant profits, whereas early adopters usually benefit from reduced entry fees, higher risk tolerance and early access to emerging technology. In the same way, individual investors are more susceptible to financial risk and market manipulation because institutional investors have substantial advantages due to their larger resources, sophisticated trading instruments, regulatory influence and access to private investment opportunities. Overall, the results indicate that although cryptocurrency promises equitable access, it frequently exacerbates rather than resolves current economic disparities.

Kaleb Richardson

Dr. Rami Khasawneh

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AS-150-A

C36 Combating Antibiotic Resistance through Inhibition of Metallo-Beta-Lactamases

Antibiotic resistance is a growing global health threat, driven by the spread of resistant pathogens. Metallo-beta-Lactamases (MBLs), such as New Delhi Metallo-beta-lactamase-1 (NDM-1), contribute to this problem by hydrolyzing beta-lactam antibiotics and rendering many treatments ineffective. Recent studies have identified 8-hydroxyquinolines (8HQs) as promising inhibitor scaffolds due to their zinc-sequestering properties, which may disrupt MBL catalytic activity. In this work, virtual screening and molecular docking were used to identify potential 8HQ-based inhibitors targeting NDM-1 enzymes. These computational approaches provide insight into protein-ligand interactions and support the development of restoring □-lactam antibiotic efficacy. By targeting the zinc-dependent active sites of MBLs using the 8-hydroxyquinoline scaffold, this research seeks to restore the effectiveness of beta-lactam antibiotics.

Rihan Alwan

Dr. Kari Stone

C29 AI-driven Discovery of Metallo-beta-lactamase Inhibitors

The emergence of carbapenem-resistant bacteria expressing metallo-beta-lactamases (MBLs) represents a major challenge for current beta-lactam antibiotics and motivates new approaches to inhibitor discovery. In this work, a machine learning driven workflow that integrates molecular generation and predictive modeling to identify novel 8-hydroxyquinoline (8HQ) based MBL inhibitors. A SMILES-based variational autoencoder (VAE) is pretrained on a large, diverse molecular dataset to learn molecular grammar and subsequently fine-tuned on an 8HQ-focused chemical space to bias generation toward scaffold-relevant analogs while preserving chemical diversity and validity. Generated compounds are then prioritized using an XGBoost regression model trained to predict protein-ligand docking scores, enabling rapid filtering of candidates prior to explicit docking and molecular dynamics simulations. This combined generative and predictive framework reduces computational cost while expanding exploration of relevant chemical space, demonstrating the utility of AI-guided drug design for metallo-□-lactamase inhibitor discovery where time is of the essence.

Anthony Baudino

Dr. Kari Stone

C37 Optimizing Mn-oxidizing Pseudomonas putida MnB1 for intercalation-based metal uptake for novel materials syntheses

This study explores the potential of Mn-oxidizing Pseudomonas putida MnB1 to facilitate intercalation-based metal uptake for the synthesis of novel materials. P. putida MnB1 efficiently oxidizes environmental Mn(II) to Mn(IV)-oxides through a multicopper oxidase pathway, producing biogenic manganese oxides (BMOs) with unique physicochemical properties. Unlike their abiotic counterparts, BMOs exhibit high surface area, reactivity, and an amorphous, poorly crystalline structure, making them promising platforms for metal intercalation. This research demonstrates the incorporation of various transition and rare earth metals into the layered MnOx structures of BMOs, with structural characterization conducted via scanning electron microscopy, energy dispersive X-ray spectroscopy, and inductively coupled plasma optical emission spectroscopy. The kinetics of metal uptake by BMOs are modeled using iron as a representative intercalant. These findings advance the understanding of biologically mediated metal intercalation processes and open pathways for designing new functional materials with potential applications in catalysis.

Elisa Morales

Dr. Kari Stone

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AS-155-A

C49 Structural investigation of Redox-Active Metal-Organic Frameworks in Electrochemical Capacitors

Electrochemical capacitors have gained popularity in recent years for their potential to increase the competitiveness of green energy. The energy storage devices, also known as supercapacitors, store energy by mobilization of polarized charges at the electrochemical double layer, surface bound faradaic interactions, or through both electrochemical double layer and faradaic interactions. It is important to incorporate redox active materials with high surface areas to maximize both electrochemical double-layer capacitance and faradaic charge storage. Metal-organic Frameworks (MOFs) are porous coordination networks that are comprised of metal oxide clusters coordinated with organic linkers. Though MOFs are highly porous materials, the metal oxide nodes inhibit the ability of the MOF to efficiently transfer charges at the metal centers. Conductive polymers, like polyaniline (PANI), are often introduced to MOFs to increase conductivity. It has previously been reported that PANI can be covalently bonded to MOFs to increase charge transfer efficiency. Redox-active MOFs of the same organic ligand were covalently anchored onto graphite-PANI electrodes. The procedure was repeated for several different MOFs, including NH2-MiL-101(Fe), NH2-MiL-101(Cr), and NH2-MiL-53(Fe). The resulting composite materials were characterized using XRD analysis, BET surface area analysis, and FTIR-ATR spectroscopy. The electrochemical activity of each electrode was investigated using Cyclic Voltammetry and Galvanostatic charge-discharge techniques. The structure and morphology of the electrodes were determined with SEM imaging, EDS analysis, and FTIR spectroscopy.

Adam Makhlouf

Dr. Daniel Kissel

C46 Wavelength Specific Optoelectronic Properties of Cross-Linked Polymer MOF Composites with Added Photoactive Materials

Metal-Organic Frameworks (MOFs) are well regarded for their versatility thanks to their high porosity. They have seen applications in gas storage, catalysis, and energy storage. Despite their versatility, most MOFs are insulating due to the metal nodes within the MOFs endowing insulating properties to the material, inhibiting charge transfer efficiency. To combat this, conductive organic polymers such as polyaniline (PANI) are introduced to the MOFs to improve their charge transfer efficiency. PANI is often integrated through an in-situ synthesis from the monomer, resulting in competing interactions due to the reductive nature of the MOF's during synthesis. To avoid this, a novel synthetic approach that allows for a Michael addition reaction of the framework onto the PANI structure to create novel polymer composite materials. In addition, TiO2, a known photoactive material, will be integrated into the composites to see their effects on the photoelectric properties of the MOF composites. Thin films of these polymer composites were engineered through self-assisted evaporation onto glass substrates. The photoelectronic properties of the materials were investigated in both a simulated sunlight environment and at specific wavelengths, demonstrating photo responses. Bandgap measurements were investigated using UV/Vis Reflectance Spectroscopy to examine electronic properties. The study of optical influence on electrical properties of MOF based systems encourages further exploration into MOF usage for the creation of conductive polymer composite materials.

Ruben Franchini

Dr. Daniel Kissel

C55 Defect Engineering in Zr (IV)- and Ti (IV)- Based Metal-Organic Frameworks to Enhance Photocatalytic Properties

Metal-organic frameworks (MOFs) are unique microporous materials being explored for a wide range of applications. Their porosity and high surface areas can readily be exploited for guest-host interactions, separations, and photochemical catalysis but many suffer from poor charge separation and fast electron–hole recombination. Introducing structural defects, such as missing linkers or metal nodes, can create unsaturated metal sites and alter band structure, conductivity, and light absorption, improving photocatalytic performance. UiO-66-NH_2 and MIL-125-NH_2 are water-stable, visible-light-active MOFs well suited for dye degradation, and their properties can be enhanced through defect engineering. In this work, defects were introduced in these two MOFs using formic or acetic acid modulators and by controlling synthesis temperature. The resulting materials were characterized by XRD, FTIR and SEM-EDS. Defect states were tracked using N_2 adsorption/BET analysis, and UV–Vis spectroscopy. Photocatalytic activity was evaluated by monitoring rhodamine B degradation under simulated solar irradiation. It was found that temperature and acid modulation have different effects on the kind of defects generated and the electronic properties of the final products. Increased synthesis temperature promotes mesopore formation and lower bandgaps, while acid modulation forms more crystalline products with higher bandgaps. Defective MIL-125-NH_2 synthesized at 150 °C showed the highest dye-degradation efficiency, indicating that temperature-induced defect formation is more effective than growth modulation for tuning photocatalytic behavior in these MOFs.

Adan Martinez

Dr. Daniel Kissel

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AS-156-A

C47 Counterpart

Counterpart" is a storyboarded short film that tells the story of a man who becomes worried for his twin brother when he realizes he might not be what he seems. The aim of the project is to prove that a suspenseful story can be told within a visual model without having to have prior film experience to do so. The inspiration for this project comes from horror anthologies I enjoy as well as murder mysteries that have captivated me with their storytelling. For the past 11 years, I've wanted to create a short film of my own but always pushed it aside in fear of it being unfinished or imperfect. I decided to take a leap and attempt to tell a story all my own to prove that a project like this, no matter how big or small, can be accomplished. To create the film, I digitally hand drew the frames and edited background ambience to give the viewer a suspenseful experience. This project made me realize that the overall ambition to create will always overcome the fear of not starting due to the fear of failure. If you want a story to be told, you must be willing to provide a way to let it be told. In closing, I want others to realize that they shouldn't let their fears of something being 'imperfect' or 'unfinished' deter them from creating something that could be of great impact to one viewer or even many.

Franchesca Ornelas

Dr. Kristin Callahan

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AS-157-A

C53 Neural Landscapes: An EEG Study on Exposure to a Simulated Nature or Urban Experience Following a Mild Stress Task

Current research suggests that the environments we are in can influence our mental states. Yet little research has been done to examine these effects using electroencephalogram (EEG) technology. This study investigates how brief simulated environmental exposures affect neural and psychological responses to stress. EEG brain activity was recorded using noninvasive sensors on the scalp. Participants completed several strategic procedural phases, including an initial baseline recording, a mild cognitive stress task, a brief simulated high definition first person environmental video (nature or urban), and a post-viewing recovery period. EEG activity was recorded continuously to assess changes in stress and relaxation related metrics across each phase. Lastly, participants completed a self-report survey assessing perceived stress, relaxation, and prior environmental exposures. By examining brain wave responses to simulated nature and urban environments, this study may aid in future research in environmental psychology as well as potentially give insight into accessible stress regulation strategies.

Annabelle Makselan

Dr. Matthew Domico

C44 Immigration Enforcement as a Public Health Deterrent: Implications for Healthcare Access and Abuse Reporting

This project examines how contemporary Immigration and Customs Enforcement (ICE) policies may be producing a “chilling effect” on immigrants’ willingness to seek medical care and to report domestic violence or child abuse. Although prior scholarship documents structural barriers to care in immigrant communities, less attention has been paid to how heightened enforcement climates shape everyday help-seeking behavior. This study evaluates whether fear of detention, family separation, or potential information-sharing between local institutions and federal authorities discourages immigrants, regardless of legal status, from accessing essential services and legal protections Methodology This study conducts a secondary analysis of previously published datasets and publicly available records. It reviews peer-reviewed research, government health statistics, hospital utilization reports, domestic violence hotline data, and child protective services referral trends from 2020 to 2025. Comparative trend analysis is used to assess changes in service utilization and reporting patterns before and after shifts in federal immigration enforcement priorities. Trends are evaluated across jurisdictions with differing enforcement intensities to identify consistent patterns. Results Findings indicate a decline in non-emergency healthcare utilization and abuse reporting in periods and regions associated with heightened enforcement activity. Across multiple datasets, immigrant communities in high-enforcement contexts show delayed care-seeking and reduced engagement with protective services. Conclusion By identifying consistent trends linking enforcement climates to reduced access to health and safety systems, this research highlights critical public health and child welfare implications that warrant policy attention.

Zaina Mahrat, Edith Lozano

Dr. Huma Zia, Dr. Morris Jenkins

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AS-158-A

R01 Fragile Foundations: Navigating Policy Shifts, Censorship, and Institutional Decline in the 21st Century

Modern educational environments are currently undergoing a period of profound structural and cultural transition. This presentation examines four intersecting crises that are redefining the boundaries of the American classroom: the legal volatility of Title IX, the efficacy of teacher preparation programs, the rise of educational censorship, and the accelerating closure of Catholic schools. We begin by analyzing the current ""flux state"" of Title IX, where recent court decisions and political divide are continuing to create a climate of compliance uncertainty for administrators and students alike. This legal instability is compounded by a record-breaking surge in educational censorship, with over 6,800 book bans documented in the 2024–2025 school year alone, leading to a ""chilling effect"" on classroom discourse and critical literacy. Simultaneously, we address the human infrastructure of education. Traditional teacher preparation programs are facing intense pressure to modernize as nearly 20% of new educators leave the profession within five years, often citing inadequate clinical training and a lack of preparation for polarized classroom environments. Finally, the presentation explores the ""sacred loss"" of community through the closure of Catholic schools—driven by unsustainable deficits and a ""demographic cliff""—and the resulting disruption to student stability and local identity. By synthesizing these challenges, this session offers a roadmap for stakeholders to foster resilient classroom cultures amidst a rapidly eroding institutional landscape.

Annie Murray, Drew Troppito, Anne Walsh, Nicki Jones

Dr. Elvira Pichardo, Dr. Erica Davila

3MT® THREE MINUTE THESIS
FOUNDED BY THE UNIVERSITY OF QUEENSLAND

WEDNESDAY • APRIL 22

12PM

CONVOCATION HALL
ST. CHARLES BORROMEO

12:05 Influence of the Macroenvironment on Defect Formation during Molybdenum Post-CMP Cleaning

Austin Rockaitis

12:10 Investigating Optimal Parameters to Reduce Corrosion-Based Defects in Cu post-CMP Cleaning

Nicole Staszak

12:20 Conductive Polymer Functionalization of Cellulose-Derived Hydrogels for Bio-Sensing Applications

Jadyn Dominguez

12:25 Pilot Perceptions of Differences between Day or Night Flight Training

Teja Dhanumjaya Lakshmisetty

12:30 Stimuli-Responsive Silica Nanocapsules for Enhanced Copper (Cu) Chemical Mechanical Planarization (CMP) Slurry Delivery and Control

Samuel Robles

12:35 Megasonic Control of REDOX Activated Slurries and Surface Films for Low-Stress Chemical Mechanical Planarization of Next Generation Metals

Connor Keating

12:40 MOF Film Reactors for Carbon Dioxide Capture

Adan Martinez

12:45 Collaborative Robotic Systems for Smart Grid Maintenance and Monitoring

Alfonso Flores

12:50 Pilot Mental Health

Scott Pearce

12:55 Design of Zirconia-Based (ZrO2) Slurry for Improved Shallow Trench Isolation (STI) Chemical Mechanical Planarization (CMP)

Cesar Alvarado Orellana

DR. STEPHANY SCHLACHTER AWARD

WEDNESDAY • APRIL 22

12PM

CONVOCATION HALL
ST. CHARLES BORROMEO

C38 Quantifying the Court: Statistical Insights and Ranking Methods in NCAA National Collegiate Men's Volleyball

Zach Pekol, Luke Pekol, Tony Kochev

Dr. Amanda Harsy, Dr. Adam

C40 Organometallic Catalyst Design for Accelerated Silicon Carbide (SiC) Chemical Mechanical Planarization (CMP)

Amanda Warfield, Andrew Murphy

Dr. Jason Keleher

C41 Developing a Circular Economy for Processing Copper CMP Wastewater

Rebecca Ratajczyk

Dr. Jason Keleher

C42 The Unveiling of Nature: Hegel's Geist as a Fulfillment of Heraclitean Thought

Miecio Smith

Dr. Arsalan Memon, Dr. Claire Lockard

C43 Applications of the Low-cost 3D-printed Static Light Scattering System

Enzo Ribeiro

Dr. Joseph Kozminski

BR. JOEL DAMIAN BUSINESS PITCH COMPETITION

WEDNESDAY • APRIL 22

1–4:30PM

FLIGHT DECK
ST. CHARLES BORROMEO

1. GreenGuard

Akhil Daggumati

Graduate Student – College of Business
Track: Sustainability

GreenGuard is an AI-powered IoT platform designed to reduce food waste in grocery stores, restaurants, and food distributors. The system integrates predictive analytics, temperature sensors, and real-time sales data to forecast product expiration and automate surplus redistribution to local food banks.

CORE FEATURES

- Expiration forecasting using AI
- IoT temperature monitoring
- Automated discount / donation alerts
- Direct integration with shelters and nonprofits
- ESG impact dashboard (CO_2 saved, meals donated)

BUSINESS MODEL

- SaaS subscription + optional IoT hardware integration

JUDGE WATCH AREAS

- Hardware cost structure
- Integration complexity
- Pilot validation

2. Aura Beats

Elizabeth Gonzalez

Junior – College of Business
Track: Health & Fitness

Aura Beats is a biometric-aware music intelligence platform that integrates with wearable devices to personalize music in real time based on heart rate and physiological response.

The system learns which songs correlate with calm, focus, or activation and adapts automatically. The venture also explores anonymized physiological analytics for music creators.

BUSINESS MODEL

- $9.99/month subscription + future B2B data licensing

JUDGE WATCH AREAS

- Data privacy compliance
- Integration with streaming platforms
- Proof of biometric accurac

3. Swabie

Johan Olmos

Senior – College of Aviation, Science & Technology
Track: Education

Swabie is a next-generation LMS ecosystem featuring gamification, permanent student credentialing (Swabie ID), global collaboration tools (Forge), and hands-on digital labs.

CORE COMPONENTS

- Free LMS core
- Premium Labs & Forge
- Digital credential wallet
- Employer and scholarship network

JUDGE WATCH AREAS

- Institutional adoption cycle
- Monetization clarity
- Competitive positioning vs Canvas/ Blackboard

4. Action Packed

Elaina Veome

Junior – College of Business
Track: Social Impact

Action Packed funds hygiene kits for homeless shelters through low-cost youth sports clinics run by collegiate athletes.

REVENUE MODEL

Clinic registration ($25–$50)
80% → hygiene packs
20% → athletic program fundraising

DUAL IMPACT

- Support shelters
- Develop collegiate athlete leadership

JUDGE WATCH AREAS

- Nonprofit compliance (501c3)
- Scalability beyond one sport
- Margin sustainability

5. Tomek's Smokehouse

Thomas Lesnikowski

Junior – Business & Aviation
Track: Open (Wild Card)

Tomek's Smokehouse is a small-batch smoked meat and cheese company sourcing locally and using traditional European smoking techniques.

DIFFERENTIATION

- No artificial preservatives
- Local supply chain
- Fully smoked process
- Early-stage demand growth

JUDGE WATCH AREAS

- Food safety regulation
- Distribution model
- Margin scalability

BR. JOEL DAMIAN BUSINESS PITCH COMPETITION

WEDNESDAY • APRIL 22

1–4:30PM

FLIGHT DECK
ST. CHARLES BORROMEO

6. Homestead Harvest

Daniel M. Baumhart

Senior – College of Business
Track: Fintech

Homestead Harvest is a local-first digital marketplace connecting suburban consumers with small-scale egg producers.

FEATURES

- Verified seller profiles
- Transparency dashboards
- Direct-to-consumer purchasing
- Reduced food miles

REVENUE

Marketplace transaction model

JUDGE WATCH AREAS

- Regulatory compliance
- Marketplace liquidity
- Competitive differentiation
- Why Fintech?

7. PryoShell

Amari Greene

Sophomore – College of Business
Track: Technology

PryoShell is a firefighter-inspired consumer safety brand developing heat-resistant tablet cases and fire prevention education programs.

ECOSYSTEM

- PryoShell Case
- EcoShield battery accessory
- FireReady Kids curriculum

JUDGE WATCH AREAS

- Product testing standards
- Liability exposure
- Manufacturing cost

SNAPSHOT (AT A GLANCE)

Venture	Track	Core Category	Business Model	Stage
GreenGuard	SustainabilityAI + IoT	Food Waste	SaaS + Hardware	Pre-MVP
Aura Beats	HealthTech	Biometric Music AI	Subscription + Data	Pre-MVP
Swabie	Education	Next-Gen LMS	Freemium + Premium	Live Demo
Action Packed	Social Impact	Sports-for-Good Model	Clinic Revenue	Pilot Planning
Tomek's Smokehouse	Consumer Food	Smoked Meats & Cheese	Direct Sales	Intermediate Traction
Homestead Harvest	Marketplace	Local Farm Platform	Transaction Fees	Discovery Stage
PryoShell	Consumer Safety	Fire-Resistant Tech Case	DTC Product	Pre-MVP

PRESIDENT'S 18TH ANNUAL ART EXHIBITION

WEDNESDAY • APRIL 22

2PM

ART GALLERY
(OREMUS FINE ARTS CENTER)

GALLERY EXHIBITION / 9 AM–9 PM

Art will be displayed throughtout the day.

GALLERY TALK / 2–3 PM

Winners will discuss their works.

Prize money donated by Dr. David J. Livingston, Lewis University President

ALUMNI AWARD

Prize donated by the Wadsworth Family Gallery

John McIntire
Windows,
Oil on Canvas

1ST PLACE

Meghan Check
Piece of Peace, Oil on Canvas

2ND PLACE

Long Nguyen
Together, Digital Drawing on Paper

3RD PLACE

Franchesca Ornelas
Safe Space, Charcoal on Paper

HONORABLE MENTIONS

Payton Frey
Have a Snack, Graphite Pencil on Paper

Skylar Hauert
Tangled Chaos, Yarn, Embroidery Thread Canvas

Logan Knott
The Me I Didn't Choose, Oil on Canvas

Claire Lyman
Serenity, Acrylic on Canvas

Katie Melzer
Reflections of the Mundane, Oil and Acrylic on Canvas

Erika Ornelas
The Devil's Antidote, Sharpie and Gel Pen on Canvas

Madison Sea-Macak
Eat, Sleep, and Breathe, Pencil on Paper

Kyle Starks
Freedom Under Arrest, Acrylic on Canvas

POSTER SESSION A

WEDNESDAY • APRIL 22

2PM

FIELDHOUSE

A1 Nontoxic Carboxylic Acid-Crosslinked Cellulose Hydrogels for pH-Responsive Wound Dressing Applications

Student Project in Chemistry

The search for safer, environmentally benign wound dressing materials has driven the development of innovative hydrogel systems. This porous matrix offers a versatile and innovative approach to wound treatment due to its hydrophilic, three-dimensional structure. They have been employed in medical applications to maintain wound moisture, as their hydrophilicity induces a high-water adsorption capacity. Hydrogels gain long-term stability and increased water uptake when crosslinked with stabilizing agents. However, many of these organic crosslinkers are harmful to humans and the environment. In this work, hydrogels were synthesized using nontoxic carboxylic acid derivatives (e.g., citric acid, malonic acid, itaconic acid) to crosslink cellulose polymer chains through ester formation. These crosslinks introduce pH-responsive functional groups that tune swelling behavior and network porosity. To evaluate their suitability as a wound dressing, oxygen transport was measured under controlled conditions. Additionally, contact angle measurements were used to assess surface interactions. These simulated wound exudate experiments showed that the acidic crosslinkers were favorable for exudate uptake, particularly in a wound's typically acidic environment. Surface area adsorption and desorption analyses confirmed a mesoporous network structure that supports fluid management and gas exchange. Together, these findings highlight a biocompatible strategy for designing tunable, environmentally compatible hydrogel dressings.

Ezra Samson

Dr. Jason Keleher

A3 A study of cadmium and chloride tolerance in lettuce and bean plants.

Student Project in Chemistry

Soil and water contamination is common in the winter as road salts are used and cause excess chloride and metals to accumulate in ecosystems. The contamination of salts and heavy metals presents a significant environmental problem due to its negative effects on plant growth and ecosystem health, as cadmium increases cancer risks and harms bone and kidney health. This study aims to address the issue of reduced plant growth in environments contaminated with cadmium and to evaluate the potential benefits of phytoremediation, in which plants absorb heavy metals from the surrounding soil. Previous studies have shown that lettuce is generally sensitive to heavy metal stress, while beans have demonstrated moderate tolerance under certain conditions, making them useful species for comparing differences in plant response. Traditional methods used to reduce contamination are often costly and require major modifications to public infrastructure. However, phytoremediation offers a less invasive and potentially more cost-effective alternative when lettuce or beans demonstrate the ability to effectively absorb cadmium and chloride ions. In this study, the effects of varying concentrations of cadmium and chloride on lettuce and bean plants were observed to assess changes in germination and plant growth. The plants were found to have stunted growth, with some failing to sprout and others showing visible signs of stress such as yellowing.

Henry McFerron

Dr. Kari Stone

A5 A Study of Chloride and Lead Tolerance in Pea and Sunflower Plants

Student Project in Chemistry

Chloride is an ion found in road salt, which is applied to roads during winter to increase safety by preventing ice formation. When runoff containing road salt enters nearby soil and bodies of water, it can disrupt photosynthesis, cause damage to DNA and necrosis. Lead is a toxic heavy metal found in the environment due to industrial emissions, leaded gasoline, and lead-based paint. When plants are exposed to lead, it can inhibit seedling growth by reducing enzyme activity. A way to remove harmful ions from soil is through phytoremediation, which involves the use of plants to store, stabilize, or degrade pollutants. The aim of this project was to determine the chloride and lead tolerance of pea and sunflower plants, and their ability to remove these contaminants from soil. It is hypothesized that as the concentration of lead in soil increases, the growth of the sunflower is unaffected due to its known role as a hyperaccumulator of lead. It is also hypothesized that the growth of the pea plant is decreased due to a reduction in enzyme activity. Seeds of each plant type were grown in solutions of varying concentrations of chloride and lead. The initial results indicate that sunflower seed germination was not impacted by lead exposure, while pea seed germination was reduced. For both the sunflowers and pea seedlings, they experienced the most growth in a 100 ppm solution of chloride. Further results will be discussed.

Elizabeth Martin

Dr. Kari Stone

A7 AI around the world

Student Project in Engineering, Computing and Mathematical Sciences

The rapid growth of cryptocurrencies and blockchain technologies has prompted governments worldwide to develop regulatory frameworks that address financial stability, consumer protection, and innovation. This paper provides a comparative analysis of crypto regulation in the United States, the European Union, China, and a developing country (e.g., India), examining the legal structures, enforcement mechanisms, and policy priorities in each jurisdiction. The analysis highlights key differences, such as the U.S.'s market-driven and somewhat fragmented approach, the EU's harmonized regulatory efforts through MiCA, China's strict prohibition of cryptocurrency trading, and the emerging, adaptive policies in developing nations. Furthermore, the study explores the challenges and implications of these regulatory approaches, including risks of market manipulation, technological innovation barriers, and financial inclusion concerns. By evaluating the effectiveness and limitations of each approach, this paper argues for a balanced regulatory model that promotes innovation while safeguarding investors and maintaining financial stability. The findings aim to inform policymakers, financial institutions, and researchers about global trends in cryptocurrency regulation and provide insights for developing coherent and adaptable regulatory strategies.

Alan Lopez

Dr. Rami Khasawneh

A9 Analysis of Home Court Advantage and Ranking Methods for NCAA National Collegiate Men's Volleyball

Student Project in Mathematics

This study investigates the presence and extent of home court advantage in NCAA National Collegiate Men's Volleyball by conducting a comprehensive statistical analysis across numerous game-related performance metrics. Using data from recent NCAA seasons, we compare home and away game statistics to identify significant differences that may indicate an advantage when playing on home courts. Results reveal statistical significance in several key metrics favoring home teams, suggesting that factors like a familiar environment may enhance performance. Predictive analytics in men's volleyball are further explored using the Colley and Massey linear algebra-based models and focus on incorporating home-court performance into the model design. We extend the Colley model by applying custom weightings to game outcomes based on location. Using the optimal combination of home, away,

and neutral weights that minimize error, we compare predicted rankings to actual AVCA Coaches Polls. In addition, a random forest data mining technique was applied to extract features of importance, and linear regression was used to quantify the impact of these variables on match outcomes. These features were incorporated as weights for the Massey and Colley models to improve their predictive capability and better capture the importance of home performance. Through iterative optimization and evaluation against AVCA Coaches Polls, we demonstrate that incorporating venue-specific data significantly improves prediction accuracy in the Massey model. This work highlights how statistical analysis and enhanced Colley and Massey algorithms can be combined to generate data-informed assessments of competitive performance in NCAA National Collegiate Men's Volleyball.

Luke Pekol

Dr. Amanda Harsy

A11 Analyzing the Impact of Pedagogy in General Education Mathematics Courses

Student Project in Mathematics

This poster analyzes the preliminary findings from a study examining the overall perceptions and attitudes of college students enrolled in general education mathematics courses. The study analyzes survey data collected at two points during the semester: pre- and post-course, from two distinct general education mathematics courses. We compare one course that was taught primarily using active learning approaches, including group work, projects, and discovery-based activities, and another course which employed a more traditional, lecture-centered instructional model. The surveys assessed students' dispositions, mindsets, mathematical confidence, mathematics anxiety, and perceptions of pedagogical methods. By comparing pre- and post-survey responses, we also investigated how students' perceptions and dispositions had evolved over the duration of each course.

Kristin Pawlowski

Dr. Amanda Harsy

A13 Applications of the Low-cost 3D-printed Static Light Scattering System

Student Project in Physics

In conventional Mie scattering experiments, the light source is co-planar to the particles of interest, creating an effect known as 'forward scattering'. This investigation explores the possibility of particle sizing through zenithal Mie scattering with 3D-printed components and Arduino-based sensors. In employing a setup that costs less than $250, we aim to make light scattering experiments more accessible to young researchers, given steep retail prices for the same type of equipment. A polarized laser beam is vertically incident on an aqueous sample of polystyrene microspheres. Then, the TSL2591 digital light sensor records refracted light as it orbits around the sample on a 3D printed goniometer. An additional polarizer (coplanar to the sensor) is incorporated to isolate dipole and quadrupole-dominant contributions to the refracted light. By implementing diluted polystyrene microsphere samples, the sensitivity of the sensor can be assessed over the ranges of [0, 3]μm and [0, 2]mg/mL prior to particle sizing. With a modification to the low-cost setup, the laser beam can be incident from the side so that forward scattering can also be explored and characterized using this low cost-apparatus.

Enzo *

Dr. Joseph Kozminski

A15 Aqueous uranium ion capture using chromium and MIL based metal organic frameworks

Student Project in Chemistry

Nuclear energy is responsible for providing approximately 20% of power nationwide. The fission reactions that take place inside fuel rods are capable of outperforming traditional fuels like coal or oil by over two million times. It also produces zero CO2 emissions, making nuclear power the cleanest and most environmentally sustainable energy producer. The key component in nuclear fuel is uranium-235, an isotope with less than 1% abundance. With such a low natural supply, uranium harvesting methods must be optimized to continue steady nuclear energy production. While uranium is typically mined from terrestrial reserves, most of the world's supply is found in low concentrations in seawater. This study analyzes the efficiency and optimization conditions for capturing this aqueous uranium using metal organic frameworks (MOFs) as adsorbents. MOFs are polymeric crystalline materials with characteristics such as having extremely high surface areas and storage capabilities which make them ideal candidates for uranium adsorption. A continuous chromatographic system was engineered using a surrogate uranyl acetate solution and various chromium-based MOFs. UV/Vis spectroscopy was implemented to monitor concentrations of uranium over various periods of time. Initial experimental results showed that with optimized pH, timing, and concentrations of both MOF and uranium, over 50% of uranium in solution was adsorbed. Further parameters to be analyzed include temperature and MOF rigidity. Final results to be presented.

Amanda Anderson

Dr. Daniel Kissel

A17 Body Armor for Chloroperoxidase via cross-linking to enhance its catalytic versatility

Student Project in Chemistry

We address the challenge of enzyme resilience by developing a robust immobilization carrier with high loading capacity and chemical stability, which is essential for creating an optimal and durable biocatalyst. This study investigates the biocatalytic degradation of azo dyes and chlorination of barbituric acid using chloroperoxidase (CPO), a P450-like heme-thiolate enzyme known for its broad catalytic activity. We clarify the preferred degradation pathway of these dyes by CPO, addressing a mechanism that has previously been debated. Our findings provide fundamental insights crucial for optimizing and scaling up this enzymatic system for industrial wastewater treatment. These findings underscore the importance of designing stable and efficient biocatalytic systems to advance sustainable industrial technologies.

Norman Paz-Ramirez

Dr. Kari Stone

A21 Characterization of Communities in Experimentally Reduced Microbiomes in Daphnia dentifera

Student Project in Biology

When the microbiome of Daphnia dentifera—a model organism used to study disease dynamics—is reduced, it is less likely to be infected by the fungus Metschkinowia bicuspidata. Microbiomes are the community of microorganisms living on or within an organism. Studying reduced daphnia microbiomes provides insight on how pathogens impact their hosts. The purpose of this project is to determine if functional diversity of the daphnia microbiome changes when it is reduced in its species diversity. Species diversity is the number of species present in the community, whereas functional diversity is the number of roles the community can play. To investigate this, microbially reduced (MR) daphnia were cultivated. MR daphnia were cultured under antibiotic pressure and fed algae treated with antibiotics; control daphnia were fed normally. EcoPlate was used to determine functional diversity differences (i.e., community's utilization of carbon substrates) between MR daphnia and control daphnia. Results indicated mixed trends: in one trial, MR daphnia had lower carbon richness and average well color development (AWCD) values than control daphnia, while in another trial, MR daphnia had higher carbon richness and AWCD values. This may indicate variability in functional response to microbiome reduction. Shannon Diversity Index values were higher for MR daphnia than control daphnia, indicating greater species richness and evenness. So, microbiome reduction altered microbiome makeup and affected functional diversity variably. DNA was extracted from samples, as confirmed by nanophotometer analysis. In future studies, ribosomal RNA intergenic spacer analysis will be conducted with extracted DNA samples to investigate reduced daphnia microbiomes.

Maryam Sohail Warraich

Dr. Jerry Kavouras

A23 Collaborative Robotic Systems for Smart Grid Maintenance and Monitoring

Student Project in Engineering, Computing and Mathematical Sciences

The rapid evolution of smart grids has introduced unprecedented challenges in maintenance and monitoring, including increased system complexity, safety risks, and the need for real-time efficiency. This thesis investigates collaborative robotic systems (cobots) as a transformative solution, integrating unmanned aerial vehicles (UAVs) and unmanned ground vehicles (UGVs) to enhance grid operations. Drawing on qualitative analysis of recent literature and case studies, such as Chen and Wang (2021) for

path-planning algorithms like the Improved Biological Excitation Neural Network (IBENN), Rodríguez-Guerra et al. (2021) for human-robot interaction (HRI) frameworks, Disyadej et al. (2019) for high-voltage inspections, and Garcia-Cerezo et al. (2024) for the AERIAL-CORE project, the study evaluates system architectures, coordination strategies, safety standards (e.g., ISO 10218 and ISO/TS 15066), and real-world deployments. Objectives include reviewing current cobot technologies, analyzing multi-robot coordination and HRI, assessing field performance, and proposing an integrated framework for smart grid applications. The methodology employs a structured literature review and comparative analysis across four dimensions: architecture, coordination, HRI, and deployment, synthesizing insights from simulations and field tests. Findings reveal cobots' potential to reduce human exposure to hazards, minimize downtime, and improve inspection accuracy through AI-driven autonomy and synergistic aerial-ground operations. However, persistent challenges encompass standardization, regulatory compliance, energy constraints, and operator trust in HRI. The proposed framework emphasizes scalable interfaces, safety redundancies, and adaptive algorithms to bridge simulation-to-reality gaps. In conclusion, collaborative robotic systems promise to revolutionize smart grid maintenance, fostering safer, more resilient infrastructure. Future work should incorporate emergingtechnologies like advanced AI and IoT for broader adoption, contributing to sustainable energy management.

Flores Alfonso

Dr. Yazan Alsmadi

A25 Comparative Analysis of CO2 Adsorption in Hybridized UiO-66 and UiO-66-NH2 MOFs

Student Project in Chemistry

Carbon Dioxide (CO2) capture is crucial for mitigating climate change challenges. Two MOFs, UiO-66 and UiO-66-NH2 have shown promising results with high CO2 capacity, surface area, and porosity. This study aims to analyze how these properties change by comparing their original MOF powder form and as activated carbon composites. MOFs selectively adsorb gas molecules within their pores to store these molecules depending on their surface area, pore size distribution, and affinity. The materials were synthesized and characterized using X-ray Diffraction (XRD), Infrared Spectroscopy (IR), Scanning Electron Microscopy (SEM), and surface area (BET). The goal is to identify the changes that occur when characterizing raw UiO-66 compared to its amino-functionalized derivative powdered material as well as their MOF composites. Pure activated carbon is highly porous and has a high surface area. By studying how activated carbon changes the features of the initial MOF material, this research can establish the framework of enhancing CO2 capture MOF design for sustainable applications.

Syndell Garcia

Dr. Daniel Kissel

A27 Conductive Polymer Functionalization of Cellulose-Derived Hydrogels for Bio-Sensing Applications

Student Project in Chemistry

There is a critical need for real-time, efficient, and environmentally sustainable biosensors for monitoring water conditions. Conventional approaches rely on off-site, static measurements that require costly materials and introduce delays between sample collection and analysis. Cellulose-based hydrogels offer an attractive alternative due to their porous structure, tunable conductivity, and biodegradability. Two cellulose derivatives, carboxymethyl cellulose (CMC) and hydroxyethyl cellulose (HEC), contain reactive functional groups, including hydroxyl, carboxyl, and hydroxyethyl substituents, that enable chemical modification. These polymers can form alternating chains (CMC–HEC–CMC) and be crosslinked using a dicarboxylic acid such as citric acid, producing a functionalized hydrogel scaffold suitable for prolonged submersion with minimal structural degradation. Previous studies employed photoinitiated polymerization using Fe(III)–carboxylate complexes to incorporate polyaniline (PANI) into the hydrogel matrix, followed by hydrochloric acid doping to generate an electrochemically active polymer network. Although this approach enhanced current output, the environmental impact of PANI motivated exploration of more sustainable conductive polymers. Integration of alternative polymers is evaluated using cyclic voltammetry to characterize redox behavior and guide organic electrode design. The hydrogel scaffold can be further customized by embedding molecular probes, such as IgG antibodies, to enable selective detection of target analytes. Binding events between probes and specific molecules induce measurable electrochemical shifts that are amplified by the surrounding conductive network. This strategy demonstrates strong potential for developing an aqueous biosensor capable of providing rapid, on-site analysis while maintaining environmental compatibility.

Jadyn Dominguez

Dr. Jason Keleher

A29 Crypto & Trust

Student Project in Engineering, Computing and Mathematical Sciences

Financial trust is changing, the public fears losing their money and want to be more in control of where their money goes and is. Cryptocurrency gives us a new hope, it gives us more control of our money, we no longer have to rely on banks or governments who have a say in where our money ends and goes. In this project, we explore the idea of trust and whether Crypto is a viable option for financial storage and trade for future societies and even in our current society.

We will explore how crypto works and how it becomes accessible to the public. Can banks ever be replaceable, will the trust in these institutions ever go away despite crises considering the amount of consumers who rely on them. Trust is what we explore in this project and we define and deeply understand what drives customers to and away from certain financial institutions. "

Brayan Bollas

Dr. Rami Khasawneh

A31 Crypto and Crime: Myth vs Reality

Student Project in Engineering, Computing and Mathematical Sciences

Cryptocurrency has been given the perception of the evil man's dollar. It is often portrayed as a tool in illegal and criminal activity. This includes things like fraud, money laundering, illegal transactions, and the infamous rug pull. This portrayal of crypto has shaped the public eye and influenced a lot of regulatory discussions. However, this paper will closely examine the connection between crime and crypto, and reveal if it is supported by strong, relevant evidence or fueled by misconceptions. By examining current data and regulatory reports this paper argues that while crypto may be used for illegal activity, it's often over exaggerated how frequent crypto is crime related. In fact, the US Dollar is more commonly used in crimes because of its easy acceptance and lack of trace. Blockchain is very transparent and the transaction can be tracked, which has only aided law enforcement. This paper also discusses how better regulation, adherent tools, and blockchain analytics are reducing the criminal use of crypto and digital assets as a whole. Overall, this study suggests that crypto is not inherently criminal but is a work in progress fin-tech tool that has risks and benefits that depend on its use and how much it is regulated. Being able to understand this difference is crucial for policy decision making and public debate.

Salvador Coria

Mr. Rami Khasawneh

A33 Crypto and Trust

Student Project in Engineering, Computing and Mathematical Sciences

Cryptocurrency has created a shift in public trust of their finances, as there no longer is a centralized institution to manage societies capital. This paper will analyze the core aspects that cryptocurrency is aiming to replace the trust in third party agencies, such as banks and governments, with a decentralized online system. Traditionally, people put their trust on regulated institutions that rely on regulated audits and systematic legal frameworks. Cryptocurrency provides a transparent, code based system that is governed by open source software algorithms. Overall, this technological evolution leads to a new form of prioritization of trust through predictable computer based systems, rather than subjective human judgement. This paper seeks to deconstruct the basis of trust in our different forms of currency in today's age, evaluating cryptocurrencies' future benefits and vulnerabilities.

Cole Hammill

Dr. Rami Khasawneh

A35 Crypto Scams & Consumer Protection

Student Project in Engineering, Computing and Mathematical Sciences

As cryptocurrency becomes more popular, many consumers, especially beginners, face increased risks from scams. This project examines common cryptocurrency scams such as rug pulls, phishing attacks, and celebrity or influencer-promoted coins, along with broader challenges of cryptocurrency including price volatility, security risks, regulatory uncertainty, technical complexity, and the irreversibility of transactions. The purpose of this research is to raise awareness of these risks and help new users better protect themselves. To accomplish this, the study reviews real-world examples of crypto scams and existing consumer protection research. This analysis identifies patterns in how scams target beginner investors and highlights how limited regulation and complex systems increase consumer vulnerability. The findings show that hype-driven promotion, lack of transparency, and weak consumer protections make beginners especially susceptible to financial loss. Therefore, this project presents a Crypto Safety Guide designed for beginners that provides clear, practical tips for recognizing red flags. By combining scam awareness with actionable solutions, this research can contribute to improved financial literacy and stronger protection with using cryptocurrency.

Megan Pryor

Mr. Rami Khasawneh

A37 Crypto Scams & Consumer Protection

Student Project in Engineering, Computing and Mathematical Sciences

In the last decade, cryptocurrency has grown substantially while being adopted by numerous individuals and communities, creating opportunities for financial growth. However, that growth comes at substantial risk for customers, especially those who don't quite have the financials or understand the complex technology of cryptocurrency. This project aims to examine common crypto currency scams such as rug pulls, fraud and hoaxes, meme coins, and the numerous fake investment platforms. Through the analysis of these various scams, the project will explore how these schemes exploit trust, generate false hype, and bend regulatory laws. By looking through multiple case studies, media reports, and consumer reports recurring patterns are recognized that show how scammers aim to manipulate investors seeking a quick buck. The project also aims to investigate the challenge regulators and financial platforms face in trying to prevent fraud in decentralized financial systems. The collection of findings from this research aims to create a Crypto Safety Guide to aid new investors in identifying red flags, while making informed decisions. Overall this project aims to increase safer, more stable participation in crypto to strengthen the investor's financial responsibility.

Samuel Donigain

Dr. Rami Khasawneh

A39 Cultural Attitudes Toward Cryptocurrency Across Countries

Student Project in Engineering, Computing and Mathematical Sciences

Cryptocurrency adoption varies widely across countries, influenced not only by economic conditions and regulation but also by cultural values and social norms. This presentation examines how cultural attitudes shape public perceptions and usage of cryptocurrency in different regions of the world. By comparing countries with high adoption rates to those with more cautious or resistant approaches, the study explores factors such as trust in financial institutions, attitudes toward risk, technological openness, and historical experiences with inflation or government control. Case studies from selected countries illustrate how culture influences whether cryptocurrency is viewed as an opportunity for financial empowerment, a speculative investment, or a threat to economic stability. Understanding these cultural differences provides insight into why cryptocurrency succeeds in some societies while facing resistance in others, highlighting the importance of social context in the global development of digital currencies.

Nikola Perkowski

Dr. Rami Khasawneh

A41 Design and Implementation of 64 Bit adder

Student Project in Engineering, Computing and Mathematical Sciences

Design and implementation of 64-bit full adders using three different logic families: CMOS, Pseudo NMOS, and Transmission Gate. Full adder circuits are digital logic circuits that are capable of adding two input bits and a carry-in bit, and generating a sum and carryout bit as outputs. They are an essential building block for larger adders and are widely used in digital circuits. To design the adder circuits, we used the design tools provided by Cadence. We implemented the full adder circuits using the appropriate type of MOSFETs for each logic family and cascaded several full adders together to form the larger 64-bit adder. Once we had designed the adder circuits, we used simulation tools to verify their functionality and compare their power and performance characteristics. We measured the power consumption of the adder circuits under different operating conditions and analyzed the speed of the adder circuits to determine which logic family offered the best trade-offs in terms of power efficiency and performance. Overall, our results showed that the different logic families had different strengths and weaknesses, and the best choice for a particular design will depend on the specific requirements and constraints of the project. We were able to identify the logic family that offered the best combination of speed, power consumption, and area for our specific design, and our implementation of the 64-bit full adder using this logic family was successful.

Rohan Yadav

Dr. Alsmadi Yazan

A43 Design of Zirconia-Based (ZrO2) Slurry for Improved Shallow Trench Isolation (STI) Chemical Mechanical Planarization (CMP)

Student Project in Chemistry

Moore's law states that the number of transistors on a semiconductor chip doubles every two years. There is a consistent emergence of sub-1nm microdevices that require next generation slurries to comply with the device performance demands. A key step to achieving atomically flat surfaces and removing excess material is chemical mechanical planarization (CMP). In Shallow Trench Isolation (STI), the process features the prevention of current leakage by using a dielectric material such as silica (SiO2) or tetraethyl orthosilicate (TEOS). Currently, ceria (CeO2) is mostly used in STI applications but has limitations such as defectivity control as well as supply chain issues. For this reason, emerging slurries including zirconia (ZrO2) nanoparticles are becoming more attractive. By modifying the aqueous environment in which the ZrO2 nanoparticles are dispersed with additives, the resultant slurry has shown high material removal rate (MRR) and improved surface quality. This study attempts to evaluate the effect and role of the carboxylic acid structures to improve the CMP performance of ZrO2 nanoparticles on TEOS films. The initial results show that quality surface depends on the additive structure used, and the stability depends on concentration. More specifically, increasing the concentration of the additive increases the stability of the ZrO2 slurry, as well as shows significant improvement on MRR.

Cesar Alvarado Orellana

Dr. Jason Keleher

A45 Designing Photocatalytic Biopolymer Scaffolds for Sustainable Water Reclamation

Student Project in Chemistry

Implementing sustainable strategies to meet global waste-reducing efforts has become a critical concern within the semiconductor industry. As semiconductors advance, necessary processes such as chemical mechanical planarization (CMP) continue to demand more water. 40% of water consumption in the semiconductor industry is attributed to CMP, producing substantial amounts of wastewater. Components in CMP slurries, such as organic additives, abrasive nanoparticles, insoluble coordination complexes, and corrosion inhibitors, pollute CMP wastewater streams, and pose health and environmental risks. With the complexity of CMP wastewater, the need for efficient water reclamation methods is increasing. Current methods for remediation, such as filtration, coagulation, and sedimentation have been proven to be ineffective against small molecules in the system. This research investigates the use of adsorptive, reusable photo-redox active biopolymeric filters to improve water remediation. Several studies were conducted to determine the reusability of the beads, the kinetics, and mechanism of adsorption using methylene blue and BTA. Photocatalytic nanoparticles (NPs), like TiO_2, act as a nontoxic photocatalyst for redox activity. Incorporating TiO_2 into the biopolymeric media

allows the filters to adsorb and degrade up to 80% of waste under irradiation. Organic additives, such as glycine, can serve as a nontoxic additive during synthesis to modulate the porosity of the media, allowing for greater adsorptive capabilities by increasing surface area. These polymers show promise for remediating CMP wastewater to the point of reuse.

Isabella Johnson

Dr. Jason Keleher

A47 Economy

Student Project in Engineering, Computing and Mathematical Sciences

As cryptocurrency continues to grow in popularity, more consumers are being drawn into digital finance opportunities, while also facing an increasing risk of scams and fraud. This study explores common cryptocurrency scams, including rug pulls, phishing attacks, and celebrity-backed coins, to better understand how these schemes operate and why they are effective. The analysis groups these scams by their tactics, platforms, and the weaknesses they exploit within crypto markets. It also discusses key challenges for consumers, such as limited regulation, lack of clear information, technical complexity, and the strong influence of social media. Based on these findings, the study introduces a beginner-friendly Crypto Safety Guide that outlines practical tips for spotting scams, protecting digital assets, and making safer investment decisions. Overall, this research aims to raise awareness, help consumers avoid common mistakes, and support stronger consumer protection in the rapidly changing world of cryptocurrency.

Roman Hernandez

Dr. Rami Khasawneh

A49 Enhancing Glucose Detection during Fermentation utilizing a Glucose Oxidase/Horseradish Peroxidase Method

Student Project in Chemistry

Fermentation is the process of converting glucose to ethyl alcohol using the process of yeast activated glycolysis. Traditional large-scale methods of monitoring are costly increasing the demand for more cost-effective methods of tracking the fermentation process, and traditional methods might not provide a clear timeline. Enzymatic catalysts are a more cost-effective and environmentally friendly way of monitoring glucose levels during fermentation. Utilizing the GOD-POD (Glucose Oxidase – Peroxidase) method allows for the colorimetric detection of glucose when peroxidase reacts with a substrate after glucose oxidation. The intensity of the product can be monitored using UV-Vis spectroscopy allowing for quantification of glucose during each level of the fermentation process. Though, the enzymes themselves are unstable in harsh conditions, so being able to harness them onto a stable composite will enhance enzyme stability, reactivity, and recyclability. Silica composites are natural, inorganic substrates allowing for the immobilization of enzymes that can act as biosensors to monitor the fermentation process. Characterization of the composite can be done through IR, SEM, UV-Vis, and surface area analysis. By creating an enzyme immobilized composite, a more cost effective and simplified way of tracking glucose levels is readily available. Further tracking can be done for more than fermentation, optimizing efficiency for purposes such as glucose monitoring for blood sugar levels. Results of this study will be presented.

Jacob Redwinski

Dr. Kari Stone

A51 How Crypto Is Marketed to Young People

Student Project in Engineering, Computing and Mathematical Sciences

Cryptocurrency has become a significant part of online culture, particularly on social media platforms, where it is often embraced by young people. Social media, such as Instagram, TikTok, Snapchat, and YouTube, increase people's interest in cryptocurrency. This presentation examines how influencers market cryptocurrency to younger audiences by using entertainment with financial advice. This presentation looks at marketing strategies, including viral trends, and how trust and knowledge are presented to audiences. There are concerns that influencers are inexperienced and giving advice to young viewers that can be misleading. This raises ethical concerns because viewers may not understand the risks associated with investing in cryptocurrency. Overall, this presentation emphasizes why stronger transparency, accountability, and financial education are essential to help young people make informed decisions about cryptocurrency online.

Lindsey Lord

Dr. Rami Khasawneh

A53 How Crypto is Marketed to Young People

Student Project in Engineering, Computing and Mathematical Sciences

The rapid growth of cryptocurrency has been accompanied by targeted marketing strategies aimed at young people, particularly through social media platforms and online communities. This presentation examines how cryptocurrency is promoted to younger audiences through influencers, viral content, celebrity endorsements, and narratives of financial independence and quick wealth. By analyzing marketing practices on platforms such as TikTok, Instagram, and YouTube, the study explores how hype culture, fear of missing out (FOMO), and simplified messaging can shape perceptions of risk and reward. The presentation also considers the ethical implications of marketing speculative financial products to young audiences with limited financial experience. Understanding these strategies provides insight into how marketing influences cryptocurrency adoption among young people and raises important questions about consumer protection, financial literacy, and responsible promotion in the digital age.

Nikola Perkowski

Dr. Rami Khasawneh

A57 Influence of the Macroenvironment on Defect Formation during Molybdenum Post-CMP Cleaning

Student Project in Chemistry

Molybdenum is becoming an important metal in advanced semiconductor devices because of its high corrosion resistance and thermal stability. However, its use creates challenges during chemical mechanical planarization (CMP), one of the critical steps in the semiconductor manufacturing process. During CMP, molybdenum can form dense oxide layers that cause particles to stick to the surface, leading to non-uniformity and potential device failure. Because of this, post-CMP (p-CMP) cleaning is a critical step for removing remaining particles, organic residues, and metal byproducts. Current p-CMP cleaning methods use polyvinyl alcohol (PVA) brushes and specialized cleaning solutions that rely heavily on mechanical action to remove contaminants. While effective, these processes can unintentionally damage the molybdenum surface by increasing oxidation, corrosion, etching. This issue is made more complex by molybdenum's multiple oxidation states, which lead to different oxide structures with varying stability. This work focuses on improving p-CMP cleaning by controlling the chemical environment at the molybdenum surface. Specifically, it studies how factors such as pH, dissolved oxygen, and solution conductivity affect electrochemical reactions at the molybdenum–PVA interface. These effects are examined with and without mechanical stress to better understand how cleaning conditions influence surface reactions. Electrochemical techniques, including open circuit potential, polarization measurements, and impedance spectroscopy, are used to study oxide formation and corrosion behavior. The results are compared with static etch rate measurements to show how adjusting cleaning conditions can reduce defect formation during p-CMP cleaning.

Austin Rockaitis

Dr. Jason Keleher

A59 Innate Immunity of Wild-Type and daf-2 C. elegans Worms When Treated with Berberine Chloride.

Student Project in Biology

Caenorhabditis elegans, a type of roundworm, are a commonly used model organism in scientific research. They have a significant amount of shared homology with vertebrates such as humans, making them excellent candidates for the drug development process and other experimental investigation related to human applications. This research aimed to determine the role of berberine chloride in wild-type and daf-2 mutant C. elegans' lifespan and defense against pathogens. The daf-2 gene in C. elegans worms is a critical regulator of insulin, aging, and defense against pathogens. It was hypothesized that the C. elegans with the daf-2 mutation would have a longer lifespan if presented with a pathogen. Berberine chloride is the active ingredient found in a variety of herbs that have been used for over 2,000 years as a treatment for bacterial and fungal diseases. It was hypothesized that, with an exposure to berberine chloride,

both wild type and daf-2 mutant strains of C. elegans would be able to live longer when introduced to the pathogen, S. aureus. The treatment was achieved by suspending both strains of worms in liquid media infused with berberine chloride for 24 hours. Both strains of the treated worms, along with untreated daf-2 and wild-type worms will subsequently be exposed to the chosen pathogens. Lifespan assays will be used to assess the overall impact of conditions on longevity, along with the assessment of HSP4, ACS17, and NLP29 gene expression will be used to determine whether the antimicrobial response to pathogens is altered by experimental manipulation.

Deni Gonzalez

Dr. Sarah Powers

A61 Introducing megasonic energy for non-contact Shallow Trench Isolation (STI) post Edge Chemical Mechanical Polishing (CMP) cleaning

Student Project in Chemistry

Substrates edge region plays a critical role in maintaining the surface contamination control after Chemical Mechanical Polishing (CMP). Applications like 3D integration (device stacking) within the semiconductors industry require proper wafer bonding for integration. After the CMP processes, the edge shape of the substrate often accumulates slurry residues that must be removed. It is known that defects such as particles, scratches, and areas with increased surface roughness can act as points of discontinuity and reduce wafer bonding strength. An important type of dielectric substrate is Tetraethyl orthosilicate (TEOS). Commonly used nanoparticles in CMP along TEOS are Silica (SiO2) based slurries. Contact methods for cleaning the edge can lead to wafer cracking or scratches. Megasonic energy is a non-contact alternative to remove nanoparticles while minimizing the surface stress of the substrate. Moreover, there haven't been enough studies emphasizing the post-CMP edges cleaning of the substrate. Particle removal rate (PRE) is discussed by presenting the effect of varying the rotation speed, flow of clean chemistry (De-ionized water), flux and wafer insertion by using Silica-based slurry. Under the dynamic conditions, the cleaning chemistry stays on the edges of substrate, and its thickness is studied as the variables are changed. A singlet oxygen trapping using fluorescein is shown and initial studies prove the greater generation of Reactive Oxygen Species (ROS) as the flux is increased. The thickness formation of the cleaning chemistry onto the substrate has been shown to increase as the flux is increased."

Nathan Petsche

Dr. Jason Keleher

A63 Investigating Biomimetic Compounds for Green Corrosion Mitigation in Chemical Mechanical Planarization (CMP)

Student Project in Chemistry

In the semiconductor industry, Chemical Mechanical Planarization (CMP) is a process used to achieve the planarity of device substrates using a combination of chemical and mechanical forces. Corrosion inhibitors are used during CMP to protect fragile device features from defects (pitting, erosion, dendrite formation, and dishing), and control material removal rates. Traditionally, triazole derivatives like benzotriazole (BTA) are used for their ability to form a polymeric-coordination complex film that acts as a passivation layer on metal substrates like copper. These complexes, which end up in wastewater, pose environmental concerns for aquatic environments as they are poorly biodegradable, and limit the efficiency of reclamation of CMP's wastewater. The semiconductor industry is looking for greener alternatives to these chemicals that can maintain passivation functionality and efficiency. This work focuses on biological molecules that are less persistent in aquatic waste and can undergo ecological degradation pathways. Thiamine, chitosan, and quercetin contain functional groups that allow them to coordinate effectively with copper and may serve as functional substitutes for BTA and other triazole derivatives. This research will determine the passivation effect, kinetics, and thermodynamics of film formation and compare them to traditional inhibitors. Dynamic tafel analysis, electrochemical impedance spectroscopy, and open circuit potential will be used to investigate electrochemical passivation mechanisms. To determine film density and surface characteristics, contact angle, and atomic force microscopy (AFM) force-distance curves will be used.

Angelina Martinez

Dr. Jason Keleher

A65 Investigating Optimal Parameters to Reduce Corrosion-Based Defects in Cu post-CMP Cleaning

Student Project in Chemistry

As the need for higher output integrated devices continues to increase, there is a requirement for an optimized method to ensure long lifespan devices. Chemical Mechanical Planarization (CMP) is a fundamental process aimed at achieving defect-free uniform planar surfaces through the integration of chemical reactions and mechanical forces. A key challenge in the CMP process is the absorption of nanoparticles and organic residues on the wafer surface, which must be removed through post-CMP (p-CMP) cleaning to ensure optimal device performance. However, careful management of this process is crucial due to the risk of potential defects due to substrate oxidation. This modulation of p-CMP processes to reduce corrosion-based defects is especially important when investigating easily corroded metal substrates, like the common interconnect material Cu. To thoroughly assess the impact of the p-CMP cleaning process on Cu substrates, a series of Static etch rate (SER) tests at various processing conditions were evaluated and correlated to dynamic electrochemical measurements. Furthermore, Green Light Interferometry (GLI) surface roughness measurements were used to assess the impact of cleaning chemistry macroenvironment and process conditions on substrate surface defects. These parameters included variables like wafer rotation, brush displacement, and dissolved oxygen concentration. Preliminary data shows increased defect rates for Cu substrates at higher displacements and increased dissolved oxygen levels.

Nicole Staszak

Dr. Jason Keleher

A67 Investigating Phytoremediation in Lettuce and Beets Seeds of Chloride and Iron Tolerance

Student Project in Chemistry

Road salt is widely applied all over the U.S which in many cases leads to chloride in the salt breaking down and polluting soil and streams. Chloride is non biodegradable with even low amounts being harmful to ecosystems. These effects include browning in roadside plants which signifies dying cells and reduced energy production. Chloride can also harm the reproduction of aquatic life, and other animals may experience kidney issues or even death. To reduce this form of pollution, plants have a process known as phytoremediation. This process is when a plant stabilizes contaminants in the environment by translocating to the shoots or leaves to store the chloride. In this study lettuce and beet seeds were placed in varying concentrations of solutions containing chloride and Iron to test their ability to phytoremediate. Beet has a strong tolerance to heavy metals that would pose contamination hazards possessing a greater ability to thrive. Lettuce is recognized as a hyperaccumulator of metals, and can "cleanse" soil, absorbing heavy metals from contaminated soils. During the study seeds were observed for germination, overall length, and visual health. While iron (Fe) is not considered toxic or poisonous compared to other heavy metals, it promotes chlorophyll production in plants and can help in processes like photosynthesis. Initial results show germination rate was roughly 80 to 87% regardless of concentration for the solutions and further results will be discussed.

Nolan Hooper

Dr. Kari Stone

A69 Lanthanide-Doped Uio-66-Based Metal–Organic Frameworks for Fluorescence Detection of Nitroaromatic Explosive Compounds

Student Project in Chemistry

This project investigates europium- and terbium-doped UiO-66 and UiO-66-NH_2 metal–organic frameworks (MOFs) for fluorescence-based sensing of nitroaromatic compounds found in explosives. Nitroaromatics remain a persistent forensic challenge, and there is a need for developing fast, reliable sensors to detect their presence. To address this, UiO-type MOFs were synthesized using solvothermal and microwave-assisted methods, doped with lanthanide ions, and characterized by XRD, IR, SEM/EDS, and fluorometry. Fluorescence measurements and quenching studies were performed to evaluate potential sensing mechanisms. Preliminary results confirm successful synthesis and indicate measurable emission properties suitable for analyte detection, with ongoing work focused on

comparing the optical responses of the two MOF scaffolds. Overall, this research supports the development of tunable and stable lanthanide-based MOF sensors with promising applications in forensic explosive detection.

Brianna Olynyk

Dr. Daniel Kissel

A71 Linking CMP Effluent Chemistry to Underlying Defect Generation Mechanisms

Student Project in Chemistry

As semiconductor devices continue to scale for artificial intelligence and high-performance computing, minimizing defectivity during chemical mechanical planarization (CMP) is increasingly critical. CMP enables nanoscale planarity through chemical reactions and mechanical abrasion at the wafer, pad, slurry interface. While shear forces drive material removal, they also generate debris, destabilize surface films, and promote particle agglomeration. All of which are key pathways for scratch formation, corrosion, and wafer non-uniformity. This work investigates defect formation mechanisms by analyzing post-polish slurry effluent generated during CMP. Polishing produces a range of species, including surface bound intermediates, soluble metal–ligand complexes, and insoluble aggregated particles. These byproducts can re-deposit or become entrapped at the interface, disrupting passivation film stability and contributing to defect formation. Collected runoff is characterized using particle size and count analysis, SEM/EDS, and UV–Vis spectroscopy to determine debris morphology and composition. Electrochemical measurements, including Tafel analysis and open-circuit potential (OCP), are used to evaluate how reactions influence surface film kinetics and stability. Results are correlated with key CMP metrics such as material removal rate and shear force under varying debris conditions. Studies across Cu, STI, and SiC polishing systems provide insight into the chemical pathways governing defect formation and propagation in advanced CMP processes.

Andrew Murphy

Dr. Jason Keleher

A73 Mathematics in Politics

Student Project in Mathematics

Gerrymandering refers to the deliberate manipulation of electoral district boundaries to bring advantage to a particular political party. This practice raises significant concerns about the fairness and integrity of democratic elections. Visual inspection of district shapes is often used to judge fairness and identify cases of gerrymandering, but this method is not reliable and can miss more subtle forms of bias. This project studies how mathematics can be used to detect and measure gerrymandering in voting districts. To evaluate this fairness issue rigorously, we draw on mathematical tools that quantify the extent of partisan advantage within district maps. Several quantitative metrics are examined, including the efficiency gap, mean, median, compactness, and seat vote relationships. Each metric captures a different aspect of how votes are translated into political representation. We also incorporate ensemble analysis which compares a given district map to many alternative maps generated under the same rules. This allows fairness measures to be interpreted using statistical comparisons rather than isolated values. The results show that no single mathematical measure can fully describe fairness and that different measures can lead to different conclusions. Based on ideas from voting theory the project concludes that perfect fairness cannot be achieved. However, using multiple mathematical measures together provides a clearer and more reliable way to evaluate gerrymandering and supports more informed discussions about electoral reform.

Kait Knipple

Dr. Amanda Harsy

A75 Mechanistic Insights into the Effects of PVA Brush Surface Locale on post-Chemical Mechanical Planarization (p-CMP) Cleaning

Student Project in Chemistry

Polyvinyl alcohol (PVA) brushes are widely used in post-chemical mechanical planarization (p-CMP) cleaning to remove residual slurry particles and organic contaminants from wafer surfaces. On the PVA brushes, there are two specific locale, brush nodules and land areas, which may come in contact with the wafer substrate under an applied load. Effective brush performance depends on a complex combination of mechanical effects, pore structure, surface chemistry, and fluid transport within the porous matrix. This work focuses on creating a small-scale brush scrubber to examine the effects of brush surface on the coefficient of friction values (CoF), particle removal efficiency (PRE), and brush performance. Pencil PVA brushes were created out of typical CMP roller brushes, and they were used to correlate pore architecture and brush shape with mechanical parameters, revealing their combined influence on contact mechanics and cleaning efficiency. Young's modulus and Poisson's ratio tests were performed to determine brush characteristics under loads relevant to CMP and understand the material response of the porous polymer. Through scanning electron microscopy (SEM) and energy-dispersive spectroscopy (EDS), the elemental interaction between the slurry and the pore matrix was understood. The results demonstrate that brush cleaning efficiency correlates strongly with pore structure and mechanical stiffness, which govern particle entrapment and release during wafer contact. These structure-property relationships provide quantitative metrics for predicting brush lifetime and guiding the optimization of PVA brush design and conditioning for improved post-CMP defect reduction in advanced semiconductor manufacturing.

Sydney Tremblay

Dr. Jason Keleher

A77 Megasonic Control of REDOX Activated Slurries and Surface Films for Low-Stress Chemical Mechanical Planarization of Next Generation Metals

Student Project in Chemistry

As three-dimensional architectures and advanced packaging impose stringent requirements on surface quality and mechanical integrity, chemical mechanical planarization (CMP) has become a critical enabler for advanced integration schemes, including device packaging and hybrid wafer bonding. While Cu remains the dominant interconnect metal and is well characterized, the CMP behavior of emerging contact, barrier, and via materials such as Ta, W, Mo, and Al is less understood despite increasing integration demand. These materials present additional complexity due to distinct oxidation behavior and surface film stability. Mechanically aggressive polishing can also degrade bonding yield and reliability in compliant hybrid stacks, motivating CMP strategies that emphasize chemically mediated material removal. This study examined the CMP behavior of multiple metals under megasonic activation of peroxide-based slurries, focusing on surface chemistry–dominated regimes. Flucto-CMP® was investigated as one pathway, using controlled megasonic acoustic energy to influence slurry chemistry and surface film evolution. Acoustic activation at 454 kHz and 920 kHz was applied, and slurry reactivity was monitored using oxidation-reduction potential and reactive oxygen species measurements. Organic additives promoted compliant surface film formation, enabling material removal through moderated oxidative strength and chemically softened interfacial layers. Electrochemical analysis showed noble potential shifts and reduced anodic current densities consistent with passivating surface film formation. These trends correlated with CMP performance under low PV conditions, while atomic force microscopy and contact angle measurements validated the formation of thicker, more passive metal oxide films. Overall, the results demonstrate that megasonic activation enables tunable, chemistry-driven CMP across diverse metal systems relevant to advanced interconnect and packaging technologies.

Connor Keating

Dr. Jason Keleher

A79 Microbial Activity of Rhizosphere in Soils Amended with Biochar Produced from Different Species of Invasive Plants

Student Project in Biology

Biochar is a carbon-rich substance made from plant biomass combusted under limited oxygen that can be applied as a soil amendment to improve soil quality. This research examined the microbial activity in soils amended with biochar produced from invasive plant leaves. Because biochar properties vary depending on the source, microbial activity was expected to differ accordingly. Biochar from invasive plants was mixed with soil collected from the Lewis University campus and used to grow lettuce and cilantro in planting trays over eleven weeks. After harvesting, soil samples from each treatment were collected for analysis

of microbial community metabolic profiles using EcoPlate, according to manufacturer's instructions. The metrics used to analyze microbial activity included carbon richness, average well color density (AWCD), Shannon diversity index, similarity index, Simpson diversity index, and Shannon Evenness index, calculated from the absorbance measurements. The results indicated that there was an increase in carbon richness and AWCD in treatments of cilantro grown in soil amended with biochar compared to unamended soils with cilantro. The substrates □-ketobutyric acid and □-cyclodextrin were utilized in biochar treatments but not in unamended soil treatments. The results also indicated that lettuce grown in soil without biochar exhibited greater carbon richness and AWCD than lettuce grown with biochar. The conclusions are that biochar does not universally improve soil microbial activity but instead depends on the source of biochar as well as the crop planted in the amended soil.

Octavio Ortiz

Dr. Jerry Kavouras

A81 Novel Redox Systems for Silicon Carbide Chemical Mechanical Planarization

Student Project in Chemistry

With ever-growing demands for technological advancements, wide band gap (WBG) materials are emerging as the future of integrated circuits (IC), as they provide faster switching speeds, improved thermal performance, and compact device design. A WBG material that is gaining prominence is silicon carbide (SiC) due to its intrinsic qualities (i.e., high hardness, light transmittance and chemical stability). Chemical mechanical planarization (CMP) is employed to achieve an atomically flat surface of the substrate for use in IC devices. The current standard is potassium permanganate (KMnO4), a harsh oxidizing agent that produces high material removal rate (MRR). However, it also produces surface and sub-surface defects that diminish the quality and integrity of the material. This work focuses on exploring the effects of alternative oxidizing agents (i.e., persulfate, periodate, peroxide) on SiC substrates. A survey of the macro environment of the slurry will be conducted, investigating pH effects, generation of reactive oxygen species (ROS), and dissolved oxygen content in correlation with MRR. Initial data indicates that while the MRR is lower than current industry standards, the surface quality is improved. Furthermore, preliminary work suggests that amino alcohols can induce persulfate cleavage for radical generation and oxidative control, providing a tunable MRR while achieving a high surface quality.

Elizabeth Martin

Dr. Jason Keleher

A83 Project W.A.T.C.H (Water Antigen Tracking with Cellulose Hydrogels): A Biopolymeric Scaffold for Advanced Sensing Applications

Student Project in Biology

There is a critical need for real-time, efficient, and environmentally sustainable biosensors for monitoring water conditions. Current techniques rely on off-site static measurements, necessitating expensive materials that create delays between sample collection and analysis. An appealing material for these biosensors is cellulose hydrogels due to their porous structure and ability to be conductive. The hydrogel scaffold can be customized through the addition of specific probes with sample-specific detection capabilities. IgG proteins (i.e. antibodies) are especially promising as a probe due to their ability to selectively discriminate between specific characteristics of antigens within complex mixtures. By embedding these probes into the matrix, the electrochemical shifts produced by specific antibody-antigen binding are amplified by the surrounding network. As a proof of concept, IgG proteins were collected and purified from the MA1-6 hybridoma cell line that specifically expresses a monoclonal antibody reactive to an antigen found in the bacterial species Pseudomonas fluorescens. The purified antibodies were attached to ITO glass slides, a known conductive substrate used to mimic a conductive hydrogel. The ITO glass slide-antibody complex was stained with a different, fluorescently tagged antibody that recognizes and binds to the purified antibody. This was done to verify that the purified antibodies were bound to the glass slide. A simulated wastewater solution containing the antibody-specific antigen was passed over the glass slide-antibody complex, and the rate of antibody-antigen binding and the current of the slide were measured. This proposed mechanism shows promise for future aqueous biosensors that can provide immediate and critical analysis.

Luca Fischer

Dr. Sarah Powers

A85 Purification of Contaminated Water Following Island Stranding Simulation

Student Project in Chemistry

In a time of crisis, particularly under unexpected, life-threatening circumstances, it is essential to focus on what you know, recognize the conditions of the environment, identify the resources at your disposal, work to fulfill your most pressing needs first and proceed in in an organized and rational way. To exemplify that approach, we have undertaken the Shipwreck Project. Simulating being stranded on the Pacific island of Clipperton Atoll without fire or electricity, this study attempted to create potable water from an extreme mixture of contaminants: motor oil, copper oxide, sodium chloride, sand, aluminum alloy, and steel bits. Students in three groups constructed different, multi-stage, gravity-fed filtration column using only salvaged and island materials: plastic bottles housing the filtering system, coffee filters containing most filter layers, cotton balls and felt to remove coarse material, charcoal for adsorption, and popcorn/ white coral sand for mechanical filtration. Each multi-layered design successfully removed suspended solids (sand, steel, aluminum alloy) and lowered hydrocarbon contamination, with one two-filter apparatus process eliminated lead entirely. While the all filtration system significantly improved clarity and odor, water testing indicated it was less effective at removing dissolved salt (sodium chloride) or completely eliminating copper oxide and lead (in two cases), for which additional study will be necessary. The project illustrates the effectiveness of multi-stage passive filtration in survival situations, utilizing local, natural and repurposed materials for environmental remediation.

Arthur Stuart - Period 10 Environmental Students

Dr. Jason Keleher

A87 Remote Sensing Measurements of Nitrogen Dioxide and Formaldehyde with the NASA TEMPO on Industrial Developments

Student Project in Physics

Air pollution remains one of the most prominent causes of adverse health effects, such as impaired cardiovascular function, respiratory disease and asthma related symptoms. Among the most concerning atmospheric pollutants are Nitrogen Dioxide (NO2) and Formaldehyde (HCHO), both of which are by-products of human and industrial activity. This project investigates how urban and industrial development influences atmospheric composition using high-resolution observations from NASA's TEMPO satellite. This study examines areas impacted by warehouse, traffic, and a coal power plant activity in Illinois to evaluate how these sources affect tropospheric NO2 and HCHO concentrations. Using Google Colab, a Python based computing platform, TEMPO satellite data are filtered and analyzed with xarray slicing and geospatial mapping to isolate trends within defined study areas over several observation days. The results show measurable spatial variability in NO2 and HCHO concentrations across transportation and industrial zones, with patterns consistent with combustion-related emissions and localized atmospheric transport. This study demonstrates how geostationary satellite data combined with cloud-based computational analysis can provide clear, region-specific insight into the air quality impacts of evolving urban and industrial activity.

Tyler Ranieri

Dr. Joseph Kozminski

A89 Salt Tolerance and Phytoremediation of Copper & Chloride within Sunflowers, Beets, and Duckweed

Student Project in Chemistry

Heavy metals such as copper affect plant roots, causing an inability to take up water and ultimately harming the plant through dehydration. The dehydration can spread to other surrounding plants, making the problem worse for soil conditions and even wildlife. In urban and suburban areas, salting the roads during the winter allows chloride to soak into

the soil and cause, "salt burn" which prevents water from being absorbed by plants. Research has shown that beets can filter road salt while helping against corrosion on vehicles, making it a possible solution to minimize the damage. For copper toxicity, sunflowers can be a solution due to their high biomass production and capacity for metal accumulation. This study analyzes the salt and copper tolerance of duckweed, sunflowers, and beets to determine if solutions can be found to better filter out that salt and copper and simultaneously minimize the effects they both possess. Concentrations of chloride and copper were used to germinate and grow sunflower and beet seeds. To measure these effects, the plants were measured and observed for any visual signs of deterioration. The beet germination rate was 65.7% and the sunflower germination rate was significantly lower at 28.6%. It was also noted whether they began to wither or prematurely stopped growing. Studies show that sunflowers are the best for filtering copper, while beets are the best solution against road salt effects. Having more seeds per each tray increased the odds for germination of the seeds for each concentration of copper and chloride.

Isabella Ciarlo

Dr. Kari Stone

A91 Shipwreck Simulation Purification of Contaminated Water

Student Project in Chemistry

This study, conducted as simulation resulting from a shipwreck on the Pacific island, Clipperton Atoll, created a survival scenario to obtain potable water. With no fire or electricity available, three groups were tasked with the design and testing of a water purification system to treat a complex, highly contaminated water sample (motor oil, copper oxide, sodium chloride, sand, aluminum, steel). The project applied principles of chemical separation, utilizing the adsorption properties of activated charcoal and the density differences between contaminants and water. Each group engineered a multi-stage, gravity filter using a plastic bottle to house a filter levels of coffee filters containing popcorn for large particles, cotton balls/felt for coarse particulate removal, charcoal for chemical adsorption of the oil, and white coral sand for secondary filtration. Each group employed a different filter layering arrangement. The results showed that systems successfully removed aluminum and steel debris by sediment filters. The charcoal and felt layers effectively absorbed the majority of the motor oil and much of the lead. Although initial filter systems struggled to remove the dissolved sodium chloride and all copper oxide, it produced clear water suitable for further study. Thus, using felt and cotton as filters for coarse material, combined with active carbon absorption, is an effective strategy for partially restoring polluted water. This experience highlights the importance of understanding chemical properties of pollutants and of ingenuity utilizing resources to help ensure survival.

Arthur Stuart - Per. 9 Environmental Students

Dr. Jason Keleher

A93 Should Governments Issue Digital Currencies

Student Project in Engineering, Computing and Mathematical Sciences

With the growth of the digitalization of banks and global financial systems, many governments have explored developing CBDC's which is a central bank digital currency. These digital dollars could have potential disadvantages and advantages that many people might be able to exploit or use to be a more efficient method of payment. This study examines the potential advantages and disadvantages of a CBDC especially their viability for economic stability and payment efficiency. The analysis will also examine the concern of data privacy and cyber security risks. By evaluating the impact that digital dollars will have on consumers and what role traditional banks will play. This research aims to see if CBDC's represent a risk to financial freedom or evolution to our financial system in an ever growing digital economy."

Lukasz Otreba

Dr. Khasawneh Rami

A95 Statistical Analysis of High-Pressure Moments in Tennis

Student Project in Mathematics

High-pressure sports moments like shootouts, free throws, and serving can greatly impact the outcome of a game. Past research has looked at psychological, physiological, and behavioral factors in an attempt to understand the phenomena of "choking under pressure." Using definitions of pressure from previous works, this research seeks to further understand these high-pressure moments specifically in tennis. We use statistical tests to determine whether elite players are less susceptible to performance declines in high pressure situations, how performance while under pressure varies in general across professional players, and to discern what factors (such as fatigue and experience) influence serve performance while under various pressure situations.

Maxim Cilek

Dr. Amanda Harsy

A97 Stimuli-Responsive Silica Nanocapsules for Enhanced Copper (Cu) Chemical Mechanical Planarization (CMP) Slurry Delivery and Control

Student Project in Chemistry

Cu CMP remains a critical step in advanced interconnect fabrication, requiring precise control over removal rate, planarity, and defectivity. Traditional Cu CMP slurries consist of an oxidizer, corrosion inhibitor, complexing agent, and abrasive, dispersed in an aqueous medium. While these components work together to influence copper oxidation and removal, the decoupling of chemical and mechanical interactions across wafer topographies can lead to excessive shear forces, elevated defectivity, and inefficient Prestonian responses. In this work, we propose a singular approach by functionalizing colloidal silica nanoparticles with functional amino acid-derived metal ligands for the micellar assembly of nano-scale slurry capsules. These metal oxide-based slurry nanocapsules are designed to be both mechanical and stimuli responsive, becoming active under mechanical stress (e.g. shear force). These selective properties allow for spatial and temporal control of the chemical reactivity at the wafer surface, selecting only for oxidation and dissolution under the point of mechanical contact. This approach also circumvents the pot life limitation of ROS by generating them in situ at the pad-wafer interface, immediately upon activation, rather than storing them in the bulk slurry. Electrochemical techniques such as potentiodynamic polarization and cyclic voltammetry will be implemented to investigate the oxidation rate of the Cu substrate. Dynamic light scattering (DLS), zeta potential, and scanning electron microscopy (SEM) will be used to validate the structural integrity of the nanocapsule. These next-generation structured nanomaterials modulate the Preston response by reducing the need for high shear forces and decreasing the frequency of dishing, erosion, and scratch defectivity.

Samuel Robles

Dr. Jason Keleher

A99 Structure Activity Analysis of Surfactant in Contact and Non-Contact SiC CMP

Student Project in Chemistry

Chemical mechanical planarization (CMP) is a process where the surface of a silicon carbide (SiC) wafer is altered to be atomically flat. This is achieved by using a downward shear force and nanoparticles that produce the kinetics needed to alter the wafer's surface. Once this process is complete, the wafer's surface is left with residue. To remove these particles from the surface, a process referred to as post-CMP (p-CMP) is utilized. The removal of these particles is essential to the back-end-of-line process for semiconductor assembly as they can lead to damage of the components. Creating more efficient cleaning chemistries and cleaning techniques can lead to less particle residue and thus less surface defects. The traditional method of particle removal employs a polyvinyl alcohol (PVA) brush that makes contact with the wafer to remove the particles. The direct contact to the wafer leads to some particles being redeposited to the surface or not removed at all. In recent years, researchers have determined that surfaces defects can be decreased by using a non-contact cleaning method that utilizes megasonic waves. By combining more efficient cleaning chemistries with this proposed technique, then the particle removal efficiency (PRE) can be increased.

Arielle DeShazier

Dr. Jason Keleher

A101 The Effects of Allicin on Clinically Relevant Bacteria

Student Project in Biology

The rise of antimicrobial resistance caused by the overuse of antibiotics has created a need for alternative strategies. Studies have shown that allicin, a biologically active sulfur-containing compound derived from garlic, exhibits broad antimicrobial properties. The

purpose of this study was to investigate the extent to which allicin inhibited microbial growth across multiple organism types and environmental conditions. Allicin was diluted in ethanol to preserve biological activity. Various concentrations of allicin (0, 25, 50, 100, and 150 µL/mL) were added to tubes containing sterile tryptic soy broth for bacterial cultures and fungal growth media for yeast species. Each tube was inoculated with 100 µL of selected microorganisms, including Gram-positive bacteria (Listeria monocytogenes, Staphylococcus aureus, Bacillus subtilis, Enterococcus faecalis, and Micrococcus luteus), the Gram-negative bacterium (Escherichia coli), and the fungal species (Candida albicans). Cultures were incubated at varying temperatures for approximately 22-24 hours, after which turbidity was measured to quantify microbial growth, with non-inoculated growth media used for calibration. Overall, microbial samples exposed to higher concentrations of allicin resulted in decreased turbidity. In all tests, concentrations of 100 and 150 µg/mL produced the greatest inhibition of microbial growth. Gram-positive, Gram-negative, and fungi tested exhibited measurable inhibition, with Gram-positive species demonstrating the highest sensitivity.

Mustafa Altamimi

Dr. Jerry Kavouras

A103 Volatility, Rugpulls, and Other Risks in Trading Cryptocurrency

Student Project in Engineering, Computing and Mathematical Sciences

After the financial crisis of 2008, cryptocurrency surged in popularity due to a desire to decentralize currency and to take some control away from the federal reserve and the government. Nearly two decades later, cryptocurrency has only become more popular. However, this growth has revealed major issues for consumers. This presentation takes a closer look at risks that hurt consumers and discourage potential crypto investors who may be interested in crypto, but fear losing their investments. Among these risks are volatility, rugpulling schemes, and the rise of celebrity and meme coins. Cryptocurrency was intended as a decentralized currency, but its volatility has made it more of an investment rather than a medium of exchange. Volatility is one of the biggest concerns in the crypto market, leading to sudden and severe losses for investors, especially those who are not experienced in trading. A lack of regulation from governments has also led to several fraudulent crypto schemes, where developers generate hype and publicity, often with the help of celebrities and other charismatic figures, bringing in millions of dollars in investments and then abandoning the projects. By emphasizing the need for regulations to protect consumers and lead to mainstream adoption.

Erick Hernandez

Dr. Rami Khasawneh

A105 Who Wins and Who loses in Cryptocurrency

Student Project in Engineering, Computing and Mathematical Sciences

Everyone of us has probably heard about cryptocurrency at some point in our lives. Cryptocurrency is becoming more popular in today's world since the rise of Bitcoin. Many people start to invest in cryptocurrency through online apps such as Robinhood. However, many beginners lose money because of scams. This project focuses on common crypto scams and aims to increase awareness and protection for users. There are three main types of scams that people might fall for. The first one is a rug pull. This is a type of scam where scammers convince people to buy their cryptocurrency and then disappear with their money. Another type is phishing. In this scam, scammers use fake emails that look similar to real emails from large companies. These emails trick people into entering their personal information, which then gets stolen. This type of scam is very common. The third type is celebrity cryptocurrency scams. People fall for this by investing in coins promoted by famous people. Later, after people invest money, the price drops and investors lose money. For this project, I want to inform people about crypto safety guidelines, especially for beginners. I want investors to be more aware of online links. Before investing in anything, they should study and look deeper into the project, not just buy it because it is popular.

Nathan Truong

Dr. Rami Khasawneh

A107 How cryptocurrency is marketed to young people

Student Project in Engineering, Computing and Mathematical Sciences

Cryptocurrency is marketed to young adults on many different social media platforms including Instagram, Tiktok, Snapchat, Facebook, etc. Influencers use these platforms to show off their lavish lifestyles and influence young adults to invest their time and money in cryptocurrency. Instagram and Tiktok platforms have short "reels" or videos where influencers can post videos and show off their life and how cryptocurrency changed their lives while on youtube, these influences can make longer videos explaining the process of cryptocurrency and how these influencers successfully made money. These videos are often oversimplified and include misinformation to attract the attention of young people. It often ignores the facts of risk, and only includes the success of cryptocurrency. These influences also include slogans like "buy it before it's gone" or "make money fast" to get the attention of young people. Influencers also often do not include that these videos are paid promotions or advertisements for cryptocurrency companies.

Emilia Gorz

Dr. Rami Khasawneh

POSTER SESSION B

WEDNESDAY • APRIL 22

3:15PM

FIELDHOUSE

B2 Cryptocurrency and Crime: A Comprehensive Analysis Alongside Cash and Traditional Banking

Student Project in Engineering, Computing and Mathematical Sciences

The rapid growth of cryptocurrency and blockchain technologies has sparked widespread debate regarding their role in facilitating criminal activity. This survey provides a comprehensive overview of the relationship between cryptocurrency usage and crime, examining how digital assets are used in both unlawful and legitimate contexts. We analyze common claims surrounding cryptocurrency's association with illegal activities and compare these patterns with traditional forms of financial crime involving cash and conventional banking systems. Furthermore, the analysis highlights key challenges related to the regulation and monitoring of cryptocurrency transactions, including anonymity, jurisdictional limitations, evolving criminal techniques, and the need for effective compliance frameworks. By identifying these challenges, this survey aims to inform stakeholders about the realities of cryptocurrency use and misuse and encourage evidence based discussions around policy and regulation. This study serves as a foundational resource for researchers, practitioners, and policymakers seeking to understand the true role of cryptocurrency within the broader financial and criminal justice landscape."

Tony Kochev

Dr. Rami Khasawneh

B4 An Analysis of Transformational and Transactional Leadership on Teamwork

Student Project in Aviation and Transportation Studies

Leadership plays a vital role in the education of aviation and its related objectives of safety, efficiency, and productive learning. The purpose of this study is to understand the effect of different types of leadership on the performance and collaboration of staff by comparing two prominent styles of leadership, transactional and transformational leadership.

Monique Montoya

Dr. Erik Baker

B6 Economic affects of Essential Air Service: Case studies in the Midwest Region

Student Project in Aviation and Transportation Studies

This study examines the economic effects of the Essential Air Service (EAS) program by comparing two EAS airports Joplin Regional (JLN) and Houghton County Memorial (CMX), with two non-EAS airports—St. Cloud (STC) and Marquette County (MQT)—in the Midwest region. Ten years of data were collected on GDP, enplanement levels, population trends, flight operations, and regional employment indicators. The methodology includes correlation analysis to evaluate the relationship between GDP and enplanement rates and to determine whether EAS airports show stronger economic trends than comparable non-EAS airports. In addition, the study assesses whether the amount of EAS funding received aligns with the level of economic growth produced, providing insight into the cost-effectiveness and value of EAS investment for rural communities. The findings contribute to ongoing discussions about the economic justification and long-term sustainability of the EAS program.

Junho Tae

Dr. Erik Baker

B8 Mind-Body Balance: The Role of Yoga in Managing Adolescent Anxiety

Student Project in Occupational Therapy

Yoga has become a common and widely used activity to promote wellness and improved physical and mental health. While primarily performed by adults, children and adolescents can also benefit from practicing yoga to address rising mental health concerns in youths across the United States. Anxiety among adolescents is rising and is the most common mental health disorder among this population (WHO, 2025). It can interfere with daily functioning, academic performance, and social participation. According to the American occupational therapy association (AOTA), occupational therapists (OTs) are uniquely positioned to provide holistic care to address both mental and physical health (2025). Understanding the risks and benefits for the use of yoga as an intervention to address adolescent anxiety is crucial. This research paper explores whether evidence supports yoga's positive impact on mental health to reduce the risk of anxiety in adolescents aged 10-19 compared to no structured mind-body intervention. A review of current evidence identified five relevant studies, including three randomized controlled trials and qualitative research. Overall, evidence supports the use of yoga to reduce anxiety-related symptoms in youth, however results were not significant due to low population size and diversity, varying degrees of study feasibility and limited standardized outcomes. While the research did not support yoga as the primary intervention for anxiety, literature clearly demonstrates the benefits of yoga in combination with multimodal treatments for OTs to utilize in practice to reduce anxiety symptoms in adolescents.

Anna McMahon

Dr. Patricia Raleigh

B62 Inducing the Blues: The Effects of Music-Based Mood Induction on Emotional Judgement

Student Project in Psychology

Music plays a significant role in inducing emotions and affecting emotional judgment. Previous studies suggest that different tempos, keys, and vocalists influence the strength of emotional reactions that people feel when listening to music. The present study examines the relationship between different genres of music, such as white noise, positive music, and negative music. Positive music played at a fast tempo in a major key and negative music played at a slower tempo in a minor key. These variables have been shown to affect participants' emotional responses, judgments during questionnaires, and judgment tasks. Lewis University students will be instructed to fill out a Postive-and-Negative-Affect-Scale (PANAS) questionnaire prior to and after the study. Once a two-minute recovery period is implemented, their emotional state will be measured. After the first questionnaire is complete, participants will listen to neutral, positive, or negative music for a total of five minutes. This will allow participants to process the target emotion of the music and ultimately feel those emotions themselves. Participants will then be instructed to rate and judge a series of ambiguous faces on how they perceive their emotions. It is anticipated that music played at a slower tempo and in a minor key will induce genuine sadness in participants. Therefore, leading participants to perceive faces as more upset than they are intended to be. The results from this research attempts to provide insight into how music of different genres can induce a wide range of emotional responses and judgment effects.

Zoe Guttello

Dr. Philip Blankenship

B10 A Comparison Of The Effects Of Mirror Therapy And Phantom Exercises On Upper Extremity Phantom Limb Pain

Student Project in Occupational Therapy

Phantom limb pain (PLP) is a condition following a limb amputation that impacts the quality of life (QoL), occupational participation, and psychological well-being of an individual. While mirror therapy (MT) and phantom exercises (PE) have demonstrated effectiveness in reducing pain levels, limited research has examined client's perceptions on how these evidence-based interventions influence QoL, daily functioning, and psychological status. This study aims to explore whether client perceptions of MT and PE differ in their perceived impact on pain, QoL, psychological status, and ability to perform meaningful occupations among individuals experiencing PLP. This qualitative study utilizes the Photovoice Method within a Participator Action Research (PAR) framework. Up to ten adults with PLP who have received occupational therapy (OT) and MT following an amputation will be recruited. Participants will capture photographs representing their experiences with MT and/or PE and discuss them during a five session structured interview process conducted via a secure Zoom videoconference. Data sources include participant photographs, interview transcripts, and demographic information. Transcripts will be coded and analyzed to identify emerging themes related to occupational participation, pain perception, and psychological outcomes. Although both MT and PE are effective interventions in OT practice, preliminary results suggest that participants may report MT as having a greater impact on pain management, occupational participation, and psychological well-being rather than PE. Examining client perceptions of MT and PE may provide valuable insights that inform future research and enhance OT practice by guiding more effective interventions to address PLP in individuals following an amputation.

Diana Cruz

Dr. Patricia Raleigh

B12 A Needs Assessment of Pre-Service and In-Service Teachers' Perceptions and Readiness for Gifted Education: A Case Study Approach

Student Project in Elementary Education/Special Education

This needs assessment investigates the perceptions, instructional readiness, and professional development interests of both pre-service and in-service teachers regarding gifted education through a mixed-methods approach. Using Yin's case study methodology, the study explores how educators at various career stages conceptualize giftedness, identify their preparedness to meet the needs of high-ability learners, and articulate barriers to pursuing a gifted education endorsement in Illinois. Google Form survey invitations were sent to local teachers, administrators, Lewis alumni, Lewis' external partners, and students majoring in education at Lewis, as well as suburban communities with diverse populations. 306 local in-service teachers and 71 pre-service teachers responded to the survey. Semi-structured interviews were conducted with participants who opted in after completing the initial survey, providing rich, narrative data on teacher beliefs, training gaps, and perceived support needs. Findings from this study will inform the development of a culturally responsive and accessible gifted endorsement program at Lewis University. Some of the main concerns for both in-service and pre-service teachers were time commitment, location, financial cost, and lack of awareness or program availability. When asked what they thought the most pressing issues and challenges were, some of the most common responses were differentiation in curriculum, identification, resources, equity and access, and program availability and structure. By centering the experiences of both future and practicing educators, this research advances equity in teacher preparation and highlights the ongoing need for professional learning around gifted education.

Maria Giron

Dr. Hyeseong Lee

B14 Addressing the U.S. Illegal Immigration Challenge: Can It Be Solved?

Student Project in Political Science

Illegal immigration remains one of the most polarizing policy issues in the contemporary United States, sharply dividing public opinion along ideological, racial, and socioeconomic lines. This study examines American attitudes toward undocumented immigrants and evaluates the factors that shape preferences for inclusionary versus punitive immigration policies. Using data from the 2022 General Social Survey (GSS), the analysis focuses on three key independent variables—political ideology, race (specifically Hispanic identity), and income level—and their relationship to opinions on whether undocumented immigrants should be granted citizenship, permanent legal residency, or be identified and deported. Employing correlation analysis and cross-tabulation techniques, the findings reveal a strong and statistically significant relationship between political ideology and immigration attitudes, with more conservative individuals expressing substantially greater support for deportation. Race also emerges as a significant predictor, as Hispanic respondents are more likely to favor inclusive policy outcomes compared to non-Hispanic respondents. In contrast, income level demonstrates only a weak and statistically insignificant relationship with immigration attitudes, offering little support for the hypothesis that higher-income individuals favor more punitive immigration policies. Overall, the results indicate that political ideology is the most powerful determinant of public opinion on illegal immigration, while race plays a secondary but meaningful role, and income exerts minimal influence. This study contributes to the broader literature on immigration attitudes by empirically demonstrating how ideological polarization and racial identity shape policy preferences in an increasingly divided political environment. The findings underscore the challenges policymakers face in developing durable immigration solutions amid deep-rooted partisan and social cleavages.

Nassar Nassar

Dr. Steven Nawara

B16 An Analysis of Indoor & Outdoor Play & Symptom Improvement in Children with ADHD

Student Project in Occupational Therapy

Play is defined as "activities that are intrinsically motivated, internally controlled, and freely chosen and that include freedom to suspend reality" (AOTA, 2024). During early childhood (EC), play is an activity where children grow and develop essential life skills. Play in itself is a child's occupation, which is why developmental milestones are centered around play activities (AOTA, 2024). Occupational therapists (OTs) use play-based interventions to support children with developmental delays, such as Attention-deficit/hyperactivity disorder (ADHD). This critical appraisal (CAT) explores the difference between outdoor and indoor play in children with ADHD. ADHD is defined as a neurodevelopmental condition that affects 5% of all children and adolescents, making it the most common childhood neurodevelopmental disorder for school-age children (Armitt et al., 2022; Ogundele et al., 2023). Children with ADHD experience challenges with focus, impulse control, emotional regulation, and social interactions (site). OTs address these challenges through play-based interventions (Wilkes-Gillan et al., 2022; Armitt et al., 2022). Research identified in this CATwill give OTs insight into specific play interventions that would be beneficial for children with ADHD.

Christina Esposito

Dr. Olga Nestor

B18 Analysis of Maintenance Efforts

Student Project in Aviation and Transportation Studies

A Midwest Part 141 flight school operates a high-utilization fleet of Cessna 172R and 172S aircraft, leading to increased wear from frequent cycles such as touch-and-go landings, short flights, and repeated engine starts. Although maintenance (MX) actions are logged through EBIS, logbooks, and pilot squawks, the data had not been analyzed for trends. This study evaluates MX events alongside flight-hour usage to identify differences by aircraft model, seasonal patterns, and operational demand, providing insights to improve forecasting, minimize downtime, and enhance fleet reliability.

Haley Leon

Dr. Erik Baker

B20 Are Micronutrients in the Diet More Effective than Sleep at Preventing Stress Fractures in Female Cross Country Runners?

Student Project in Exercise Science

Stress fractures are a major concern for female collegiate cross country runners, who face elevated risk due to high training volumes, repetitive loading, and sex-specific factors such as low energy availability and reduced bone mineral density (BMD). This project investigated the PICO question: "Is micronutrient intake more effective than sleep in preventing stress fractures in female cross country runners?" A structured literature search identified six studies examining nutrition, micronutrient intake, resistance training history, sleep patterns, and Female Athlete Triad risk factors.

Across the studies, inadequate calcium, vitamin D, and total energy intake were consistently associated with lower BMD and increased bone stress injury risk. Sleep quality contributed to recovery and injury reduction, but findings were mixed, and no study demonstrated sleep as a stronger predictor of stress fractures than micronutrient status. Evidence also showed that resistance training and optimal energy availability provide important protective effects on bone health. Based on the literature, the recommended practice change is to implement a standardized nutrition focused prevention program, emphasizing optimal energy intake, calcium and vitamin D efficiency, and structured education on stress fracture risk. Sleep health should remain a secondary but still significant component. To evaluate this change, teams and coaches could track micronutrient intake, energy availability quantities, sleep patterns, and injury incidence over a competitive season.

Zachary Dunn

Dr. Cathy Bohlin

B22 Aviation Student Insight of Midwest University Flight Scheduling System

Student Project in Aviation and Transportation Studies

Flight training requires aviation students to balance rigorous scheduling demands with academic coursework, employment, and personal responsibilities. This study examines aviation student perspectives on the current flight scheduling system at Midwest University to identify strengths, challenges, and areas for improvement. A survey instrument was administered to aviation students to collect both quantitative and qualitative data regarding satisfaction with the scheduling process, communication practices, work–life balance, and overall program experience. Findings indicate that students value the system's simple online sign-up process and the fairness of scheduling based on progression level. However, key frustrations include limited flexibility, insufficient communication, and competition for desirable flight blocks, which negatively affect academic and work-life balance. Based on student feedback, recommendations include improving transparency, increasing advance notice of schedule changes, adding additional scheduling blocks, and enhancing communication between students and flight administrators. These results provide meaningful insight for improving student satisfaction while maintaining the existing scheduling structure.

Dawood Hassan

Dr. Erik Baker

B24 Avoiding Hot Brakes: A320 Taxi Techniques

Student Project in Aviation and Transportation Studies

Brake overheating before takeoff can cause delays, extra fuel burn, and safety risks. In daily taxi operations, pilots mainly rely on experience rather than clear data-based guidance. Although the Airbus FCTM advises avoiding continuous braking and recommends smooth deceleration, it does not provide specific limits for brake use. This study focuses on short-haul A320 operations and analyzes Quick Access Recorder (QAR) data to examine how different braking techniques affect pre-takeoff brake-temperature rise (Δtemp). The goal is to identify which pilot behaviors generate more heat and to develop practical, data-driven techniques to reduce brake overheating. Results show that braking habits and environmental conditions have clear effects on brake-temperature rise. These findings support the development of measurable operational limits to reduce BRAKES HOT warnings, improve ground safety, fuel efficiency, and maintenance planning-without adding new equipment or aircraft weight."

Xiang Li

Dr. Erik Baker

B26 Avoiding Hot Brakes: A320 Taxi Techniques

Student Project in Aviation and Transportation Studies

Brake overheating before takeoff can cause delays, extra fuel burn, and safety risks. In daily taxi operations, pilots mainly rely on experience rather than clear data-based guidance. Although the Airbus FCTM advises avoiding continuous braking and recommends smooth deceleration, it does not provide specific limits for brake use. This study focuses on short-haul A320 operations and analyzes Quick Access Recorder (QAR) data to examine how different braking techniques affect pre-takeoff brake-temperature rise (Δtemp). The goal is to identify which pilot behaviors generate more heat and to develop practical, data-driven techniques to reduce brake overheating. Results show that braking habits and environmental conditions have clear effects on brake-temperature rise. These findings support the development of measurable operational limits to reduce BRAKES HOT warnings, improve ground safety, fuel efficiency, and maintenance planning-without adding new equipment or aircraft weight.

Mengna Zhong

Dr. Erik Baker

B28 Can Coach Education Decrease the Rate of Lower Extremity Injuries in High School Volleyball Athletes?

Student Project in Exercise Science

Over two million injuries occur in youth sports per year. The most common injuries in high school volleyball athletes are lower-extremity injuries, such as anterior cruciate ligament (ACL) tears and ankle sprains. Injury prevention programs have proven effective; however, implementation and compliance are low. This critically appraised topic paper examined the importance of coach education and its potential to reduce lower-extremity injuries, protecting the millions of athletes participating in sports. Five journal articles were reviewed and appraised from the last five years that demonstrated the relationship between coach education and the prevention of ACL and ankle injuries. Research has demonstrated the best practice for reducing ACL and ankle injuries is injury prevention programs; however coaches struggle to implement these programs due to lack of time, inadequate resources and improper training. Based on this research, high school coaches should be required to complete annual continuing education focused on lower extremity injury prevention programming. Completion of such programs can be verified with a completion certification, similar to a CPR certification. Based on the evidence, this recommendation received a B on the Strength of Recommendation Taxonomy (SORT).

Hunter Brough

Dr. Cathy Bohlin

B30 Cognitive-Based Interventions to Promote Community Reintegration After Stroke: A Critically Appraised Topic

Student Project in Occupational Therapy

Cognitive impairment affects between 30% to 50% of stroke survivors, and is linked to negative outcomes of functioning and community reintegration (CR). International guidelines recommend CR as a rehabilitation priority for stroke survivors; therefore, it is important to address the relationship between impaired cognition and CR in adults during the post-stroke rehabilitation process. This critically appraised topic aimed to investigate the question: How does the implementation of cognitive-based rehabilitation strategies influence community reintegration in adults post-stroke? The researchers conducted an exploratory literature review through key databases (i.e., Primo, PubMed, Google Scholar, EBSCO, NIH, and AJOT), followed by a critical appraisal of the eligible studies. Twenty studies were identified and screened, of which five fulfilled the eligibility criteria and were selected for full review. The resulting studies revealed supportive evidence regarding cognitive intervention strategies' effectiveness in promoting CR. Effective cognitive-based interventions included the Cognitive Orientation to Daily Occupational Performance (CO-OP), Functional and Cognitive Occupational Therapy (FaCoT), and Improving Participation after Stroke Self-Management (IPASS) programs, which improved skill-building and self-efficacy in adults with mild-to-moderate stroke and improved daily functioning and community participation compared with standard clinical care. This review revealed limited studies incorporating adult stroke survivors, with many existing cognitive interventions to facilitate CR exclusively targeting traumatic brain injury. This review indicates a need for continued research to develop effective cognitive interventions to promote stroke survivor CR and supports the integration of CO-OP, FaCoT, or IPASS programs to improve CR outcomes for stroke survivors.

Aubry Dewald

Dr. Eron Bozec

B32 Common Errors Midwest University Flight Students Make During Stage Checks

Student Project in Aviation and Transportation Studies

This study analysed 2023–2025 stage-check records to identify the most frequent errors made by Private Pilot students and to examine whether pass/fail outcomes were influenced by season, day type, or time of day. Landing issues and maneuver errors appeared most often

and were the leading factors in failed checks. Interviews with check airmen reinforced these patterns, highlighting challenges with judgment, coordination, and checklist discipline during testing. Seasonal differences were minimal, and time of day showed only a slight effect. Overall, the results suggest that strengthening landing technique, maneuver consistency, and scenario-based decision-making may help reduce repeated errors and improve training outcomes for Private Pilot students.

Gianna Cacciato-Lewis

Dr. Erik Baker

B34 Cooking up Laughter; Examining the Cognitive Influence of Social Conformity

Student Project in Psychology

Conformity has been broadly studied by Solomann Asch who showed that people will conform to a group even when choosing an incorrect answer. In other research, it is shown that conformity does equate to emotions as well. More specifically, people are more likely to conform whilst experiencing the emotion of awe. The current study wants to extend this work to see whether or not it occurs in the experience of laughter. Participants will be exposed to a neutral cooking video that is not inherently laughter stimulating. Differing numbers of confederates will either laugh or not in the presence of the video, where we will observe if participants conform to the laughter. We hypothesize that in the face of confederate laughter, participants will conform and laugh along to the neutral video. Moreover, following the video, it is anticipated that participants who conform to the laughter will report the cooking videos as being funnier than those who do not conform. This extends research focused on the decision-making process of conformity, determining if influences apply to involuntary and emotional responses.

Isabel Muradian

Dr. Phillip Blankenship

B36 Do labels have taste?: How food branding influences consumer taste perceptions on name vs store brand foods.

Student Project in Psychology

Previous research has shown that name brand food products tend to be preferred more frequently. The purpose of this study is to extend these findings and extend them by investigating whether or not social expectations can influence brand preferences and taste perception. The current study hypothesizes that consumers who are familiar with name brands have higher expectations of food quality associated with that brand; therefore, they will prefer the taste of the name brand opposed to a store brand. Our participants will consist of undergraduate Lewis University students. Two different brands of cereal will be given to participants to taste test, one store brand and one name brand. Participants will also be shown the corresponding branding labels for each cereal. However, depending on the condition a participant is assigned to, the brand labels will be flipped. Participants will respond to a survey containing questions about brand expectations and how the cereals tasted. This will allow us to investigate the difference of taste preference for each cereal according to the brand label. It is anticipated that cereals presented with a name brand label will be rated as higher quality and better tasting than the store brand food, even if the food is incorrectly labeled. This research is of benefit to market companies attempting to appeal to new consumers by outlining the most important attributes of a food product label and brand.

Sofia Hunt

Dr. Philip Blankenship

B38 Effects of Exoskeleton Gloves on Hand Function in Hemiplegic Adults

Student Project in Occupational Therapy

Hand therapy is an important part of occupational therapy in regaining client's independence in ADLs after an injury or accident. In order to improve hand function and motor control, technology such as exoskeleton gloves, is being used in rehab settings. Alvi (2024), says that the creation of exoskeleton gloves with adjustable stiffness allows for a variety of grip patterns and offers flexible hand rehab therapies. "The first objective was to explore the type of variable stiffness technologies that are best suited to work with human-robotic interaction systems in exoskeleton rehabilitation gloves" (Alvi 2024). For clients with problems such as hemiplegia, this type of technology allows more controlled and precise movements. This CAT will provide occupational therapists (OTs) evidence regarding whether technology hand therapy interventions, such as the exoskeleton glove, will improve motor and function control in comparison to standard hand therapy practices.

Firdose Amer

Dr. Olga Nestor

B40 Effects of Exoskeleton Gloves on Hand Function in Hemiplegic Adults

Student Project in Occupational Therapy

Hand therapy is an important part of occupational therapy in regaining client's independence in ADLs after an injury or accident. In order to improve hand function and motor control, technology such as exoskeleton gloves, is being used in rehab settings. Alvi (2024), says that the creation of exoskeleton gloves with adjustable stiffness allows for a variety of grip patterns and offers flexible hand rehab therapies. "The first objective was to explore the type of variable stiffness technologies that are best suited to work with human-robotic interaction systems in exoskeleton rehabilitation gloves" (Alvi 2024). For clients with problems such as hemiplegia, this type of technology allows more controlled and precise movements. This CAT will provide occupational therapists (OTs) evidence regarding whether technology hand therapy interventions, such as the exoskeleton glove, will improve motor and function control in comparison to standard hand therapy practices. Are you interested in giving an additional presentation in either the 3-Minute Thesis Competition (graduate students) or the STEM or HASS (Humanities, Arts, Social Sciences) Slams (undergraduate)? In these rapid-fire sessions, you will have exactly 3 minutes and one presentation slide to present your scholarly work to a broad audience."

Gholeh Ella

Dr. Olga Nestor

B42 Effects of Exoskeleton Gloves on Hand Function in Hemiplegic Adults

Student Project in Occupational Therapy

Hand therapy is an important part of occupational therapy in regaining client's independence in ADLs after an injury or accident. In order to improve hand function and motor control, technology such as exoskeleton gloves, is being used in rehab settings. Alvi (2024), says that the creation of exoskeleton gloves with adjustable stiffness allows for a variety of grip patterns and offers flexible hand rehab therapies. "The first objective was to explore the type of variable stiffness technologies that are best suited to work with human-robotic interaction systems in exoskeleton rehabilitation gloves" (Alvi 2024). For clients with problems such as hemiplegia, this type of technology allows more controlled and precise movements. This CAT will provide occupational therapists (OTs) evidence regarding whether technology hand therapy interventions, such as the exoskeleton glove, will improve motor and function control in comparison to standard hand therapy practices. "

Rayann Mohammad

Dr. Olga Nestor

B44 Evaluating Reentry in Rural Contexts: A Process Analysis of a Community-Based Program

Student Project in Justice, Law, and Public Safety Studies

Over the past decade, offender reentry has emerged as a central priority within state and federal correctional policy. However, most of the empirical research has focused on urban and suburban contexts, leaving significant gaps in understanding how reentry initiatives operate in less-studied community settings. This study examines the Insignia Group Training Academy, a structured reentry program designed to support individuals transitioning from incarceration to community life, with the dual aims of promoting sustainable reintegration and reducing recidivism. The research employs a qualitative case study design to analyze the program's organizational framework, strategic objectives, and implementation processes. Document analysis was conducted to assess stated goals, operational procedures, and service delivery models. In addition, semi-structured interviews were carried out with project leaders, advisory board members, and key staff. A SWOT analytical framework guided data collection and interpretation, enabling systematic evaluation of institutional capacity, perceived effectiveness, and structural challenges. Preliminary findings indicate that the Academy's integrated service model—encompassing housing assistance, employment readiness, educational and vocational training, health and wellness services, and life-skills development—

constitutes a comprehensive approach to reentry support. Stakeholders identified cross-sector collaboration and individualized service planning as program strengths, while resource sustainability and coordination barriers emerged as ongoing concerns. By situating program evaluation within a structured strategic framework, this study contributes to reentry scholarship beyond metropolitan settings and offers evidence-informed insights for practitioners and policymakers seeking scalable, community-responsive reintegration models.

Victoria Paugys

Dr. Huma Zia

B46 Exploring the Role of Artificial Intelligence in Speech-Language Pathology Assessment and Intervention: A Scoping Review.

Student Project in Speech-Language Pathology

Background: With the increasing capability and accessibility of Artificial Intelligence (AI), its application in the healthcare sector shows potential as a valuable tool for supporting diagnosis and treatment. While the rise of AI has promising effects on its implementation in the healthcare system, SLPs need to be aware of its challenges and limitations and to use their own clinical judgement on deciding its efficacy and ethicality when incorporating it into patient care. Objective Question: This scoping review is based on identifying the current evidence of the use of AI in SLP assessment and intervention. Methods: The databases of ASHAWire, EBSCO, and PubMed were used, resulting in 16 studies reviewed. Studies not in English were excluded. Results: The results of this scoping review identified the majority of the selected studies were largely based on descriptive or qualitative research, reflecting a lower level of evidence and highlighting the need for more rigorous, higher-level studies. The majority of studies demonstrated promising feasibility and clinical relevance of AI applications, however, the limited amount of studies and its exploratory nature underscores AI's emerging status in this field. Conclusions: The findings indicate that while AI-based applications are emerging in the field of speech-language pathology, the current evidence remains limited and primarily exploratory. AI shows promise as a supportive tool to enhance assessment and intervention, but should not replace clinician expertise. Ongoing collaboration among researchers, clinicians, and AI developers is essential to ensure ethical, reliable, and clinically meaningful implementation. "

Mariz Villasenor

Dr. Ann Guernon

B48 Feasibility of Applying a GIS-Based Bird Strike Risk Mapping Application at Lewis University's Airport

Student Project in Aviation and Transportation Studies

Bird strikes pose a persistent risk to aviation safety and operational efficiency, even in academic and training-focused airports such as Lewis University's airport (KLOT) in Romeoville, Illinois. According to the Federal Aviation Administration (FAA, 2023), over 14,000 bird strikes are reported annually in the United States, with many occurring at or near airports during takeoff and landing phases (Dolbeer, 2019). While large commercial airports may have dedicated wildlife hazard management systems, smaller airports often lack integrated technology for real-time avian threat assessment. Lewis University's airport operates with a part-time or temporary control tower during peak periods but does not currently employ any GIS-integrated bird strike risk monitoring system. Manual reporting protocols are in place, typically involving visual observations from ground personnel and informal communications with ATC or within the flight operations office. However, these measures are reactive rather than predictive and lack a spatial or data-driven component that could support long-term safety planning.

Maaz Khan

Dr. Erik Baker

B50 Feasibility of Intelligent Traffic Light in Mid-Sized U.S. Cities

Student Project in Aviation and Transportation Studies

Urban traffic congestion increases travel time, fuel use, and greenhouse gas emissions. Traditional fixed-time traffic signals often fail to respond to fluctuating traffic conditions, worsening inefficiencies. This study examines whether ITLs can deliver measurable improvements in average vehicle wait times and environmental performance, while considering the cost-effectiveness and scalability of alternative traffic management strategies like roundabouts.

Chen Po

Dr. Erik Baker

B52 How do parents of children ages three to five describe the COVID-19 pandemic's effect on their child's social skills in a preschool environment?

Student Project in Occupational Therapy

The COVID-19 pandemic significantly altered early childhood routines, play opportunities, and social participation, particularly for children during the critical developmental period of ages three to five. Prolonged lockdowns, reduced peer interaction, and increased reliance on screen-based activities disrupted the development of foundational social and communication skills, with lasting effects observed as children transitioned back into preschool environments. These disruptions have also impacted children's occupational engagement in daily routines, with parents reporting increased difficulty in tasks such as self-care, organization, and participation in structured activities. Understanding parental perspectives on these changes is essential for informing occupational therapy (OT) interventions that support post-pandemic recovery. This qualitative study aims to explore how parents of children ages three to five describe the COVID-19 pandemic's effect on their child's social skills and participation within a preschool setting. The study will be conducted through the Lewis University Occupational Therapy Program and will recruit up to ten parents of children ages three to five at time of COVID-19 who experienced pandemic-related disruptions and demonstrate social communication difficulties. Data will be collected using a Photovoice methodology, in which parents will capture photographs representing their child's social participation and daily occupational engagement over an eight-week period. Individual semi-structured interviews will be conducted via HIPAA-compliant Zoom to facilitate reflection and discussion. Findings from this study are expected to provide insight into parent-identified challenges, adaptations, and strengths related to children's post-pandemic social participation. Results will contribute to the development of evidence-based, family-centered OT interventions that promote social engagement, communication, and meaningful participation in daily routines within early childhood settings.

Sams Alexandria

Dr. Patricia Raleigh

B54 Implications for Occupational Therapy Practice: Dog-Assisted Therapy and Emotional Regulation in Correctional Settings

Student Project in Occupational Therapy

Dog-assisted therapy (DAT) has been utilized in correctional settings to address behavioral and mental health concerns among incarcerated adults. This critically appraised topic analyzes the relationship between participation in dog-assisted therapy, compared to no participation, and its impact on emotional regulation among incarcerated adults. A literature search identified five relevant studies, including one Level 1a systematic review, three Level IV case series, and one Level V expert opinion article. The findings provide moderate evidence supporting the effectiveness of DAT in improving emotional regulation, stress levels, and overall mental health outcomes. However, the current evidence base is limited by small sample sizes and lower levels of study design. Across the included studies, results consistently suggest that DAT serves as a beneficial intervention for enhancing emotional regulation within correctional settings. Further research using larger samples and higher-level study designs is recommended to strengthen the evidence base. These findings indicate that DAT may be a valuable intervention in occupational therapy practice to promote emotional well-being among incarcerated populations.

Emma Varkalis

Dr. Olga Nestor

B56 Improving Nurse Interpreter Use and Self-Efficacy through Experiential Mobile Cart Microteaching

Student Project in Nursing

BACKGROUND: Nurses must possess proficiency in utilizing interpreter services and be supported in their responsibility to provide equitable care for patients with language barriers; when this is not the case, patients' satisfaction, safety, and quality of care are jeopardized. The purpose of this project was to improve nurse self-efficacy in utilizing interpreter services and increase interpreter use overall through an innovative teaching methodology. METHOD: The intervention included experientially focused mobile cart microteaching which integrated an unfolding case study, hands-on simulation, and discussion. The PDSA-formatted intervention was implemented three times weekly over two months on two inpatient hospital units. RESULTS: Average increases of 4.95%, 5.25%, and 7.8% were found in measures of confidence in understanding the importance of interpreter use, confidence in utilizing interpreters, and frequency of interpreter use, respectively. CONCLUSION: The experiential mobile cart successfully improved nurse self-efficacy in using interpreters and increased interpreter use overall."

Jennifer Tokarski

Dr. Donna Martin

B58 In Children With Autism, Do Occupational Therapy Interventions Lead to Greater Independence in Self-Care Skills Compared to Reliance On Parental Support Alone

Student Project in Exercise Science

Children with autism spectrum disorder (ASD) often have difficulty becoming independent in self-care skills because of challenges with sensory processing, motor planning, and completing multi-step tasks. Because of these challenges, many children depend heavily on their parents for daily routines such as dressing, brushing their teeth, and feeding themselves. This paper explores whether occupational therapy (OT) interventions help children with ASD develop greater independence in self-care skills compared to relying mainly on parental support alone. To answer this question, I conducted a literature review using PubMed. I searched for peer-reviewed studies using key terms such as autism, occupational therapy, self-care skills, independence, and parent involvement. Filters were applied to include studies published within the last five years, written in English, and focused on children. Six studies met the criteria, including randomized controlled trials, cohort studies, and cross-sectional research that examined parent participation in OT, Ayres Sensory Integration (ASI), sensory diet programs, and caregiver perspectives. Overall, the research demonstrates that OT interventions improve self-care skills, sensory regulation, social participation, and individualized goal achievement. Stronger outcomes were reported when parents were actively involved in therapy and consistently practiced strategies at home. Although one large randomized trial did not show significant differences on standardized measures, caregiver-reported improvements and progress toward personal goals were observed. Overall, this review highlights the importance of occupational therapy, particularly when parents are actively involved, as a meaningful and evidence-based approach for helping children with ASD build long-term independence in life."

Mariana Mejia

Dr. Cathy Bohlin

B64 Integrating Physical Activity and Psychological OT Interventions to Reduce Post-Stroke Depression

Student Project in Occupational Therapy

People who have survived a stroke experience a profound impact on their physical, cognitive, and mental health (Bermudo-Gallaguet et al, 2024). As many as 50% of stroke survivors may experience a stroke-related psychological or emotional disorder (Hildebrand, 2014). Occupational therapists address mental health within post-stroke care. By comparing an occupational therapy (OT) intervention program that integrates both physical activity and psychological interventions to a medication-only mental health treatment, occupational therapists can better understand how to help mitigate post-stroke depression symptoms and improve quality of life. A critically appraised topic was completed through a literature review using academic databases, including PubMed and the American Journal of Occupational Therapy (AJOT). Through this process, 5 relevant post-stroke OT intervention studies were reviewed. Articles were found within the parameters of the publication date, 5 years or less, and selected using keywords: stroke, post-stroke, occupational therapy, and mental health. Results from the research included the importance of psychological and emotional recovery, the positive impact of mental practice and combined motor interventions, and the relevance of client-centered holistic approaches within occupational therapy. By addressing the person as a whole, including their physical and emotional needs, OTs can promote occupational participation and overall recovery outcomes. Based on the study participants, it was concluded that clients who participated in physical activity and psychological interventions demonstrated improvement in their functional recovery. The combination of mental and physical health approaches can guide OTs in implementing treatment interventions for stroke recovery that prevent and manage depression or anxiety symptoms."

Khristina Scassiferro

Dr. Eron Bozec

B66 Logbook training for Aircraft Maintenance Technicians

Student Project in Aviation and Transportation Studies

This project is based around a singular aspect of our project from last year. We looked at how effective a real world scenario project is to learning. This year we are studying how well we are teaching logbook entries and where the deficiencies are in that teaching. Logbook entries are the most important aspect of aviation maintenance. Work on an aircraft must be adequately documented for it to be acceptable to the FAA. Through my experience at Lewis, we have been taught many different ways to do these logbook entries. This project is meant to document and figure out where we are as a program in terms of teaching logbook entries. This project will use data collected from professors using a standard logbook scenario and having their classes write a logbook entry with no outside influence. These logbook entries will be graded on a 30 point scale grading multiple aspects. These will be the overall completeness of the logbook entry, accuracy of information contained in the logbook entry, accurate collection of the data in the scenario, and overall neatness of the logbook entry. Logbook entries in general have a wide amount of ambiguity as to the layout, form and location of logbook entries. However, the content of logbook entries is standardized and heavily based on the activity that has taken place. If we send students into the workforce with a false sense of knowledge or incorrect knowledge then it will negatively impact their careers and the reputation of the university as a whole.

Dachniwsky Michael

Dr. Brian Kozak

B70 Pilot Perceptions of Differences between Day or Night Flight Training.

Student Project in Aviation and Transportation Studies

This study examines Pilot Perceptions of Differences between Day or Night Flight Training with a focus on fatigue, workload, situational awareness, and operational challenges. A cross-sectional survey of 28 Lewis University pilots, instructors, staff and assistant chiefs was conducted to assess the challenges faced during night flight. Findings indicate that the majority of pilots are more fatigued at flying at night, more comfortable flying during the day, and report greater challenges with maneuvering, scheduling, and situational awareness at night. The most important challenges were identified as visibility and fatigue. These results point to a necessity of better training methods, fatigue-reduction measures, and greater night support of collegiate aviation.

Teja Lakshmisetty

Dr. Erik Baker

B72 Pilot support for mental health seminar

Student Project in Aviation and Transportation Studies

Student Pilots attending FAA Part-141 schools often face mental health challenges that can be overlooked or ignored by themselves, school staff and even the students flight instructors. Some examples of the mental health challenges being studied in this research are anxiety, fatigue and the negative mental health stigma plaguing the industry as a whole. There are many factors that play into these challenges such as FAA requirements during training, school requirements, and personal factors. The purpose of this research is to investigate whether an awareness class, focused on Psychology for Certified Flight Instructors (CFIs) at Lewis University's Part 141 program, will improve Student Pilots academic success and proficiency in learning piloting

skills. The method of research that was used is a survey. The survey targeted 52 individuals identifying them as Student Pilots, CFIs, Both, or Others. The survey identified also gender and level of study in the University (undergraduate or graduate). The scoring of the surveys was done on a 5-point Likert Scale. The responses from the surveyed showed strong support for the role mental health plays at a Part 141 School but showed less willingness to mandate training indicating more support for it to be optional.

Scott Pearce

Dr. Erik Baker

B74 Private Pilot Checkride Common Errors

Student Project in Aviation and Transportation Studies

The airline industry has been growing significantly for the last few years and based on U.S. Bureau of Labor Statistics, overall employment of airline and commercial pilots is projected to grow 4% from 2024 to 2034. The FAA private pilot check ride is one of the first major challenges flight students face in their aviation careers. This study shows the common errors for private pilot license check ride and the maneuvers that flight students struggle the most during the private pilot check ride to help the next generation aviator and instructors for the preparation of the PPL check ride.

Yoshinari Inui

Dr. Erik Baker

B76 Small groups, big feelings: Evaluating the influence of social contagion on emotion in small group tasks

Student Project in Psychology

Group interactions play a significant role in shaping individuals emotions, behaviors, and perceptions. Prior research in social and cognitive psychology shows and suggests that emotional contagion and mirroring influence how people react and interpret within the social environments. Factors such as gender, tone of voice, and compliance have all been shown to impact how people react in situations. These influences may influence how other individuals in the social setting react and behave. The present study examines the relationship between gender, tone, and compliance in small group settings and how these variables affect the participants emotional responses and social judgements during an interactive group task that required the participants to create an origami puzzle. The participants were composed of a total of 19 students. All participants above the age 18 and Lewis University students. Participants were exposed to two confederates who had a select tone and compliance such as neutral, friendly, and harsh conditions and their reactions were measured through the Behavioral Mood Introspection Scale (BMIS) before and after the experiment. Differences in pleasant-unpleasant and negative-calm subscores in the BMIS were compared across the two conditions via a 2x2 factorial ANOVA. Simple main effects revealed a significant effect of timepoint on the pleasant-unpleasant BMIS scores indicating that an external factor in the experiment outside of the tone of the confederate interaction may have improved pleasant-unpleasant BMIS scores. Further research shows that brief human interaction, regardless of tone, can positively affect a person's mood due to human bio-social needs. This is important in understanding the nature of the dynamics between human interaction and the formulation of emotions.

Gabriella Siragusa

Dr. Phil Blankenship

B78 Take the (Rage)Bait: Anger, Cognition, and Decision-Making Among College Students

Student Project in Psychology

The presence of anger has been shown to have a massive impact on decision-making and cognitive processing. Previous studies have highlighted the effect of anger on performance, focusing on the emotional aspect of performance. We plan to expand previous work by examining the experience of anger on problem solving and cognition. This study aims to fill a gap in the research where the induction of rage or anger affects the cognition of college aged students. Therefore, inducing frustration in participants will examine the relationship between an individual's cognitive processing and problem solving skills while also considering whether personality factors, such as trait anger, may modulate the impact of the induction of anger. Lewis University undergraduates will take the State-Trait Anger Expression Inventory (STAXI) to measure their state and trait anger levels before the behavioral task. During the experiment, the confederates will be given a series of "impossible" difficulty Sudokus with an unreasonable time limit. Following each unsuccessful trial, they will be told the next Sudoku would be easier to further frustrate them. Finally, they will be provided with a "medium" difficulty Sudoku and their latency to solve and accuracy. Following the last trial, the STAXI will be given a final time. This method of experiments is to measure cognition and rapid decision making of the participants. The results produced from this experiment will help further analyze the impact of anger on cognition.

Nicole Zalewski

Dr. Philip Blankenship

B80 Teaching Social Determinants of Health through an Interprofessional Education Session

Student Project in Nursing

Social determinants of health (SDOH) are critical influences on patient outcomes, but they are not consistently integrated into health profession education. This pilot project aimed to evaluate health science students' existing knowledge of Social Determinants of Health (SDOH) and their understanding following an educational session on the topic. It also assessed the impact of interprofessional, case-study based learning intervention on students' knowledge of SDOH and also their perceptions of interprofessional education (IPE). A quasi-experimental pre-test and post-test design were implemented with multiple health disciplines including nursing, physical therapy (PT), speech-language pathology (SLP), occupational therapy (OT), and respiratory therapy (RT). The Assessment of Student Knowledge of SDOH (ASCK-SDH) is an assessment tool that was given before and after the educational intervention. The Interprofessional Professionalism Assessment (IPA) was completed by students at the end of the session to reflect on their IPE experience and its effectiveness in teaching SDOH topics. Results demonstrated a statistically significant increase in ASCK-SDH scores ($p<.001$) with a moderate effect size. This indicated a meaningful improvement in students' knowledge. The IPA scores were uniformly high which suggests strong perceptions of collaborative professionalism. The results support the inclusion of SDOH education and IPE experiences in health science programs, providing students with knowledge of critical topics that significantly impact patient health outcomes.

Laurel Deaven Hudson

Dr. Donna Martin

B82 The Cheat Code: How social pressure and gender influences academic dishonesty

Student Project in Psychology

Academic dishonesty (AD) is prevalent among students in university settings as college students endure pressure to perform well. Research suggests that participants are more likely to cheat if they are under the impression that the group is overall accepting of cheating. In addition, research has suggested male participants are more receptive to engaging in academic dishonesty than female participants; however, research related to gender differences in AD are relatively limited. We aim to explore what conditions cheating will occur in and if gender influences a student's rationale to cheat. We plan to collect data from a total of 40 college students, 20 males and 20 females. Participants will be divided into four groups, manipulating numbers of male/female individuals in each group. Participants will be distributed a survey regarding gender, personality traits, and intelligence. The examiner will leave the room and the students will then complete a logic puzzle test. Varying numbers of confederates will be told to use their phone to cheat on the test and observations of the participant's behavior will be collected. The students will be measured based on if they use their phone to cheat on the test. We think the results will show that participants are more likely to cheat if they see another person cheating. We hope to expand on research regarding gender differences in academic dishonesty and how social pressures to conform influence acceptance of it.

Kelly Sullivan

Dr. Philip Blankenship

B84 The Cognitive Cost of Convenience: ChatGPT and the Depth of Student Learning

Student Project in Psychology

The emerging prevalence of generative AI, such as ChatGPT, has shaken all areas of human life, especially higher education. Previous studies have produced conflicting results, with some showing that the use of ChatGPT is beneficial to learning and memory, while others show the contrary. Additionally, many studies have shown a link between ChatGPT use and loss of critical thinking skills, shallower comprehension, and lower feelings of pride in work. Therefore, the current study intends to further investigate the relationship between ChatGPT use and learning comprehension. Students from Lewis University will answer demographic questions, and then be randomly assigned to one of the following groups: Article Only, ChatGPT only, or Article and ChatGPT. All groups will have 10 minutes to complete the task. The article-only group will be reading an article about ladybugs, provided by Oregon State University. The ChatGPT group will be asked to gather information about ladybugs by asking ChatGPT. The article and ChatGPT group will both be given the article to read, and also allowed to use ChatGPT. After the information gathering period, participants will take a short quiz about the subject matter. We predict that the article and ChatGPT group will perform the best on the post-test, the article-only group the second best, and the ChatGPT-only group the worst. This study will advance the current literature by adding to the existing knowledge and potentially swaying the consensus in one way or another. It is important in this new age of generative technology to decide whether AI can be used as a tool or if it should be further restricted.

Sophia Balis

Dr. Philip Blankenship

B86 The Effects of Health Promotion Occupational Therapy Interventions for Children at Risk of Developing Mental Health Disorders

Student Project in Occupational Therapy

Mental health disorders can cause harm in youths by potentially impacting their development, with significant impairment to quality of life, academic performance, physical health, and overall well-being. Children at risk of developing mental health disorders typically face challenges that affect their social, emotional, and cognitive health. While occupational therapy offers activity- and occupation-based interventions to promote positive mental health, their effectiveness requires further evaluation. A focused literature search on occupational therapy-based mental health promotion activities, including activity and occupation-based interventions, in children ages 6-18 was conducted to identify the highest level of available research relevant to the Critically Appraised Topic. Results of the Critically Appraised Topic indicated that school-based and community-based mental health promotion interventions led by occupational therapists (OTs), specifically those targeting coping and life skills, demonstrate moderate to strong effectiveness in improving mental well-being, self-esteem, motivation, and social participation. These findings highlight the essential role of occupational therapy in promoting mental health, preventing the progression of mental health disorders, and supporting meaningful participation in everyday life.

Molly Schiltz

Dr. Eron Bozec

B88 The Essential Toolkit: School Nurse Support for Postural Orthostatic Tachycardia Syndrome/ Functional Neurological Disorder/ Psychogenic Non-Epileptic Seizures/ Hypermobile Ehlers-Danlos Syndrome

Student Project in Nursing

Background: Students with complex, overlapping chronic health conditions such as Postural Orthostatic Tachycardia Syndrome (POTS), Functional Neurological Disorder (FND), Psychogenic Nonepileptic Seizures (PNES), and hypermobile Ehlers-Danlos Syndrome (hEDS) often experience significant challenges in the school environment. Objective: To provide a continuing education resource for school nurses through the creation of The Toolkit to improve school nurses' confidence, and preparedness in recognizing and managing these conditions while supporting collaboration among school staff and healthcare providers. Methods: Guided by the School Nursing Practice Framework, the Cognitive Theory of Multimedia Learning, and continuing professional education principles, The Toolkit includes condition overviews, symptom management guidelines, individualized healthcare plan samples, and communication tools for training school staff, students, and families. The Toolkit educational presentation was presented to 46 participants during an IASN town hall event and each participant completed a pre- and post-test survey about their confidence and preparedness levels when caring and advocating for these students. Results: Educational presentation of The Toolkit improved nurses' confidence in their ability to identify and manage these conditions and apply their understanding of these conditions to promote inclusive learning environments. This was most evident in the "preparedness to advocate for appropriate accommodations or support services for students" question, with a 48% increase in participants selecting very prepared and a 9% increase in participants selecting moderately prepared after the educational presentation, zero participants selecting not at all prepared, and one participant selecting slightly prepared. It also prepared school nurses to facilitate collaborative work among educators, families, and healthcare providers to support equitable educational access for all students.

Samantha Schneider

Dr. Dena Hinkle

B90 The Invisible Wall: How College Students Respond to Face-to-Face Rejection

Student Project in Psychology

Social rejection and conformity are key aspects of human behavior that influence how individuals interact and function in group settings. Studies have shown that social rejection is associated with anxiety, sadness, and depression, as it evokes both social and physical pain. To manage these feelings, individuals may change their behaviors to conform to group standards or engage in other behaviors to cope with that exclusion. The current study plans to replicate and extend original work, ala the Cyberball experiment, to gain insights into in-person social rejection and conformity. Participants were randomly assigned to either 1) social exclusion or 2) social inclusion conditions. During a brief group interaction, two confederates either include the participant in conversation or intentionally exclude them after an initial 3 minute exchange. The participant and confederates were observed through a one-way mirror and recorded for later behavioral analysis. Prior to and following the social interaction, participants completed three self-report measures: Rosenberg Self-Esteem Scale (RSE), General Self-Efficacy Scale (GSE), and Sense of Belonging Instrument (SOBI) It was hypothesized that participants in the social exclusion group will report lower levels of belonging, self-esteem, self-efficacy, and demonstrate higher conformity behaviors compared to those in the inclusion group. Moreover, it is anticipated that those in the exclusion group will be significantly more likely to use their phone as a coping mechanism for the exclusion feelings. Preliminary results failed to reveal significant results, but additional data collection is ongoing. The results of this work attempt to extend understanding of coping behaviors and conformity, related to social exclusion."

Laila Albazzor

Dr. Philip Blankenship

B92 Two Patients, One Decision: Assessing the Risk of Managing High-Risk Pregnancies in Low-Risk Facilities

Student Project in Nursing

High-risk pregnancies require specialized monitoring, coordinated multidisciplinary care, and the ability to respond quickly to unexpected complications. Despite professional guidance outlining levels of maternal care, high-risk patients are sometimes evaluated or managed in facilities that may lack advanced maternal-fetal resources or immediate escalation capacity. Given the unpredictable nature of obstetrics, this mismatch between patient acuity and facility capability raises significant patient safety and quality concerns. Ongoing debate centers on whether maintaining local access to care outweighs the risks associated with delayed transfer and limited specialty support. This paper examines the clinical, ethical, and system-level implications of managing high-risk pregnancies in low-resource settings. Drawing on professional guidelines and quality improvement frameworks, it argues that high-risk pregnancies should be managed in risk-appropriate facilities to reduce preventable harm, strengthen escalation processes, and improve maternal and fetal outcomes.

Henrietta McDonald

Dr. Kimberly Scheffel

B94 Uh...Umm...Err: Examining Pragmatic Language Deficits in College Students with ADHD

Student Project in Psychology

Aims: Research on neurodivergence and ADHD has commonly reported deficits in pragmatic language. Many of these studies have focused on children and also rely on parent or teacher reports to assess pragmatic language skill, highlighting two significant gaps in the existing literature: lack of self-report and the limited age of focus. Therefore the current study focuses on ADHD in college age students, who can advocate for themselves, to determine if ADHD-related differences in pragmatic language persist into emerging and early adulthood. Methodology: We will have Lewis University college students use the BAARS-IV: Self Report to assess themselves and their scores will tell us the predicted level of ADHD they may have. They will then be given a short reading to read through on their own. We will have them then sit with a confederate to communicate the material they read. We will measure the amount of dysfluent turns (examples being “like”, “umm”, or “uh”) in their speech and how coherent their conversation is. Results: We predict there will be a significant difference between students with ADHD and typically developed students in their pragmatic language and level of understanding of what they read. Conclusion: If we find a significant difference in pragmatic language between students with ADHD and typically developed students, this necessitates additional research into emerging and early adulthood neurodivergent study and provides additional support for the availability of resources for these students at the college academic level.

Annabelle Owen

Dr. Philip Blankenship

B96 Understanding Re-entry Challenges: A Comprehensive Analysis of Post-Incarceration Experiences and Community Engagement in a Northern Illinois Jail

Student Project in Justice, Law, and Public Safety Studies

Persistent rates of recidivism underscore the structural and social barriers confronting individuals reentering society after incarceration. In Illinois, nearly 40% of releasees return to custody within three years, highlighting the urgency of effective, evidence-informed reentry strategies. This study examines reentry barriers faced by individuals incarcerated in a Northern Illinois jail, with the aim of identifying both individual-level needs and community-level service gaps that shape post-release outcomes. Using a mixed-methods approach, structured surveys were administered to incarcerated individuals nearing release to assess anticipated challenges and programmatic interests. Survey data were complemented by a community-based SWOT analysis to evaluate local institutional capacity and coordination in supporting reintegration. Quantitative findings were analyzed descriptively, while qualitative and stakeholder-informed assessments contextualized systemic constraints and available resources. Findings indicate that housing instability, limited transportation access, substance use disorders, and weakened social support networks constitute primary reentry obstacles. Community analyses revealed existing organizational strengths but identified fragmentation, service duplication, and limited cross-sector collaboration as persistent challenges. By integrating incarcerated individuals’ perspectives with community capacity assessments, this research advances a participatory and community-driven framework for reentry reform. The findings provide actionable insights for policy development and program design aimed at reducing recidivism and promoting sustainable reintegration outcomes.

Jessica Barrios

Ms. Huma Zia

B98 Vignette-Based Training for Volunteer Youth Sports Coaches to Improve Recognition of Potential Concussion

Student Project in Speech-Language Pathology

Youth sport coaches have reported a lack of confidence with identification of potential on-field concussions despite having training. This research presents the development of a vignette-based training, driven by experiences described by youth coaches. The training vignette provides an opportunity for coaches to practice identifying signs and symptoms of concussion.

Sabrina Peskind

Dr. Ann Guernon

B100 Why So Salty? Salt Intrusion in the Delaware River

Student Project in Marine and Coastal Sciences (Rutgers University)

Salt transportation in estuarine systems is mostly dominated by two mechanisms: exchange flow and tidal flux. In the Delaware River the rising salinity levels, due to climate change, have posed a grave threat to Philadelphia’s drinking water. As salinity levels are increasing more upstream it would affect millions of people’s drinking water supply. Due to this threat, understanding these two components is essential to understanding and predicting how the salt transportation will vary with these environmental changes. This research applies harmonic analysis to salinity and along-channel velocity from sixteen transects. The M2 (lunar semi-diurnal tide) was the tide that this research focused on because it is the dominant tide in the Delaware estuary. With the M2 tide isolated, the analyzing of whether the tidally driven fluxes dominate or if the exchange flow dominates began.Initial results show that both exchange flow and tidal flux play significant roles, both varying with depth and the time of day. While a conclusion on which process played a more important role in the Delaware estuary is not completed. This research highlights the complexity of salt transport dynamics. As well as highlighting the need for further analysis in salt transportation to improve predictions of estuarine response to climate-driven change.”

Molly Paez

Dr. Robert Chant

B102 Women 2.0

Student Project in Sociology

The percentage of American women over the age of 50 who are single has been steadily increasing. Outliving a spouse, grey divorce, and a desire for freedom are just a few of the factors impacting this growth. While many single women in later adulthood have greater financial independence and more education, others are navigating challenges such as financial instability, single parenthood, or reentering the workforce after years of being a primary parent. My research examines the transition to the third stage of life for single women in the US. What are the ways in which women are navigating and embracing singlehood, creating support systems, and building community? Preliminary analysis based on interview data from ongoing research will be presented.

Lilliana Haritos

Dr. Carlene Sipma

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