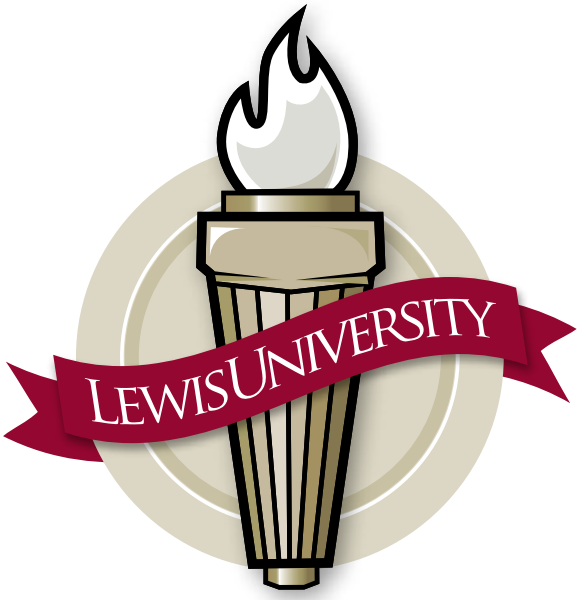


TWELFTH ANNUAL

CELEBRATION OF SCHOLARSHIP

APRIL 17, 2024

Three Minute Thesis

Schlachter Award Finalist Presentations

APRIL 18, 2024

Poster Sessions

Concurrent Sessions

Creative Works Presentations/Performances

STEM and HASS Slams

Business Pitch Competition

Art Gallery Talk

Awards Program

PROGRAM

WEDNESDAY, APRIL 17, 2024			
SESSION	**TIME**	**LOCATION**	**PRESENTERS**
3MT Competition	12–12:50PM	Studio Theatre	Graduate students presenting their thesis or dissertation idea in only three minutes.
Stephany Schlachter Finalists	1–1:50PM	Studio Theatre	Students selected as finalists for the Stephany Schlachter Excellence in Undergraduate Scholarship Award.

THURSDAY, APRIL 18, 2024			
SESSION	**TIME**	**LOCATION**	**PRESENTERS**
HASS Slam / STEM Slam • Humanities, Arts, and Social Science disciplines • Science, Technology, Engineering, and Mathematics disciplines	10-10:50AM	Studio Theatre	Undergraduate students present three minute "elevator pitches" of their research projects using a single slide.
Student Presenter Luncheon	12–12:50PM	Fieldhouse	All student presenters are welcome to come together for a community meal.
CONCURRENT SESSIONS			
Session I	1–2PM	Academic Science Center	Student(s) with Faculty Mentor(s) selected through review of submitted applications.
Session II	2:15–3:15PM		
Session III	3:30–4:30PM		
POSTER PRESENTATIONS			
Group A	1–2PM	Lewis Fieldhouse	Student(s) with Faculty Mentor(s) selected through review of submitted applications.
Group B	2:15–3:15PM		
Group C	3:30–4:30PM		
BR. JOEL DAMIAN BUSINESS PITCH AND PLAN COMPETITION			
Business Pitch Competition	1–4:30PM	Convocation Hall	Student projects, as overseen by the Stahl Center.
CREATIVE WORKS			
President's Art Exhibition	9AM-9PM	Art Gallery	Student work, mentored by Faculty, selected through review of submitted applications.
Gallery Talk	2–3PM		
Creative Works	3:30–4:30PM	Studio Theater	
OTHER EVENTS			
President's Reception	4:30–5:30PM	Lewis Fieldhouse	a) all student presenters with their faculty mentors; b) moderators, judges and other event volunteers.
Awards Program	5:30–6PM		
Preview Night for "Godspell"	7:30PM	Philip Lynch Theatre	Undergraduate student theatrical performances.

GENERAL INFORMATION

Lewis University proudly supports the 12th Annual Celebration of Scholarship, a platform dedicated to spotlighting the scholarly and artistic work of both undergraduate and graduate students. This annual scholarly event is co-sponsored by multiple entities within the university, including the *Culture of Inquiry Coordinating Committee*, the *School of Graduate, Professional, and Continuing Education*, the *Colonel Stephen W. and Lyla Doherty Center for Aviation and Health Research*, the *Lowell Stahl Center for Entrepreneurship and Real Estate Studies*, the *History Center: Urban, Cultural and Catholic History of the Upper Midwest*, the *Center for Ministry and Spirituality*, the *University Faculty Development Committee*, and the Scholars Academy.

The Celebration of Scholarship offers a diverse array of presentation formats—Poster and Concurrent Sessions, Creative Works, a Gallery Talk, Business Pitch Presentations, Three Minute Thesis, and STEM/HASS Slam competitions. These forums provide students across the university 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.

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

POSTER SESSIONS

Scholarly posters will feature the results of research projects, internships and class presentations. Posters will be displayed in the Lewis Fieldhouse from 1:00 to 4:30 PM with the authors present at times as designated in this program.

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 1:00 to 4:30 PM.

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 2:00 to 3:00 PM.

CREATIVE WORK PERFORMANCES

These performances will showcase pieces from various fine arts fields including music, art, theater, and poetry, occurring from 3:30 to 4:30 PM in the Studio Theater.

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.

STEM / HASS SLAM

This event is similar to the Three Minute Thesis category, but is open to undergraduate students only. Undergraduate STEM (Science, Technology, Engineering, Math, and Computer Science) students and Undergraduate HASS (Humanities, Arts, Social Sciences) students will present their original scholarship in three minutes, using only one presentation slide, aimed at making their work understandable to those outside their discipline.

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 1:00 to 4:30 PM in St. Charles Borromeo Convocation Hall.

Dear Colleagues:

It is my privilege to welcome everyone to the 12th Annual Celebration of Scholarship. I am pleased to be part of this important celebration that recognizes the scholarly and creative accomplishments of the students of Lewis University.

This year's Celebration will include more than 200 students presenting their creative and scholarly work in a variety of traditional formats, including concurrent presentations, poster sessions, business pitch competitions, and creative work performances. Following its successful debut at Lewis last year, the Three Minute Thesis (3MT) competition returns as one of our opening events. This dynamic competition highlights the scholarship of our graduate students, who will condense their dissertation or thesis project into a compelling three-minute presentation, using one single slide. We are also excited to introduce the undergraduate Humanities, Arts, and Social Sciences (HASS) Slam to our event lineup this year. Modeled after 3MT and the STEM Slam, this new addition invites students to present their scholarship in only 180 seconds, making it accessible to those without a background in the discipline. Artwork from the President's 16th Annual Art Competition will also be on display throughout the day on April 18.

At the Awards Program on April 18th, the winners of each presentation category will be announced, and prizes and trophies will be presented to the top three winners in multiple presentation categories. The grand prize, the Dr. Stephany Schlachter Excellence in Undergraduate Scholarship Award, provides a $2,000 scholarship to one student who performs and presents outstanding research. Four pre-evaluated undergraduate student finalists will compete for this prestigious award during our Extended Community Hour on April 17th.

This celebration is possible because of the commitment of many faculty and staff. Thank you to the Office of Graduate Studies, the Celebration of Scholarship Coordinating Committee, the subcommittees, and the many volunteers who give their time to make this event a success. And special recognition and gratitude to co-chairs Dr. Marie Meyer, Assistant Professor of Mathematics, and Dr. Matthew Domico, Assistant Professor of Psychology.

Student and faculty research, scholarly pursuit, and creative works are fundamental to the life of the University. It is with great pride we celebrate the work that has been done and with great hope we look to the future to see these efforts continued. Enjoy this Celebration of Scholarship and blessings to all.

Sincerely,

David J. Livingston, Ph.D.
President

Dear Colleagues:

I'm pleased to introduce Lewis University's 12th Annual Celebration of Scholarship, which highlights the research, scholarship, and creative accomplishments of our students.

The Celebration brings to life our Mission values of knowledge, wisdom, justice, fidelity, and association. In concert with our Mission values, we highly value academic excellence grounded in research, scholarship, and creative activity that responds to the needs of society, along with a transformative student experience that emphasizes impact and experiential learning. The Celebration embodies this vision in inspiring and meaningful ways. Over 200 students are presenting this year, and they represent all five Colleges at the University.

As always, this year's Celebration features the innovative and original ideas of our students. And, it offers several new features borne out of our transition out of the pandemic and responding to the drive to continue to make scholarship relevant and effective in society. We have added the Three Minute Thesis (3MT), which challenges graduate students to present their master's or doctoral research in under three minutes, using only one static slide! Since 2008, 3MT has grown as an international competition involving thousands of students across the world, and I'm very happy that Lewis is participating. Similarly, the new STEM/HASS Slam showcases undergraduate scholarship, presented in a similar 3-minute format. Both the 3MT and the STEM/HASS Slam are designed to challenge students to articulate complex ideas in a clear, concise, and engaging manner, making their scholarship accessible and compelling even to those outside their fields.

I'm delighted that we will continue many of our established traditions, including the Dr. Stephany Schlachter Excellence in Undergraduate Scholarship Award, honoring our former provost who supported the Celebration in countless ways as it came to life during her tenure. This year, the Schlachter Award has one notable change: all the finalists from diverse fields and disciplines will present their work in the same session, so judges and community members can see the work of these standout students together as a group. And finally, I'm excited about another new initiative, the creation of the Student's Choice Award, which will be granted to student presenters whose work earns the highest number of votes throughout the day.

I am grateful for all those who have worked diligently to make this Celebration a reality and a success this year. Thank you to the many faculty and staff who serve on the Celebration of Scholarship Coordinating Committee, various sub-committees, and in other volunteer capacities. A special thanks to co-chairs Dr. Matthew Domico, Assistant Professor of Psychology, and Dr. Marie Meyer, Assistant Professor of Mathematics.

The spirit of association permeates this day and speaks to our commitment to academic excellence, collaboration, and community.

Dr. Christopher Sindt
Provost

3MT COMPETITION PROJECTS

WEDNESDAY APRIL 17, 2024

12–12:50PM

The Three Minute Thesis (3MT) competition invites graduate students to present their thesis or dissertation research in just three minutes, using only one static slide. The competition was first held at the University of Queensland in 2008 and has since become a popular event in universities around the world. The goal of 3MT is for students to communicate complex ideas in a clear and concise manner that is engaging and compelling to a non-expert audience.

STUDIO THEATRE

MODERATOR: Dr. Kari Stone

1 Should Speech-Language Pathologists Leave the Sideline and Team Up with Executive Function Coaches?

Graduate Student Project in Nursing & Health Professions

Grace Petersen, Cassidy Peterson

Dr. Victoria Reynolds, Dr. Carol Szymanski

2 Synthesis and Characterization of Antimicrobial Nanoparticles Infused in Biopolymeric Nanocomposite Systems for Antimicrobial Applications

Graduate Student Project in Natural Sciences

Katey Sheets

Dr. Jason Keleher, Dr. Mallory Havens

3 Lewis University International Student Help

Graduate Student Project in Engineering, Computer Science, and Mathematics

Bharath Kumar Tella

Dr. Young June Kim

4 Chemical Activation of Polymeric Media for Applications in Chemical Mechanical Planarization

Graduate Student Project in Natural Sciences

Adam Caridi

Dr. Jason Keleher

5 We Actually Don't Have Ways of Making You Talk: Encouraging Production of Vocal Targets in Running Speech Sampling

Graduate Student Project in Nursing & Health Professions

Isidro Galvez

Dr. Victoria Reynolds, Kristin Scavo-Smith

6 Analyzing Seasonal & Event-Based Trends in Email Phishing Targeting Universities to Improve Security Awareness Training

Graduate Student Project in Engineering, Computer Science, and Mathematics

Jocelyn Murray, Provance Jade

Dr. Ray Klump, Dr. Rami Khasawneh

7 The Development and Characterization of Secondary Redox Modification to Mof-199 with Application to Water Remediation

Graduate Student Project in Natural Sciences

Kaitlyn Palmer

Dr. Daniel Kissel

8 A Scoping Review: Cognitive Function Deficits Secondary to Chemotherapy Treatment

Graduate Student Project in Nursing & Health Professions

Claudia Gonzales

Lisa Gardner, Dr. Ann Guernon, Dr. Victoria Reynolds

9 Application of Post Synthetically Modified Metal Organic Frameworks for Photocatalysis and Hydrogen Evolution

Graduate Student Project in Natural Sciences

John Kurowski

Dr. Daniel Kissel

10 Water Remediation using a Biocatalyst Built via Click Chemistry

Graduate Student Project in Natural Sciences

Norman Paz-Ramirez

Dr. Kari Stone

11 Coupling Megasonic Energy and Supramolecular Structures for Application in post-Chemical Mechanical Planarization of Oxidized Silicon Carbide

Graduate Student Project in Natural Sciences

Piper Smith

Dr. Jason Keleher

12 Comparison of Oxidizing Agents within Silicon Carbide Slurry Formulations for Chemical Mechanical Planarization

Graduate Student Project in Natural Sciences

Joseph Powell

Dr. Jason Keleher

STEPHANY SCHLACHTER AWARD

WEDNESDAY APRIL 17, 2024

1–1:50PM

STUDIO THEATRE

MODERATOR: Dr. Erik Baker

22 A Mathematical Model of *C. difficile* Transmission and Control in Healthcare Settings

Undergraduate Student Project in Engineering, Computer Science, and Mathematics

Summer Undergraduate Research Experience (SURE)

Clostridioides difficile, C. difficile, has been the leading cause of infectious diarrhea and one of the most commonly-obtained infections in United States hospitals with half a million cases recorded each year. Those infected could have contracted a *C. difficile* infection (CDI) due to interactions with a surface or person harboring the spores spread by this bacteria. Patients with a CDI spread endospores which have been proven to be difficult to remove from the hospital environment, so these patients are sometimes placed into an isolation room. Previous mathematical models have only considered patients' interactions with the environment and have not evaluated the effect of hospital employees or isolation of infected individuals. This work developed a system of ordinary differential equations to examine the effect of different transmission routes such as healthcare workers, doctors, and low- and high-touch frequency fomites, objects likely to carry infection, on the spread of *C. difficile* in a hospital setting. This model is also one of the first to consider an isolation class for patients with a CDI. Results show an emphasis on increased hand hygiene of hospital staff as well as the application of isolation protocols as the most effective strategies to minimize incidence within a hospital ward. These and other findings can be applied by healthcare professionals to help mitigate the spread of *C. difficile* in healthcare settings.

Kristen Ess

Dr. Cara Sulyok

60 ATXN3 Exon 10 Skipping as a Potential Therapeutic for SCA3

Undergraduate Student Project in Natural Sciences

SCA3, or Machado Joseph Disease, is caused by an excess of CAG repeats within exon 10 of the Ataxin-3 (ATXN3) gene. This causes excess glutamine in the protein resulting in aggregation and neurodegeneration. Symptoms arise when CAG repeats exceed 44. Currently, there is no cure for the disease. Eliminating exon 10 removes the excessive repeats but leaves the binding domain and C-terminus intact. To verify the viability of exon 10 skipping as a therapeutic approach, *C. elegans* lacking native ATXN3 and their wild-type counterparts were given the healthy version of the human gene, one with excessive CAG repeats, or a version of the gene lacking exon 10. Then, lifespan and locomotive functions were monitored over a 12-day period. Additionally, the efficacy of novel antisense oligonucleotides, ASOs, that induced exon 10 skipping was assessed in human patient fibroblasts. The results of transfecting worms with ATXN3 lacking exon 10 did not impact lifespan and the efficacy of the novel ASO will be discussed. This study is vital in contributing to the emerging interest in developing cures for SCA3.

Allan Victor Cortes

Dr. Mallory Havens, Dr. Daniel Kissel

75 Stochastic Simulations of Nosocomial *Clostridioides difficile* Infections and Transmission

Undergraduate Student Project in Engineering, Computer Science, and Mathematics

Doherty Center for Aviation and Health Research

Clostridiodes difficile (C.difficile) infection has been a prominent issue in healthcare settings for over a decade with healthcare workers (HCWs) and fomites, surfaces likely to carry infections, being recognized as the main vectors of transmission. We have developed an agent-based model to stochastically simulate how *C.difficile* endospores spread through hospital wards and infect patients. Our simulated hospital consists of six wards where factors like antibiotic prescription rates, a patient's length of stay, HCW interactions, and other parameters are varied. We monitor how patients progress through different disease statuses, including a potential *C.difficile* infection, and the main vector of transmission to cause this progression. These results can be used by hospital administrations and HCWs to mitigate the transmission of *C.difficile*.

Matthew Senese, Austin Kind, Ethan Jakubowski

Dr. Cara Sulyok, Dr. Brittany Stephenson

130 The Art of Compassion: Finding Empathy in the Nooks of Life is its Own Art Form

Undergraduate Student Project in Visual Arts

Expressing compassion is a result of recognizing these spaces, and then choosing to act kindly within them. I doodle with care in the corners of my homework, books, and sketches- and I hope to find the same blank spaces to fill with kindness in the corners of my life.

Katie Melzer

Leslie Colonna

HASS/STEM SLAM

THURSDAY APRIL 18, 2024

10–10:50AM

STUDIO THEATRE

MODERATOR: Dr. John Parker

1 Testing the Inhibitory Effects of 8-Hydroxyquinoline and its Derivatives on Recombinantly Expressed Human Histone Deacetylase 8

Undergraduate Student Project in Natural Sciences

Austin Rockaitis

Dr. Kari Stone

2 Effect of a Metal-Organic Framework on the pH Stability of Laccase from *Trametes versicolor*

Undergraduate Student Project in Natural Sciences

Cristian Borges

Dr. Daniel Kissel, Dr. Kari Stone

3 Engineering a Water Stable PhotoAnode for the Purpose of Water Electrolysis Utilizing Metal Organic Frameworks

Undergraduate Student Project in Natural Sciences

Nathan Hajek

Dr. Daniel Kissel

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

Undergraduate Student Project in Education & Social Sciences

Jessica Barrios

Zia Huma, Dr. Morris Jenkins

5 Synthesis and Analysis of Defective Zr(IV)- and Ti(IV)-Based Metal-Organic Frameworks for Photocatalysis

Undergraduate Student Project in Natural Sciences

Emily Pearce

Dr. Daniel Kissel

6 Law Enforcement Perceptions of Co-Responder Programs

Undergraduate Student Project in Education & Social Sciences

Sarah Bourell

Dr. Hannah Klein

7 Inclusion: It Ends with LGBTQ Students

Undergraduate Student Project in Humanities & Communication

Jacob Redwinski

Dr. Thomas McNamara

POSTER SESSION A

THURSDAY APRIL 18, 2024

1–2PM

1A Female Athletes: Body Image and Self-Esteem

Undergraduate Student Project in Business

This research is intended to gain a better understanding of the pressures being faced by student-athletes while they are in school. Prior research has examined how retired college athletes may struggle with body image issues once their collegiate athletic careers end (e.g., being over 6 feet tall was a true advantage for women while playing basketball or volleyball, but post-athletics, this formerly positive characteristic may be viewed as a hindrance outside of the gym). Additionally, this research is expected to contribute to the growing literature on imagery and marketing activities that have direct and indirect effects on their audience. While there is an extensive literature on the potential negative impact of marketing materials that incorporate aspirant body types (e.g., early 2000's Victoria's Secret), there is a much smaller literature on how these marketing activities may translate into disordered eating behavior or distorted body self-image. A survey will be deployed in late February to all Lewis University student-athletes who are part of at least one of the 23 NCAA sports on campus. The survey contains instruments related to body self-image, relationship with food, self esteem, social comparison, social media usage, athletic identity, and a set of reaction responses to a series of advertising images related to athletes and sport.

Emma O'Neil

Dr. James Oakley

7A An Examination of the Link Between Essential Oils and Cognition

Undergraduate Student Project in Education & Social Sciences

This within-groups design seeks to determine the impact that rosemary may have on one's cognitive function. Forty eight participants underwent a pretest and posttest battery that measures processing speed, memory, accuracy and attentiveness before and after being exposed to rosemary essential oil. The battery consisted of the Digit Symbol Substitution Test (DSST) and N-Back Task. Rosemary was investigated due to its reputation for being a stimulating scent. Alongside this test battery, participants self-reported their levels of trait-anxiety before and after inhaling rosemary using form Y-1 of the State Trait Anxiety Inventory (STAI), and physiological reactions were measured using a pulse oximeter. Primary results suggest that although there is no notable change in self-reported nor physiological indicators of anxiety, there were statistically significant increases in the N-Back task results and the DSST results. This suggests that there may be a correlation between the inhalation of rosemary and enhanced processing speed, attention, memory and accuracy.

Drew Orr, Kaitlyn De Armond, Cristian Davila

Dr. Matthew Domico

10A Understanding Re-Entry Challenges: A Comprehensive Analysis of Post-Incarceration Experiences and Community Engagement in a Jail in Northern Illinois

Undergraduate Student Project in Education & Social Sciences

A survey conducted by the Illinois Criminal Justice Information Authority indicates that nearly 40% of the people released from Illinois jails and prisons returned within three years and 17% released from Illinois prisons returned within one year. Once released, returning citizens face barriers when trying to re-enter society. Barriers which increase the likelihood of re-offending or recidivism are lack of housing, transportation, substance abuse and family issues. In this research, we will present existing data from a jail in Northern Illinois about perceptions of reentry issues from formerly incarcerated individuals. Data and surveys were collected and disbursed by project administrators inside the county jail in Northern Illinois. This survey provides a better understanding into the circumstances facing previously incarcerated individuals in their re-entry to society. Specifically, we have gained information regarding post-release living arrangements, struggles with substance abuse, and interest in participating in educational programs such as GED courses, abuse treatment, or parenting classes. This analysis will inform the proposal of post-release programs and resources within neighboring communities. We will conduct SWOT (Strengths, Weaknesses, Opportunities, and Threats) surveys in Northern Illinois neighborhoods to understand potential challenges and community concerns. Ultimately, this research aims to deepen our understanding of recidivism and support the development of community-driven solutions.

Jessica Barrios

Huma Zia, Dr. Morris Jenkins

13A Quiet Quitting and the Factors Related

Graduate Student Project in Aviation

This study is focused on research of the lifestyle/work factors that can lead an individual to quiet quitting. This study is focused solely in the Lewis University Aviation Department at the Romeoville, IL campus between the maintenance department, flight department, administration, adjunct and full-time professors and doctors in all studies, and any other full-time employee working in and around the Lewis Aviation Department. The definition of quiet quitting is provided to aid the participant in understanding what quiet quitting is and how it is understood by the research team. Quiet Quitting can be stated as doing the bare minimum, strictly following the job description, and not going above and beyond. This can come as a result of when an employer fails to meet the employees expectations, fails to implement a healthy organizational culture, and fails to meet an employees long term needs. (Ellera et al., 2023). In our poster you will see the results of these surveys and what the most common areas are that contribute to people wanting/thinking about quiet quitting based on those answers.

Autumn Harrison, Charles Melvin, Niklaas Kurth, Katarzyna Fasano, Hanan Kaminsky

Dr. Erik Baker

16A Effectiveness of Flight Simulation During Instrument Training

Graduate Student Project in Aviation

During instrument training, pilots are required to obtain a certain number of hours in a flight simulator. Training in flight simulators gives pilots the ability to learn skills without the pressure of being in an aircraft, practice different emergency scenarios, practice different types of approaches including approaches that may not be at nearby airports, and be able to save time by avoiding the process undergone when flying an aircraft. This study aims to investigate the effectiveness of simulator training on Instrument Rating proficiency through analyzing qualitative and quantitative data collected from surveys and Talon, a flight records database. The data was collected from Lewis students who have completed their instrument rating and includes Required ATD Time, Total Flight Time for Each Flight Training Activity, and number of months taken to complete the Instrument Rating.

Ian Fitzpatrick, Ayesha Jabeen, Meltonique Bowen, Genesis Garfias, Bhargava Raam

Dr. Erik Baker

19A The Effect on Student Performance Based on Flying with One or Multiple Instructors

Graduate Student Project in Aviation

Certified Flight Instructors (CFI) accompany pilots during every step of their learning process and play a crucial part in the instructional and continuous training process in aviation. Education research, however, reveals that a student's education depends to a large degree on the quality of the instructor and that instructors are least effective in the early stages of their teaching careers (Weisberg, Sexton, Mulhern, & Keeling, 2009). The first objective of this study is to observe the success of flight students at Lewis University in obtaining their license and if that can be attributed to the number of flight instructors during the program. To gain a comprehensive understanding of the achievement of flight students, it is imperative to consider the assessment of the impact of changing Flight Instructors on more than two occasions during their training. We gathered data using Talon, which is the website Lewis University uses to keep records on flight students. We randomly selected students to determine if the number of primary instructors a student has impacted their flight performance. Flight performance is measured by the amount of time, hours, and activities needed to complete a license/rating. We then used a survey to gain further data on students' opinions toward flying with multiple instructors for the duration of their training.

Daniel Ford, Jemimah Ansah, Mary Quaye, Wyatt Franks

Dr. Erik Baker

22A Safety Culture in Lewis University Aviation Department

Graduate Student Project in Aviation

This study explores how safety is managed and perceived in the Aviation Department at Lewis University. By examining responses from students, flight instructors, faculty, maintenance and support personnel reviewing existing safety procedures, the research aims to identify what is working well and what could be improved. Early results show a strong commitment to following safety rules but suggest that student participation and feedback could be better. The findings will help in developing strategies to further strengthen safety in aviation education, ensuring high standards are met.

Siyi Liu, Mazan Hashem, Ting Wei Lai, Shen Hung Tsai

Dr. Erik Baker

25A Achievement and Avoidance Games on Graphs

Undergraduate Student Project in Engineering, Computer Science, and Mathematics

A graph is a set of vertices connected by edges. We introduce a new achievement game that is played by two players that alternately select previously unselected vertices on a graph, where there are no selected vertices initially. When a vertex is selected, all vertices in closest paths from the set of selected vertices to that vertex are now considered selected. The game ends when all vertices of the graph are selected. We also introduce an avoidance variation where the object of the game is to lose. This presentation explores different outcomes and strategies for these games, determines what player wins on various graphs via computation of certain evaluation numbers, and explores sequences of graphs using a new method called reduction.

Benyamin Bamburac

Dr. Marie Meyer

28A Mathematically Modeling Disease Spread in Long-Term Care Facilities

Undergraduate Student Project in Engineering, Computer Science, and Mathematics

Although multiple mathematical models have been developed to study the spread of *Clostridioides difficile (C. difficile)* in hospital settings, very few have focused on transmission in long-term care facilities (LTCFs). Hospitals and LTCFs possess notable differences in their environments, interactions among patients and staff, and the types of individuals that stay within these facilities. These differences require distinct mathematical models with varying patient classes and assumptions. Additionally, while disease models often focus on person-to-person transfer only, *C. difficile* also spreads through contact with contaminated surfaces. Since LTCFs have many common spaces, it is important to include these surfaces in a model, representing the routes through which residents can be exposed to the bacteria. In this research, we analyzed the transmission of *C. difficile* in LTCFs using a mathematical model. In particular, we developed a system of six ordinary differential equations that incorporated both patient and environmental spore-density classes. By simulating the model, we were able to gain knowledge about the main routes of *C. difficile* transmission in an LTCF, which aids in identifying mitigation strategies to reduce disease spread within LTCFs.

Harold Arriaga

Dr. Brittany Stephenson, Dr. Cara Sulyok

31A Development of Agent-Based Models for Evaluation of Precision Nutrition Interventions through a Socioeconomic Lens

Undergraduate Student Project in Engineering, Computer Science, and Mathematics

An individual's overall health is dependent upon many characteristics including age, demographics, physical activity, body-mass index (BMI), underlying health conditions, and socioeconomic status. To date, many guidelines to promote healthier eating have targeted the total population rather than focusing on the individual level. This project will investigate the role of an individual's socioeconomic status on both their overall health and the total population health through agent-based models (ABMs) of two Chicagoland villages: Broadview, IL and Clarendon Hills, IL. We will recreate the maps of the two neighborhoods, including their occupants, using software. The demographic breakdowns will reflect reality, and individuals will have personal characteristics including age, sex, race and ethnicity, income, BMI, and medical information/disease status. Our ABMs will track individual characteristics, decision-making, and daily behaviors in order to determine an overall health score for each individual. To begin the ABM of Broadview, we first used Google Maps to create a graphical user interface (GUI) that will be representative of the village. Our GUI includes detailed information about the village, including streets, houses, schools, restaurants, and grocery stores, among other landmarks. With a GUI accurately representing the village, we are able to incorporate residents with individual characteristics and simulate their daily actions and interactions. By modeling their daily routine of interacting with both others and their surroundings, such as grocery stores and restaurants (or lack thereof), we aim to identify how an individual's social network and resources affect their overall health score.

Nuvia Hernandez, Brandon Kemp, Claire Levis, Mackenzie Welsh, Emilio Vilchis

Dr. Cara Sulyok, Dr. Brittany Stephenson

34A Graph Theoretical Modeling of Self-Assembling DNA

Undergraduate Student Project in Engineering, Computer Science, and Mathematics

Self-assembly is a term used to describe the process of a collection of components combining to form an organized structure without external direction. The unique properties of double-stranded DNA molecules make DNA a valuable structural material with which to form nanostructures, and the field of DNA nanotechnology is largely based on this premise. By modeling nanostructures with discrete graphs, efficient DNA self-assembly becomes a mathematical puzzle. These nanostructures have wide-ranging applications, such as containers for the transport and release of nano-cargos, templates for the controlled growth of nano-objects, and in drug-delivery methods. This research project centers around exploring graph theoretical and combinatorial properties of DNA self-assembly to optimize the nanostructure construction for laboratories. This poster shares our results in determining optimal design strategies for graphs with multiple growth patterns like the Double Cone Graph Family and the Sun Graph Family.

Evan Burns, Philiffe Tebalan

Dr. Amanda Harsy

37A Improving Advanced Care Planning in the Long-Term Care Setting

Graduate Student Project in Nursing & Health Professions

Advanced care planning (ACP) is essential to understanding a person's wishes at the end of life. Unfortunately, these discussions do not occur frequently in the long-term care setting. Literature has shown clinician education improves the quality and frequency of these conversations. The purpose of this project was to educate nurses on ACP and the use of the Serious Illness Conversation Guide to explore if it leads to an increase in ACP conversations with long-term care patients. During the

project, educational in-services were conducted with nursing staff at a long-term care facility. A total of 28 nurses agreed to participate. Nurses completed questionnaires before and after the educational in-service. In addition, chart audits will be performed to determine the number of ACP conversations conducted by nurses before and after the intervention. This project is still currently being implemented. Preliminary results of the questionnaires have been reviewed. Before the education, 43% of participants reported they knew what ACP was and 21% of participants reported they knew how to conduct a conversation. After the education, 100% of participants reported knowing what ACP was and how to have a conversation. The next steps will be to perform chart audits to determine if the number of ACP conversations increased after the educational in-services. This project will be essential to provide a foundation for future research related to ACP. The findings will help to better understand the impact of nursing education in a long-term care setting.

Anne Horne

Dr. Daisy Sherry

40A Attitude, Confidence Levels, and Importance of Math to Students in University-Required Math Courses

Undergraduate Student Project in Engineering, Computer Science, and Mathematics

Regardless of one's major or opinions on math, there is often a mathematical requirement at colleges and universities. In this study, we considered the four courses Win, Lose, or Draw, College Mathematics, Storytelling with Data, and Precalculus that fulfill this requirement at Lewis University. We gave both a pre- and post-class survey asking the students multiple questions, including gender, year, ethnicity, confidence level, mathematical curiosity, and any other math courses required. Multiple categories were studied, including effective learning styles in the classroom, mathematical confidence level, anxiety level, and the overall enjoyment from students in the classroom. In this talk, we will introduce any correlations between gender and anxiety/confidence level, students' perceptions of the importance of math before and after completing the course, students' anxiety level entering the course knowing it was more group-learned based, and if prior mathematics courses taken before college have affected their confidence levels this semester, all focusing on gender differences and similarities within each category.

Noelle Chovanec

Dr. Marie Meyer

43A Analysis Grand Challenge

Undergraduate Student Project in Engineering, Computer Science, and Mathematics

The Analysis Grand Challenge (AGC) is a research collaboration with Fermi National Laboratory and the European Organization of Nuclear Research (CERN). It executes a High Energy Physics analysis that scales to the data volumes and complexity expected from the High Luminosity Large Hadron Collider (HL-LHC). The Large Hadron Collider (LHC) collides protons up to an energy of 14 TeV to study matter in the universe. Compared to the LHC, the HL-LHC will have a higher luminosity by a factor of 10. The higher luminosity could present computing challenges because it will have higher event rates which will lead to larger datasets and there might be a need for a more complex environment that will require additional processing time. AGC is a building block of the Institute for Research and Innovation in Software for High Energy Physics (IRIS-HEP) which seeks to demonstrate that IRIS-HEP tools can be used to execute a data analysis at the scale that will be required for the HL-LHC. During the summer of 2023, an AGC open data analysis was successfully converted into one using CMS Run2 data and recipes which allowed the creation of a more CMS-like example analysis for people to be able to reference when they are trying to take over AGC and IRIS-HEP tools. To further progress these results, the workbook datasets will be expanded, complex systematics and Coffea2023 will be added, and scale and performance comparisons will be executed.

Christina Mondelli

Dr. Andrew Wightman

46A Behind the Math: An Exploration of Math Anxiety and Growth Mindsets through Mastery-Based Grading

Undergraduate Student Project in Engineering, Computer Science, and Mathematics

The passing down of knowledge and information is intrinsic to humans and predates the education system itself. Only within the past century has there been a monumental shift in education with a focus on student growth and positive mindsets. Students who primarily have a fixed mindset of learning believe that one is either good at something or is not, and that intelligence cannot be nurtured or developed. Conversely, students with a growth mindset reflect a belief that through perseverance and effort, one can improve their abilities and intelligence. The emphasis on promoting a growth mindset and diminishing fixed mindsets has been proven to be impactful and impressionable to students and educators, especially those in STEM. Instructors can support student development of a growth mindset by encouraging and recognizing students for their growth in learning and by using assessment practices that support the idea that through practice and effort, concepts can be understood. Non-traditional assessment techniques such as Mastery-Based Testing have shown an overall benefit to students' growth mindset and a decay in testing anxiety. This research analyzes data from a multi-institutional collaboration that studies the impact of mastery-grading assessment techniques on the growth mindset and anxiety of students in a variety of mathematics classes.

Christopher Ibarra

Michael Smith, Dr. Cara Sulyok

49A Optimizing Small-Scale Wind Turbine Energy Output

Undergraduate Student Project in Engineering, Computer Science, and Mathematics

Wind Turbines have been used to produce low-carbon energy for decades. However, they are not used widely for small-scale private use. Part of the reason for this is the amount of power it can reliably produce, the price, and the size. This research aims to build a low-cost vertical wind turbine design that can operate with the highest power output possible. Thus, the turbine must efficiently convert the wind energy to generate a high voltage and current. Instead of making a larger turbine, the goal here will be to reduce the design to a size that can be used in small-scale applications. In addition, this experiment will test the efficiency of a base design, which will be used as a control. After this, four other 3D-printed blade designs will be tested to compare their power output. To account for the difference in designs, each one will be scaled at the same height.

Christopher Wilson

Dr. Joseph Kozminski

52A Degradation of Material from Neutron Bombardment

Undergraduate Student Project in Engineering, Computer Science, and Mathematics

The purpose of this project is to study the degradation of materials in a fusion reactor, specifically the blanket that is in the reactor. During the fusion process a lot of high energy neutrons are produced and hit the inner part of the reactor. This inner part is called the blanket and its job is to collect the kinetic energy of those neutrons and convert it into electricity. With that being said when the neutrons hit the blanket it alters the material and affects the structure of the blanket. So, using a program called Geant4, which is used for stimulating environments for particle physics, I can test elements, isotopes, and materials to see what will last the longest in this harsh environment. The materials I will be testing are Lithium, Beryllium, Tungsten, Molybdenum, and if there is time some different composers. I will be creating an environment that will simulate a small portion of the inner volume of the reactor and study how much of the material is left in that volume after bombarding it with millions of 14 Mev neutrons. With this information I can then estimate the time frame for when the blanket needs to be replaced, and then in turn a cost benefit analysis on what material would also have the highest cost benefit. Once this has been adequately studied I can then study what elements are being produced in the reactions and see if those elements could have any further use. One use could be the production of tritium which is the fuel needed to run a fusion reactor, this would then increase the efficiency of the reactor.

Gavin Taylor

Dr. Ryan Hooper

55A Dynamic All-Electric Vehicle with Intelligent Devices (D.A.V.I.D)

Undergraduate Student Project in Engineering, Computer Science, and Mathematics

This presentation outlines the objectives, approach, and conclusions of the D.A.V.I.D project, which aims to develop a safe, reliable, and all-electric go-kart-styled vehicle equipped with depth camera technology for obstacle detection and avoidance. The project's objectives include body and propulsion development, technology integration, and user safety standards. The approach involves designing and refining the vehicle, integrating the depth camera systems for obstacle detection, and automatic braking. The project aims to merge the appeal of recreational electric vehicles with modern technology to enhance the driving experience while addressing safety concerns. The project's conclusion is to develop a functional electric cart-styled vehicle that can be driven safely on the road, with efficient obstacle detection and avoidance capabilities and a top speed of 25 MPH.

Austin Schaibley, Eric Ortiz, Alec Hoster, Aaron Skonieczny, Brindyn Schultz

Dr. Yazan Alsmadi

58A Optimizing Apparatus and Data Collection for Power Reduction of Laser Illumination Using Liquid Crystals

Undergraduate Student Project in Natural Sciences

In 2022, the FAA reported 9,457 laser illuminations (averaging twenty-six a day) entering the cockpit, impacting the pilot's ability to fly. These intense laser strikes can injure and distract pilots trying to fly passengers and cargo safely from one place to another. This research aims to create a film made of liquid crystal to reduce the intensity of laser light entering the cockpit. Previous work has shown a significant decrease in transmitted light intensity using liquid crystals. The liquid crystal cells are created using conditioned ITO glass, conductive tape, and MBBA liquid crystal. The cells are then externally activated using a DC power supply, allowing data collection of laser intensity for three wavelengths. Since collecting data, the automated system has been inoperable, the red laser has failed, and the initial ITO glass supplier has changed. As a result, this research is expected to re-automate the system, replace the laser, and investigate the viability of the new ITO glass supplier. If remedied, the new electrified liquid crystal cell will reduce the transmitted laser light intensity in the cockpit, similar to previous data, which is essential for enhancing pilot safety and operational efficiency.

Marissa Strelczyk

James Hofmann

61A Ages of Normal and Blue Lurker Stars in Open Cluster M67

Undergraduate Student Project in Natural Sciences

Stars thought to be blue straggler precursors, known as blue lurkers, are going through some sort of anti-aging process, essentially being rejuvenated. A known method used to determine if stars qualify as blue lurkers, is to compare their rotation rates to their cluster members' rates. Their rates are thought to be much faster due to things such as stellar collisions, binary mergers, and mass transfers. Eleven blue lurkers have been identified in open cluster M67 by their rapid rotation rates. This technique does not address the fact that they could be aging in reverse. So, instead of focusing on how fast these stars rotate, we develop and test a method to determine the ages of main-sequence stars using photometry from Gaia, Pan-STARRS and 2MASS with the statistical software suite Bayesian Analysis for Stellar Evolution with Nine parameters (BASE-9). We found that brighter stars with lower error on parallax and reddening have higher precision on their ages than dimmer stars with higher parallax and reddening error. Using Monte Carlo Markov Chain sampling, we will be able to determine if the stars agree with the known cluster age to see how well the method works. This is a proof-of-concept for a larger study aimed at deriving stellar ages for field stars and other stars with unknown ages. Our research could change our understanding about the way a star evolves throughout its lifetime.

Justyce Watson

Dr. Aaron Geller

64A Analyzing the Antioxidant Effects of Sweet Potatoes of a Manganese Catechol Oxidase Biomimetic

Undergraduate Student Project in Natural Sciences

This study will contribute to the understanding of catechol oxidases, providing insights into their structure, function, and potential applications in diagnostics. To explore this, the use of atomic absorption and UV-vis spectroscopy will showcase the manganese metal complex that mimics the reactivity of catechol oxidase. This experiment aims to not only understand the impact of manganese substitution in a metal complex on the catalytic activity and spectroscopic properties of catechol oxidase but also to quantitatively assess the correlation between antioxidant efficiency and reactivity of the manganese metal complex. Antioxidants in the form of sweet potatoes will be tested as an inhibitor in the reaction of the oxidation of catechol. Completed results of this study will be presented.

John Watson, Ariana Ayala, Devin Polcyn, Layne Kology

Dr. Kari Stone

67A Investigating Copper Chelation and its Effects on Beta-Amyloid Plaque Formation in a Neuronal Model

Undergraduate Student Project in Natural Sciences

Alzheimer's is a neurodegenerative disease, characterized by the formation of amyloid-beta plaques in the brain. As Alzheimer's progresses there is increasing degradation of neurons, loss of memory, cognitive decline, and eventual death. The cause behind the formation of the plaques is still unknown, although it is suspected that copper and heavy metals play a role. Currently, there is no therapeutic treatment or cure. Modern research focuses on the formation of the plaques and how to halt or slow it. This study focuses on the use of ligands in combination with therapeutic adjuvants to chelate copper in the hopes of slowing the degradation of neuronal cells.

Amanda Warfield, Kiersten Smith

Dr. Mallory Havens

70A Healing the Wound: Synthesis and Characterization of Nanoparticle Loaded Hydrogels for Chronic Wound Healing Materials

Undergraduate Student Project in Natural Sciences

An increase in chronic diseases and the total number of surgical procedures is expected to drive the advanced wound care market to $12.86 billion by 2026. The primary function of traditional wound dressings is to serve as an external barrier between the wound and the surrounding environment as a layer of protection, however regulation of the wound-healing process is under-developed. Current treatments for chronic wounds consist of debridement, cleaning, and dressing, but little has been done to improve or increase the overall wound healing process. Multi-functional wound management materials incorporating antimicrobial agents with responsive materials to elicit signals and provide information about healing have emerged as a significant research area. Synthetic biopolymer hydrogels have become increasingly popular due to their intrinsic properties, such as non-cytotoxicity and biodegradability, and their well-defined three-dimensional network, ideal for modification and functionalization. This work explores the strategic design of alginate-based hydrogels containing dual-functional amino acid additives (glycine, serine, and arginine) coupled with photochemically prepared metal-coated titanium dioxide nanoparticles (Ag- or Cu-TiO2) to understand the synergistic interactions of polymers/cross-linkers/additives. The resulting nanocomposite, with tunable porosity, was evaluated in its ability to uptake simulated wound exudate and tensile strength, qualities needed for sufficient wound care. Additionally, adult human dermal fibroblasts were used to simulate wounds and explore the hydrogel materials influence on wound healing

rates and the expression of growth factors (i.e., collagen and TGF-_). Results show there is increased wound closure within 24 hours and an increase in expression of both TGF-_ and collagen.

Ulysses Flores, Jadyn Dominguez, Sydney Tremblay, Deisy Estrada, Katey M. Sheets, Nicole Courtenay, Alexandra Goldman, Madison Weis, Farah Ibrahim

Dr. Jason Keleher, Dr. Mallory Havens

73A Tesla's Work Lives On: A Study of Wireless Power Transfer Efficiency in Pancake Coils

Undergraduate Student Project in Natural Sciences

Wireless Power Transfer (WPT), first discovered by Nikola Tesla, has many modern applications ranging from charging portable devices to vehicles and even medical devices. In our apparatus utilizing pancake coils, the transmitter coil with a pulsed current or alternating current running through it induces a current in a receiver coil that is completely separate from the transmitter circuit. The changing current produces a changing magnetic field that creates a current in the receiver coil, providing the power to visually light the LED bulb or flow through the attached resistor. In the system tested here, the transmitter coil consists of bifilar speaker wire and is connected to a simple transistor circuit. Even though the circuit is supplied with a direct current, the transistor behaves like a switch to produce a pulsed current that the single stranded receiver coil detects. Findings of the effects of horizontal and vertical displacement between the coils and the effects of different diameter coils are discussed. Even though 130 years has passed since the patent, WPT is demonstrated in modern times and is becoming more popular.

Emily Lindemann, Ray Hammonds, Leo Ramos and Ruben Franchini

Dr. Joseph Kozminski

76A Improving Measurements of PM2.5 Emissions for Diesel Engines

Undergraduate Student Project in Natural Sciences

Measuring concentrations of particulate matter below 10 microns in size (PM10, PM2.5) is important to public health, as exposure can exacerbate cardiovascular and respiratory conditions. Based on previous air quality monitoring work with fixed PurpleAir sensors and mobile AirBeam sensors, we focused in on two projects to better understand the impacts of diesel truck emissions on local air quality. First, we installed a PurpleAir sensor to collect continuous data near Rt. 53 and Airport Rd. A solar panel and rechargeable lithium iron phosphate battery were used to power the sensor and a hotspot to transmit data to the cloud. During testing and design improvement, the sensor successfully collected continuous data over several test periods of days to weeks. The design offers flexibility for off-grid monitoring locations as we continue to search for potential sensor sites. Second, we continued monitoring air quality near that intersection during periods of heavy truck traffic using an AirBeam sensor with a person documenting when trucks and other diesel vehicles were idling near the sensor or trucks with particularly dirty exhaust passed by. Since the AirBeam sensor records data every second, we can examine the impact of idling trucks on air quality near the sensor and how long it takes the air quality to improve after the vehicles begin moving.

Ruben Franchini, Smith Casey, Tyler Ranieri

Dr. Joseph Kozminski

79A Course-Based Lasallian Research with Global Impact: Analytical Characterization of Biochar Treated Soil in Collaboration with Universidad de La Salle- Bogota, Colombia

Undergraduate Student Project in Natural Sciences

Climate change is a global threat to agriculture. In Colombia, soil degradation has led to poor fertility and soil compaction, making it difficult to grow food crops and increases the dependence on synthetic fertilizers and industrialized agriculture practices. One possible solution for this issue is incorporating biochar into soil plant systems. Biochar is a carbon rich plant biomass that provides the necessary buffering capacity to modulate the environment for enhanced agricultural growth. This study aims at improving the survivability of crops treated with biochar by investigating water retention, and essential nutrient regulation. More specifically, this work focused on the characterization of biochar infused soils with respect to determining metal ion content, water uptake, acid/base equilibrium dynamics, and conductivity. Initial results compared the treated and untreated soils and determined the presence of metal ions (calcium, iron, lead, cadmium, silver, and copper) at varying concentrations depending on crop cultivation conditions. Further evidence supported these findings using scanning electron microscopy (SEM), and energy-dispersive X-Ray spectroscopy (EDS). This presentation will share correlated findings between the analytical results obtained and the crop growth analysis performed. Lastly, this work can serve as a model for international collaboration in the Lasallian network as a vehicle to solve critical issues.

Andrew Murphy, Ezra Samson, Audrey Ang, Miecio Smith, Andre Jones, Elisa Morales, Syndell Garcia, Cole Johnson, Ethan Scott, Genesis Dennis, Kate Green, Alexander Forster, Nicole Courtenay

Dr. Jerry Kavouras, Dr. Jason Keleher

82A Studying the Effectiveness of Small Molecule Inhibitors with Recombinantly Expressed Human Histone Deacetylase 8

Undergraduate Student Project in Natural Sciences

Histone Deacetylases (HDAC) are a family of enzymes that catalyze the removal of acetyl functional groups from the lysine residues of both histone and nonhistone proteins. HDACs are involved in various processes including the regulation of gene expression and various tumor suppressor and proto-oncogenes by dictating transcriptional activity through histone deacetylation. Considering the active involvement of HDAC in the processes involving DNA and gene regulation, it has been implicated in the development of cancer. As such, an effective inhibitor for repressing the activity of HDACs in the body is highly desired to prevent the exacerbation of cancer symptoms as they can be used as chemotherapeutics with fewer side effects than traditional chemotherapy. Inhibiting HDACs is known to upregulate tumor-suppressor genes and downregulate proto-oncogenes. Small molecule inhibitors would be the most effective since inhibitors are often built using an 8-hydroxy quinone (8HQ) backbone. In this study, human HDAC 8 was recombinantly expressed in *E. coli* cells to quantify the activity before and after the addition of the small molecule inhibitors.

Cristian Borges, Sara Siepak, Anthony Baudino, Austin Rockaitis, and James Kodatt

Dr. Kari Stone

POSTER SESSION B

THURSDAY APRIL 18, 2024

2:15–3:15PM

2B Efficacy of FAA Written Exams

Graduate Student Project in Aviation

This research aims to assess the effectiveness of FAA written exams from the perspective of flight students. The research puts considerations in diverse areas, such as their age, preparation methods, access to study materials, and their perception of the alignment between the written exam content and the practical checkride. The research is focused on how flight students utilize written exams as a learning resource. and their suggestions for improving the exams for better preparing resources for their checkrides. This research aims to provide insights into the strengths and weaknesses of the FAA written exams

Jun Hee Park, Hyung Jun Park, Joonwon Lee

Dr. Erik Baker

5B Study of Mental Health Attitudes from University Aviation Program Flight Instructors

Graduate Student Project in Aviation

This explorative research study aims to understand how collegiate flight programs impact the mental well-being of flight instructors. Additionally, this study looks to understand how workplace conditions and career satisfaction affect flight instructor attitudes. Participants were given a survey consisting of quantitative and qualitative questions to identify common attitudes in regards to the workload, environmental factors, type of instruction, job satisfaction, and career advancement opportunities that instructors experience. Trends found in the data may provide a broad perspective of the mental well-being of flight instructors working in collegiate flight programs.

Rei Ueda, Luisa Roque

Dr. Erik Baker

8B Troubleshooting Lab Developing

Undergraduate Student Project in Aviation

This work is ongoing. The Federal Aviation Administration (FAA) requires individuals who perform maintenance tasks on aircraft to be certificated aircraft maintenance technicians (AMT). For an AMT, it is important to learn skills needed to work on aircraft - troubleshooting is one such skill. A laboratory project was developed for students in the AMVT 2200_ Electricity 2 Spring 2024 class to leverage the author's real-world experience from working in the industry with aircraft line maintenance. The project involved troubleshooting and operation checking the DC power system, navigation lights, avionics system, landing lights, and stall warning system. These tasks hit a series of skills necessary for working in the industry such as reading electrical schematics, determining the fault, and then fixing the fault by replacing wires, and then writing a logbook entry. The logbook serves as a record of all maintenance tasks completed on the aircraft by the AMT. Furthermore, the logbook even includes, in the event a fault can't fully be fixed, the use of a minimum equipment list (MEL) which can be used to defer inoperative components which is a standard industry protocol. Students have 4 hours to fix all the faults, MEL the aircraft, or cancel the flight due to maintenance. Data collected is student completion time and percentage of tasks completed.

Joseph Sayyed

Dr. Brian Kozak

11B Game Winning Strategies for Total Graph Coloring

Undergraduate Student Project in Engineering, Computer Science, and Mathematics

This research utilizes the concept of total graph coloring to define a two-player game played on a graph, which consists of a set of vertices and edges. A total coloring of a graph is an assignment of colors to both vertices and edges such that no two of the same color can be adjacent. In our game, Players A and B take turns coloring the graph with colors from a predetermined set. Player A wins if every element of the graph can be colored and B wins if there is at least one edge or vertex not able to be colored, according to the total coloring property. For a given graph, we determine the minimum number of colors needed to ensure that Player A has a winning strategy. We utilize the patterns of this game to develop an algorithm that computes and solves this value for families of graphs.

Hannah Brower, Cassandra Mata, Michael Szostak, Mackenzie Welsh, Zachary Campbel

Dr. Marie Meyer

14B Analysis of Stock Market Volatility and its Relation to Reddit Posts

Undergraduate Student Project in Engineering, Computer Science, and Mathematics

The race to find methods that will accurately predict changes in the stock market has been steadily moving along. As of late, most of the attention has been placed on social media and the significant role it plays in making stock market predictions. In particular, Reddit forums (like r/wallstreetbets) seemed to have gained significant influence, especially for the so-called MEME stocks – those with a large following on Reddit. This study utilizes time series analysis to test the hypothesis that more mentions of a given stock on Reddit will increase the volatility of the stock, as measured by its volume of trades, which was used as a proxy measure. In order to fully investigate the relationship between stock volatility and the number of mentions on Reddit, data from nineteen different stocks were put through two models - an Autoregressive Integrated Moving Average (ARIMA) model and a Long Short-Term Memory (LSTM) network. The models were used to generate forecasts, and the Symmetric Mean Absolute Percentage Error (sMAPE) value was calculated for each stock, both with and without including Reddit mentions. The results revealed that the LSTM model outperformed the ARIMA model. However, the impact of Reddit mentions on the predictive accuracy of the models varied among stocks. This study leveraged the use of time series analysis tools to further explore the dynamics of social media influence on stock market behavior, contributing to the ongoing exploration of the stock market as a whole.

Nuvia Hernandez

Dr. Piotr Szczurek

17B Inclusion: It Ends with LGBTQ Students

Undergraduate Student Project in Humanities & Communication

This poster presentation argues that university diversity initiatives tend to overlook LGBTQ students, in turn undermining broader inclusion efforts. Specifically, I claim that due to a lack of collected demographics about LGBTQ students, there are aspects of inclusion not extended to this population, which in turn causes a negative student view towards the school itself. In addition to examining quantitative enrollment data, I present qualitative data collected from a smaller pilot survey that conveys how underrepresented the LGBTQ population is on college campuses. These results undercut the idea of cumulative diversity, since educational institutions collect demographic data that excludes this group of students who feel that institutions tend to stray away from going the extra mile to bring an atmosphere of inclusion on campus. Recent studies that have been conducted do not provide sufficient information on why universities do not collect this data, or how it affects those students. This is important as the number of LGBTQ identifying persons continues to grow on campus, showing how a large percentage of this population may be underrepresented.

Jacob Redwinski

Dr. Thomas McNamara

20B Analysis of a Copper Catalyst as a Biomimetic of Catechol Oxidase Using Antioxidant Citrus Extract

Undergraduate Student Project in Natural Sciences

Catechol oxidase is an important plant enzyme that specifically catalyzes the oxidation of o-diphenols to o-quinones in the presence of water. O-quinones are natural antiseptics, which therefore help protect plants, especially when damaged, against disease. The purpose of the experiment was to find a viable catalyst for the oxidation of a catechol. This was done by synthesizing the copper metal complex, then using UV-vis spectroscopy to test the kinetics of the oxidation catalysis. Citrus extract was used as an inhibitor to examine the efficiency of the copper biomimetic catalyst and analyzed utilizing the Michaelis-Menten model of enzyme kinetics. Data was collected and analyzed by the Michaelis-Menten kinetic model. Results of this study will be presented.

Eve Montgomery, Octavio Ortiz, Skylar Post

Dr. Kari Stone

23B Use of a Copper Metal Complex in Catechol Oxidase Biomimicry

Undergraduate Student Project in Natural Sciences

Enzymes are protein catalysts that participate in numerous biological processes. Using Nature as an inspiration for biomimicry, a copper metal complex is used as a catalyst for catechol oxidation to quinone. The inhibitory effects of blueberries as antioxidants will be observed for the aforementioned reaction. The purpose of this experiment is to observe the catalytic activity of a copper metal complex in catechol oxidation when producing quinone. To determine a viable catalyst, we used UV-vis spectroscopy to observe the oxidation catalysis of the copper complex. Results of this study will be presented.

Tyler Perez, Victor Rosas, Ethan Brooks

Dr. Kari Stone

26B A Biomimetic Manganese Metal Complex

Undergraduate Student Project in Natural Sciences

Catechol oxidase is a type-3 dicopper enzyme and is common in plants as protection against its surroundings. Catalysts function to optimize a reaction's speed and energy whereas inhibitors do the opposite and slow the reaction down. To study the efficiency of a manganese metal complex as a catalyst in the oxidation reaction of catechol to quinone, a variety of methods will be used such as atomic absorption and UV/vis spectroscopy as well the kinetics of the reaction. The inhibitor of this reaction will also be studied by using various antioxidants. The complete results of this study will be presented.

Amanda Anderson, Sydney Tremblay, Lexany Fonseca

Dr. Kari Stone

29B Investigating the Effects of Various Antioxidants on a Catechol Oxidase Biomimetic on Browning in Fruits

Undergraduate Student Project in Natural Sciences

The preservation of food has been essential for sustaining and prolonging life. Among the numerous methods employed to prevent food degradation, the application of antioxidants to fruits stands out as an effective strategy. Catechol oxidase, an enzyme found in plants, plays a role in the degradation and browning of fruits over time. This enzymatic process involves the oxidation of catechol to o-quinone in the presence of oxygen, leading to the formation of melanin, which causes the characteristic browning of fruits. To mitigate this natural deterioration process, antioxidants are commonly applied to fruit surfaces to inhibit catechol oxidase activity. The exploration of less conventional antioxidants, such as cinnamon, cloves, and oregano, in preserving fruit quality will be conducted during this experiment. The hypothesis posits that the potency of antioxidants correlates positively with the preservation of fruit. Results of this study will be presented.

Aaron Allred, Briana Calvillo, Sam Brzezinski, Raymond Hammonds

Dr. Kari Stone

32B Exon Skipping as a Therapeutic Approach to SCA3

Undergraduate Student Project in Natural Sciences

SCA3 (Machado Joseph Disease) is a neurodegenerative disease caused by an excessive CAG, repeat in the Ataxin-3 gene, which results in excessive glutamines in the protein. A healthy individual can have as many as 44 CAG repeats, while symptoms of the disease start appearing from 45 CAG repeats and higher. The polyglutamine causes the protein to aggregate and leads to neuronal death. The symptoms of SCA3 range from impaired motor functions to death. Currently, there is no cure for the disease or sufficient treatment. One possible therapeutic approach is to skip exon 10 of the Ataxin-3 gene. Skipping of exon 10 of Ataxin-3 removes the CAG repeat but leaves the binding domain and C-terminus of the protein intact. To accomplish this goal Antisense Oligonucleotides (ASOs) were designed to block the splice site at the 5' end of exon 10. To determine if this is a viable therapeutic method in a whole organism *C. elegans* with the endogenous Ataxin-3 gene knocked out, their wildtype counterparts, were given the healthy, diseased, and exon 10 skipped version of the human gene. Lifespan and movement data was assessed over a 12-day period and a 14-day period. The functionality of the ASOs to induce exon 10 skipping was assessed in patient fibroblasts.

Ezra Samson, Allan Cortes, Ava Artz, Joseph Owens

Dr. Mallory Havens, Dr. Daniel Kissel

35B Design of Novel Biopolymer Anode to Enhance Electron Transfer in Mediated Microbial Fuel Cell Systems

Undergraduate Student Project in Natural Sciences

The world's supply of fossil fuels and their impact on climate change has influenced the development of a next generation energy source. The ability to convert waste (i.e., discarded trash, sanitary, chemical, and pharmaceutical) into energy would create a waste-to-power lifecycle, reducing pollution and dollar per kilowatt. Microbial fuel cell (MFCs) technology has become attractive as an alternative energy source. MFCs can be used to convert the organic matter in wastewater into electricity while also removing pollutants. The efficacy of MFCs is dependent on the design of the anodic electrode. Copper and carbon-based materials on the anode have been explored with carbon-based materials as the preferred anode. Microorganisms used as catalysts in the anodic chamber play a significant role in MFC performance. This work focuses on the functionalization of biopolymer (i.e., alginate, pectin, cellulose) nanocomposites with a conductive polymer layer to promote a productive biofilm at the surface of the anode leading to enhanced surface adsorption and subsequent electron transfer. Specifically, radical-initiated photopolymerization of polyaniline (PANI) was employed to develop a uniform distribution of conducting polymer chains throughout the biopolymer matrix. Results show concentration of dopant, photopolymerization density, and the addition of sugars for enhanced adsorption of bacteria provide a viable pathway for significant electron transport. Additionally, when employed in MFC chamber for 5 days, there was an open circuit potential increase of 500mV, albeit significant degradation of the signal towards longer timeframes. This can be attributed to the formation of a passivating biofilm, impeding charge transport with increased capacitance.

Andre Jones

Dr. Jason Keleher

38B Effects of Depleting Plasminogen as a Potential Therapeutic for Alzheimer's Disease

Undergraduate Student Project in Natural Sciences

Alzheimer's disease is characterized by the formation of amyloid-beta plaque development in the brain that leads to progressive memory loss and eventual death. Although the cause of plaque development is unknown, many modern treatments target the plaques themselves or the gene Apoliprotein E and directly target the central nervous system. No exiting therapy is curative or halts the progression of the disease. Inflammatory immune responses have also been associated and plaque development. Therefore, targeting inflammation is a potential therapeutic approach. Plasminogen (encoded by the PLG gene) involved in the inflammatory response when it is converted into fibrin, which affected leukocyte migration and induces cytokine expression. A method of reducing inflammation is to target the PGL gene using antisense oligonucleotides, which are modified

nucleic acids that can bind to and cause the degradation of the PGL mRNA. This will result in plasminogen depletion in the peripheral blood stream and can be used in combination with other therapeutic techniques. The use of one such ASO targeting PLG in an Alzheimer's cell line will be discussed.

Kiersten Smith, Amanda Warfield

Dr. Daniel Kissel, Dr. Mallory Havens

41B Effect of Cleaning Chemistry Macroenvironment on Cu Post-CMP

Undergraduate Student Project in Natural Sciences

Chemical Mechanical Planarization (CMP) is an essential step in the semiconductor production process involving chemical reactions in conjunction with mechanical abrasion to achieve the desired defect-free planar surface. Chemical Mechanical Planarization (CMP) is an essential step in the semiconductor production process involving chemical reactions in conjunction with mechanical abrasion to achieve the desired defect-free planar surface. Current chemistries for post-CMP cleaning of Cu substrates comprise high-pH solutions that aim to remove excess surface residues and nanoparticles. While efficient, the current solutions provide a chemically aggressive environment that tends to accelerate corrosion (i.e., enhance oxide formation). The goal of this work is to understand the electrochemical redox reactions present at the brush/wafer interface. More specifically, the effect of dissolved oxygen content on the effective defect removal and subsequent induced corrosion defect formation will be studied. Current results have shown a correlation between the redox processes and the level of dissolved oxygen in the macro environment. Additionally, shear force and coefficient of friction data have been shown to be modulated based on the macroenvironment conditions while still effectively removing critical defects.

Carly Shipman, Steven Roberts, Adam T. Caridi

Dr. Jason Keleher

44B Expression of Human Hdac8 in Bacterial Cells Tested Against Small Molecule Inhibitors

Undergraduate Student Project in Natural Sciences

Histone deacetylase (HDAC) is a zinc-dependent hydrolase that removes acetyl groups from the lysine amino acids on histone tails. Vorinostat, also known as SAHA, targets the mono-zinc enzyme family of HDAC. SAHA has a linker that transcends the hydrophobic pocket and the hydroxamic acid group that chelates the Zn in the active site. SAHA targets Class I and Class II HDACs, specifically the Class I HDACs: HDAC1, HDAC2, HDAC3, and HDAC8. By inhibiting this enzyme, it prevents deacetylation of histones, which in turn leaves a relaxed hyperacetylated chromatin. This relaxed chromatin then enables upregulation of gene transcription of tumor suppressor genes which leads to apoptosis. 8-hydrozyquinoline (8-HQ) has been shown to have strong metal chelating properties. Due to 8-HQs privileged structure it allows for the exploitation of zinc binding and expansion of 8-HQ as a scaffold. By using small molecules and docking it can help aid in the design of more specific Zn-binding inhibitors, thus helping find an inhibitor with fewer side effects than traditional chemotherapeutics. This study recombinantly expressed human HDAC8 in bacterial cells and tested these small molecule 8-HQ inhibitors for their ability to efficiently inhibit HDAC.

Jessica Bretz, Anthony Baudino

Dr. Kari Stone

47B Conductive Functionalized Polysaccharide Chains for Pollutant Degradation

Undergraduate Student Project in Natural Sciences

The relationship between the global population increase and reliable food sources puts pressure on farmers to have increasingly successful yields. Pesticides have proven to be a safety net in maintaining healthy and plentiful harvests, but they come at a great price. The residual chemicals and metals from various sprays and pellets have poisoned the soil and run-off to the extent of causing damage to both the plant and any organism that may consume it. Hydrogels are known for their intrinsic ability to uptake large amounts of solution/pollutants/nanomaterials within their well-defined, three-dimensional networks. Their tunable porosity is ideal for tailoring the micro-reactor functionality of these materials. Secondary functionalization of these composites with conductive polymers allows for the development of a polysaccharide-based electrode. This work will focus on the development of hydrogel-based (i.e., agar, alginate, pectin, cellulose) electrodes for the exchange/capture and redox degradation of pollutants that have potentially harmful effects to the environment. Current-Voltage (IV) sweeps were performed to ensure uniform chain growth after radical-initiated photopolymerization of polyaniline (PANI) was employed. Additionally, preliminary results show a significant amount of degradation of a model pollutant, methylene blue, when introduced to the hydrogel upon an applied voltage.

Andrew Murphy, Katey Sheets

Dr. Jason Keleher

50B Lead Detection in Various Water Samples Around Illinois

Undergraduate Student Project in Natural Sciences

Motivated by the potential dangers posed by lead exposure, particularly for vulnerable populations like children, this research aims to understand the prevalence of lead in various water sources. Analyzing lead levels in Wadsworth Well, Des Plaines Water, Waukegan Harbor, and the I&M Canal, initial results indicate significantly low lead concentrations. The analysis method, flame atomic absorption spectroscopy, was not sensitive enough to detect lead at such low concentration, so the method of standard addition was incorporated to help find the actual lead concentration of each water sample. This underscores the importance of using appropriate testing methods for continued monitoring, infrastructure upgrades, and public awareness campaigns to ensure the safety of drinking water and protect community well-being.

Caroline Kucharski

Dr. Teresa Bixby

53B Cadmium Accumulation in the Environment

Undergraduate Student Project in Natural Sciences

Cadmium is a non-essential trace element that is widely distributed in the environment. Both geogenic and anthropogenic sources can elevate cadmium concentrations in soils and groundwater, which are important for maintaining healthy supplies of food and safe drinking water. However, elevated levels of cadmium doses are carcinogenic to humans. Samples of soil as well as samples for three different kinds of plants were collected near a community garden site at All Nations Church in Joliet. The samples were dried and processed by digestion for analysis in a flame atomic absorption spectrometer. Concentrations of cadmium were determined by an external calibration curve and were found to be around 2 ppm, which is typical of that area, and it is below the EPA limit of 5 ppm. The amount of cadmium that was found in the plant samples is evidence of phytoremediation, which removes heavy metals from the soil through plants. Therefore, different types of cadmium hyperaccumulating plants, ways to limit one's exposure to cadmium, as well as ways to remove cadmium from the soil in the environment are discussed in order to make the environment safer for both people and animals' health.

Sara Siepak

Dr. Teresa Bixby

56B Utilizing Whole-Cell Catalysis and Enzyme Immobilization to Facilitate the Degradation of Dyes

Undergraduate Student Project in Natural Sciences

Wastewater remediation is pivotal in addressing environmental concerns for effluent from textile dyes. Greener approaches that provide sustainable and effective results are required to improve current wastewater treatments. Novel techniques to catalytically degrade resilient dyes employ enzymes to reduce the energy needed to oxidize targets. Enzymes are nature's catalyzers but rarely maintain the stability required for intense reaction conditions. A method to improve an enzyme's stability uses whole-cell catalytic-like processes where oxidoreductase enzymes such as chloroperoxidase, secreted by Caldariomyces fumago, catalyze the decolorization dyes without the need for extensive purification. Chloroperoxidase was used to degrade orange G and crystal violet. Another technique implements porous metal-organic frameworks (MOFs), such as UiO-66-NH2, to allow the immobilization of an enzyme to the MOF, improving stability and activity where click chemistry can be utilized to covalently bind the enzyme-MOF biocatalyst. For these purposes, an azide-modified MOF and alkyne-functionalized green fluorescent protein will

be used to verify a copper-catalyzed click reaction. Both whole-cell catalysis and enzyme immobilization improve the capability of enzymes to degrade dyes for the remediation of water. The results will be presented.

Norman Paz-Ramirez, Audrey Ang

Dr. Kari Stone

59B Using a Low-Cost Distance Sensor to Investigate Truck Traffic During Air Quality Monitoring

Undergraduate Student Project in Natural Sciences

Air quality has a substantial impact on public health. Fine particulate matter below 2.5 microns in size (PM2.5) and below 10 microns in size (PM10) are air pollutants of particular concern since they can exacerbate or lead to cardiovascular and respiratory illnesses. Diesel trucks are heavy emitters of these pollutants, created when heat and particles from fuel combustion are released and combine with other small particles, remaining suspended in the air. A previous study was conducted by Warehouse Workers for Justice in Joliet, IL and used PM2.5 sensors to investigate concentrations around major truck routes. Lewis University has used these sensors to collect roadside PM2.5 concentrations and truck traffic; however, there was little correlation due to the difficulty to track passing and idling trucks for prolonged periods of time. To address this, a truck counter using a low-cost distance sensor will be designed, built and positioned at truck-height near the intersection of Rt. 53 and Airport Road near Lewis University. This sensor will be used to track the number of trucks passing, how long trucks idle in front of the sensor, and at what time this occurs. By pairing the motion sensor with PurpleAir and AirBeam PM2.5 sensors, correlations can be investigated of the air quality observed at and near times of increasing number of trucks and long periods of idling. This information can be provided to the community so they can make informed decisions concerning their health and to push for truck electrification.

Casey Smith

Dr. Joseph Kozminski

62B Testing the Inhibitory Effects of 8-Hydroxyquinoline and its Derivatives on Recombinantly Expressed Human Histone Deacetylase 8

Undergraduate Student Project in Natural Sciences

Histone deacetylase (HDAC) is a zinc dependent hydrolase that was first discovered to have activity on the tails of the histone octamers. While HDAC was first discovered to have this activity at histone tails, it was later discovered that HDAC had a more substantial impact on its role in regulating the cellular response to cancer via transcriptional regulation. Through its interaction with transcription factors, histone tails, and regulatory regions in the genome, HDAC has a very important interplay in cellular homeostasis and its response to cancer. Cancer cells often overexpress HDAC which leads to the silencing of tumor suppressor genes and dysregulation of proto-oncogenes which leading to uncontrolled growth of cancer tumors. 8- hydroxyquinoline (8HQ) was used as a scaffold to build a library of inhibitors to inhibit HDAC activity. Human HDAC 8 was recombinantly expressed in two different strains of *E. coli* and the deacetylase activity was tested using a colorimetric HDAC activity assay in both the presence and absence of 8HQ and the derivatives.

Austin Rockaitis, James Kodatt

Dr. Kari Stone

65B Quantifying Microplastics Released from Medicine Vials Through Fluorescence Microscopy: A Risk Assessment

Undergraduate Student Project in Natural Sciences

Over the last half century, the plastic industry has skyrocketed, becoming a major factor in all areas of the modern world. With this is a growing concern over increasing numbers of microplastic material that has found its way to the world's ecosystem. These microplastics are small particles ranging below 5mm in size that come from the breakdown of synthetic polymeric materials (i.e., polyethylene (PE), polypropylene (PP), polystyrene (PS), polyamide (PA), polyester (PES), etc.) found in consumer products. Once introduced into the environment, these microplastics can be picked up by living organisms and infused into the body's tissues (i.e., muscle tissue and organs) and circulatory system. This causes toxic effects (i.e., oxidative stress, DNA damage, organ dysfunction, metabolic disorder, immune response, neurotoxicity, and reproductive/developmental toxicity) in the living organism. The scope of this work was to investigate the number of microplastics found in medicine bottles of popular brands. Previous studies have indicated that microplastics can be found in many plastic products (i.e., water bottles, milk cartons, juice cartons, etc.) and have been shown to contain hundreds to thousands of microplastics per sample. Initial results show that across the selected brands, the microplastics were quantified to range as low as 3 counts/mL to as high as 10 counts/mL. These results highlight a potential problem that may impact billions of people globally and may serve as a basis for more risk assessment research with the effects of microplastics on medicinal efficiency.

Abdullah Mohammed, Joseph Powell, Katey Sheets, Allison Hennings, Dr. Farooq Junaid, Farooq Iffath, Connie Jenkins

Dr. Jason Keleher

68B Development of a Low-Cost 3D Model of Static Light Scattering

Undergraduate Student Project in Natural Sciences

Light scattering is a phenomenon where photons interact with particles in a medium and are deflected from their original path. Light scattering can provide insight on the physical properties of the scattering medium and other light interaction phenomena. Though expensive instrumentation is often needed to study scattering, a compact, low-cost apparatus developed at Lewis University can be used to analyze the properties of light scattering in various solutions with different wavelengths of polarized light. The apparatus utilizes 3D-printed components, an Arduino-based photosensor, polarizing films, stepper-motor, and low-cost red, green, and blue lasers. With the use of a more precise stepper motor, the angular dependence of light intensity due to dipole and quadrupole scattering will be provided and compared to the research grade equipment. These modifications will bring the 3D apparatus one step closer to determining the particle size of a given homogenous medium.

Michael Vargas, Enzo Ribeiro, Alexis Bibian

Dr. Joseph Kozminski

71B Measuring the Effectiveness of Photoresponsive Nanocomposite Coatings on Aircraft Windshields in Outdoor Conditions to Mitigate Laser Intensity

Undergraduate Student Project in Natural Sciences

Safely piloting an aircraft requires that pilots effectively divide their attention between various aircraft instruments, radio communications and visual references. As there are a multitude of tasks for which they are responsible, pilots cannot afford to be distracted by laser attacks which have become increasingly commonplace in recent years; 2023 set a single year high with 13,304 laser incident reports since the Federal Aviation Administration started keeping track in 2010. The effects of laser attacks against persons piloting aircraft are devastating, as one's vision may be temporarily impaired. However, aircraft-targeted laser attacks can be mitigated via the implementation of liquid crystal coatings on aircraft windshields. The effective attenuation of various laser light intensities through sample photoresponsive nanocomposite coatings was measured in the presence of various outdoor conditions such as humidity, varying temperatures, and varying atmospheric pressures. Continuing the research and development of liquid crystal coatings for aircraft windshields in an outdoor environment is necessary for future aircraft implementation to better aviation safety to maintain aviation as a safe method of transportation.

Nicholas Rohmann

Dr. Jason Keleher, James Hofmann

74B Modifying Culture Composition to Optimize Pseudomonas Putida Mnb1 BMO Production

Undergraduate Student Project in Natural Sciences

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. It is also known that abiotic Mn-oxides promote oxidation of organics and have been studied for their water oxidation catalytic function. MnB1 is grown and maintained, and subsequently transferred to culturing media containing manganese (II) salts to observe the oxidation of manganese (II) to manganese (IV). The structures and compositions of these manganese(IV) oxides have been characterized by scanning electron microscopy, energy dispersive X-ray spectroscopy, inductively coupled plasma optical emission spectroscopy, powder X-ray diffraction, Brunauer-Emmett-Teller surface area, and their properties assessed for catalytic functionality towards water oxidation in comparison to abiotic acid birnessite. Water oxidation is accomplished by whole cell catalysis of MnB1 and compared to the water oxidizing ability of abiotic Mn(IV) oxides. Further testing can investigate a way to optimize BMO growth and BMO ability to remediate metals.

Cole Johnson, Kate Green, Elisa Morales

Dr. Kari Stone

77B Engineering a Water Stable Photoanode for the Purpose of Water Electrolysis Utilizing Metal Organic Frameworks

Undergraduate Student Project in Natural Sciences

There is a great desire for the design and integration of photocatalytic electrodes into PEC cells for water electrolysis. Currently, the materials used in electrode production do not fit the need for cost effective generation of hydrogen gas. Traditional catalysts are susceptible to corrosion, can be costly, and are grossly inefficient. Metal Organic Frameworks (MOFs) have been under close examination for their promising properties. They are water stable, photocatalytic materials, easy to manufacture, and show high tunability. When functionalized by an amine group, they can bond to conductive polymers like polyaniline (PANI), which increases conductivity and reduces band gap. Polyaniline is a cost-effective conductive polymer. UiO-66-NH2 and MIL-125-NH2 are promising candidates for these reasons. A promising substrate for creating this electrode is silanated glass. Specifically, aminosilanes are useful for transforming glass into an organic reactive substrate. Atomically flat TEOS wafers were used in this study because of their topology and easily modifiable surface. An aminosilane was linked to the surface which coats the surface with nucleophilic amines. These amines were necessary to promote crosslinking of the Metal Organic Framework to the surface using PANI. These modifications resulted in the creation of multi-layered, conductive, and photoresponsive electrodes that were examined for photocatalysis. The materials and multi-layered electrodes were characterized using infrared spectroscopy, sheet resistivity, SEM imaging, and EDS analysis. The photocatalytic properties of the electrodes were characterized by various photo and electrochemical techniques such as cyclic voltametry and linear sweep voltametry.

Nathan Hajek, John Kurowski

Dr. Daniel Kissel

80B Synthesis and Characterization of Disulfide Ligands as Potential Therapeutics in Alzheimer's Disease

Undergraduate Student Project in Natural Sciences

Alzhiemer's Disease is a neurodegenerative disorder with a large body of research to further understand it and despite that little is known about the biochemical pathways involved. It is theorized that aggregation of the amyloid beta peptide and the formation of amyloid beta deposits as a key factor in the pathogenesis of the disease. Majority of pharmacueticals following this hypothesis have failed to come up with a response. A different approach to further understand how the mechanism of AD develops will be used focusing on how metal ions influence disease development. This project is focused on studying interactions between ligands designed to behave as chelation therapeutics for copper, which could possibly result in novel therapeutics for Alzheimer's Disease. The goal of this project is to work on a specific subset of ligand chelators that introduce a disulfide backbone and compare them experimentally to similar ligands containing monosulfide and nitrogen bridging atoms. These disulfide ligands with unsymmetrical N-donor groups will be synthesized and characterized before being investigated to determine their copper coordination chemistries. The characterization of the ligand structure will be determned through NMR and mass spectroscopy, and separate techniques will be used to understand how the ligand will act in living systems and as a copper chelator.

Nicholas Tovar

Dr. Daniel Kissel

83B Effect of a Metal-Organic Framework on the pH Stability of Laccase from Trametes versicolor

Undergraduate Student Project in Natural Sciences

Effective biocatalysts are highly desired for green approaches in industry, including water remediation of synthetic byproducts and processes involved in textile and manufacturing industries. Unfortunately, most enzymes that degrade or reduce hazardous compounds have limited stability in solution due to their specific operating temperatures, pH, and solution ion concentration. Scaffolded structures, such as Metal-Organic Frameworks (MOFs), provide solid supports for enzyme immobilization that can stabilize biocatalysts outside of their typical operating parameters. It has also been shown that immobilization onto solid supports can increase the catalytic efficiency of certain enzymes. In this study, UiO-66-NH2 was used as a scaffold for immobilizing laccase from *Trametes versicolor*, which has demonstrated the ability to degrade azo and anthraquinone dyes. Immobilization was accomplished using amine-reactive covalent crosslinking, specifically EDC/NHS (N-ethyl-N_-(3-(dimethylaminopropyl)carbodiimide/N-hydroxysuccinimide) coupling. The biocatalyst was characterized using IR spectroscopy, surface area analysis, and SEM/EDS microscopy, and its ability to catalyze the degradation of the azo dye, methyl orange, was determined spectroscopically over a 48-hour period at different pHs ranging from 2.5 to 11.5._

Cristian Borges, Gohari Mahnaz

Dr. Daniel Kissel, Dr. Kari Stone

POSTER SESSION C

THURSDAY APRIL 18, 2024

3:30–4:30PM

3C Evaluating Course Modalities and Their Impact on Learning

Graduate Student Project in Education & Social Sciences

Online and hybrid courses have become increasingly popular in higher education. The shift in the modality of the classes promotes a fundamental question of how course modality affects student performance and retention. This study explores the relationship between course modality (in-person and online) and student outcomes, including grades, learning experiences, engagement, and perceptions of educational quality.

Jun Maezawa, Muzzamill Ali Shaik, Ujwal Udaykumar Nair, Adrian Wlodarz

Dr. Erik Baker

6C Adverse Childhood Experiences and the Risk of Sexually Transmitted Infections Among Adolescents in Namibia

Graduate Student Project in Education & Social Sciences

Adverse Childhood Experiences (ACES) are known to impact adolescents' psychological and emotional development. However, they can also impact their physical health. ACES can lead to adolescents engaging in risky sexual behaviors. These behaviors can put adolescents at a high risk for contracting sexually transmitted infections (STIs). The aim of this study will be to (1) examine the relationship between ACES and the risk of STIs among adolescents in Namibia. This study will also (2) determine the prevalence of STIs int the adolescents of Namibia.

Michelle Lorenzen

9C Refugee Resettlement in America: An Analysis of Motivations and Integration Challenges for Syrian Refugees in America

Undergraduate Student Project in Education & Social Sciences

The UN Refugee Agency has reported that by the end of 2022, a staggering 108.4 million people had been forcibly displaced or fled to another country due to persecution and violence. Among them, 35.3 million are classified as refugees. Peace Review defines a refugee as someone who is not in their home country or usual place of residence, and who fears persecution due to their race, religion, nationality, membership in a specific social group, or political beliefs. Understanding the complex dynamics of international conflicts and the diverse motivations driving individuals to seek asylum, as well as the resources needed upon their arrival in the United States, remains a challenge. In this research, we will utilize data collected by the Syrian Community Network, an organization dedicated to supporting refugees and immigrants, to better understand the factors motivating people to seek asylum or resettlement in the United States. The Syrian Community Network conducted surveys to gather information on the gender, race/ethnicity, age, economic status, marital status, and parental status of individuals seeking assistance from the organization. First, we will identify any correlations between demographic factors and the decision to seek asylum or resettle in the United States. We will then conduct a thematic analysis to uncover recurring themes like political persecution or economic opportunities driving asylum or resettlement. Through an examination of the political, economic, and personal factors underlying this decision-making process, we aim to identify the resources that can facilitate the successful integration of these individuals into American society.

Zina Mahrat

Huma Zia, Dr. Morris Jenkins

12C Coupling Megasonic Energy and Supramolecular Structures for Application in post-Chemical Mechanical Planarization of Oxidized Silicon Carbide

Graduate Student Project in Natural Sciences

Intrinsic properties (i.e., thermal stability, wear resistance, and hardness) have led to adoption of silicon carbide (SiC) for integration as the substrate for next-generation semiconductor devices. Chemical Mechanical Planarization (CMP) has emerged as a critical processing step in device fabrication to keep up with the stringent demands of removal rate and defectivity. While the CMP process Cu, Oxide, and TaN has been studied extensively, the SiC polishing mechanisms are less understood due to the aggressive mechanical conditions and oxidative chemistries for optimal performance. These conditions produce primary defects (i.e., nanoparticle residue), which are removed during the post-CMP (p-CMP) cleaning process, which currently employs the combination of polymer brush scrubbing with redox-active cleaning chemistries. While this process results in acceptable particle removal efficiency (PRE), the high shear force generates secondary defects (i.e., scratches) that further degrade the substrate surface quality. Previous work has proposed employing megasonic energy for low-stress, non-contact cleaning to both activate chemistry and serve as a transport modality of residue/nanoparticles from the surface. This work uses a dynamic system to reach the entire substrate while replenishing the chemistry throughout the cleaning process while applying an oxidized surface to replicate the oxidation step of CMP. Results show that megasonic energy can activate the supramolecular chemistries in a synergistic fashion to enhance surface adsorption followed by defect encapsulation while being removed by the dynamic system. More specifically, Tween20 (i.e. vesicle structure) shows an increase in PRE (20%) with the addition of megasonics when compared to industry standard baseline cleaners.

Piper Smith

Dr. Jason Keleher

15C Structure-Activity Effect of Amine Chemistries on post-CMP Cleaning Relevant to Shallow Trench Isolation (STI) Processes

Graduate Student Project in Natural Sciences

Chemical mechanical planarization (CMP) is an essential process in semiconductor manufacturing for the fabrication of complex integrated circuits (ICs). One key CMP step is Shallow Trench Isolation (STI), which employs cerium oxide (CeO2) nanoparticles coupled with surface-modulating chemistries that directly impact the interfacial redox activity and enhance polishing efficiency. However, conventional methods often lead to increased friction and, consequently, surface defects, which are detrimental to final device performance. This work will investigate the development of a low-stress, non-contact approach for mitigating polish-induced substrate defects. More specifically, the integration of amine-based chemistries was evaluated for their ability of electron donation to facilitate the conversion of Ce3 to Ce4, enhancing particle removal. The synergistic effect of amines and external stimuli was evaluated to optimize cleaning efficiency while preserving surface integrity. Initial results show enhancement in the kinetic conversion of CeO2 oxidation states with no external frictional force applied. This environment has a dramatic effect on the particle removal efficiency (25%), as well as a reduction in surface roughness post-cleaning.

Elizabeth McDonnell, Adam T. Caridi, Kevin R. Reyes

Dr. Jason Keleher

18C The Evolution of Soft Cleaning Chemistries for post-Chemical Mechanical Planarization (CMP) Cleaning

Graduate Student Project in Natural Sciences

With the rapid miniaturization of artificial intelligence technology, limiting device defects formed during manufacturing is critical to producing high-performing integrated circuits. CMP has become an essential processing step in device fabrication to meet these demands. Shallow trench isolation (STI) CMP uses a synergistic balance of ceria (CeO2) nanoparticles and functional chemistry to modulate surface adsorption interactions

necessary to remove material while obtaining angstrom-level planarity. The post-STI polishing cleaning step employs a contact method involving a polyvinyl alcohol (PVA) brush, which removes defects and transports cleaning chemistry mechanically. This process is highly dependent on a uniform transfer of redox-cleaning chemistry to the oxide substrate. Subsequently, during this cleaning process, the PVA brush can induce further defects by increasing interfacial shear force. This work aims to develop post-CMP cleaning chemistry that enhances nanoparticle removal via soft encapsulation by integrating supramolecular matrices. A surface adsorbing/charge flipping encapsulation process is proposed to remove nanoparticle contamination at low friction. Results have shown that the reduction in shear force and enhancement of cleaning efficiency depends on the structure of the supramolecular cleaning additive. Moving away from the traditional contact mode of cleaning, there is a lot of work done to develop a non-contact mode. This will be done by utilizing a megasonic bath in combination with supramolecular additives and other redox-active chemistries. Results indicate that megasonic conditions (i.e., time and power), soft cleaning chemistry structure (i.e., shape and charge), and the generation of ROS all play a critical role in cleaning efficacy under low-stress conditions.

Adam Caridi

Dr. Jason Keleher

21C Strategic Design of Antimicrobial Nanocomposite Surface Coatings for Sensing of Biological Contaminants

Graduate Student Project in Natural Sciences

Biomimetic nanocomposite systems have emerged as polymeric scaffolds that use cooperative relationships to enhance physiochemical properties for next generation biosensors. These composite systems can be synthesized from biopolymers (alginate, pectin, cellulose) to manipulate the highly ordered, three-dimensional network and natural properties for micro-reactor functionality. This work focuses on the design and characterization of a conductive biopolymeric coating for the electrochemical sensing of biological contaminants present on high-touch surfaces. Specifically, base polymers infused with photochemically prepared antimicrobial metal nanoparticles (MNP's) and functional additives will be employed as the scaffold coupled with secondary functionalization via metal-coordination assisted photopolymerization of conductive polymers (i.e., aniline, pyrrole). Results show an increased rate of bacterial cell death upon contact and conductive functionalization has shown uniform polymeric chain growth evident by enhanced charge transfer by 40 mA upon an applied voltage. Unraveling adsorption/desorption phenomena between high-touch surfaces and the carrier media is essential. Initial results show that this correlation between adsorption/desorption rates and surface texturing can provide insight into the adhesion force threshold. Furthermore, the kinetic results served as a foundation for advancing an electrically active antimicrobial nanocomposite biopolymer coating with a tunable surface topography to show site-specific responsivity in the presence of a biological contaminant. Results show that upon adhesion of a biological contaminant (mucin), an impedance change caused by the increased resistance from the adherent disrupted the resting potential and decreased the current output at the adsorption site. However, upon an applied voltage the contaminant was removed, and the potential returned to an equilibrated state.

Katey Sheets, Ian Deninger

Dr. Jason Keleher

24C Assessing and Improving the Accuracy of Machine Learning of Structure-Function Relationships Through Enzyme Mutagenesis Studies

Graduate Student Project in in Natural Sciences

In the past decade, the subject of proteomics has been a big area of interest across scientific disciplines. Understanding the structure-function relationships of proteins can give major insight to the importance of a protein to the organism it originates from. Collecting data on structure-function relationships can also give insight to how the amino acid sequence dictates protein folding, which can increase the accuracy of predictive AI protein folding programs. The Design2Data (D2D) project established by UCDavis gives a perfect avenue to the protein exploration process while also generating an avenue to introduce undergraduate students to research experience. The D2D project involves students in investigating structure-function relationships in enzymes through mutagenesis and collecting relevant data for the computational protein modeling and design communities. The D2D workflow has been well established for the enzyme BglB, with the collection of a large data set of experimental mutant protein trials. This collection of data can serve as a point of comparison to analyze the accuracy of predictive AI models that assess the effect of a sequence mutation on the protein's function. This study focuses on comparing point mutation effect predictions from Protein Predict that utilizes the SNAP 2 neural network predictive model to the experimental information collected from the Design2Data CURE to assess how accurate this prediction method is.

Nicole Staszak

Dr. Kari Stone

27C Effect of Structure to Promote Organic Residue Removal During Cu post-Chemical Mechanical Planarization (p-CMP) Cleaning

Graduate Student Project in Natural Sciences

As integrated circuit and logic devices continue to decrease, limiting induced defectivity during Chemical Mechanical Planarization (CMP) processes is imperative. Defects resulting from the CMP process can be classified as mechanical, chemical, or physiochemical according to the formation mechanism. Traditionally, a contact cleaning method implements a polyvinyl alcohol (PVA) brush to transfer cleaning chemistry to the substrate of interest and provides the necessary mechanical energy for defect removal. While this process effectively removes contaminants, its reliance on shear forces can induce secondary defect modes. One major challenge for the post-CMP cleaning of Cu substrates is the polymeric residue film comprised of BTA-Cu complexes that propagate during the CMP polishing process. The current mode to mitigate this residue defect is coupling brush-induced shear force with additives that promote interfacial redox reactions to remove residues through an undercutting mechanism. This work focuses on developing an additive structure-based approach that drives less aggressive interfacial shear at the brush/substrate interface. More specifically, α-β-unsaturated additives with diverse functionality will be tested to evaluate their efficacy to overcut the organic residue via a proposed aza-Michael addition reaction pathway. This overcutting mechanism relies on additional modes of interaction with the BTA-Cu polymeric residue film. A suite of dynamic techniques attempts to correlate the additive structure and reaction mechanism to organic residue removal efficiency and measured interfacial shear forces. Initial results have shown that implementing an overcutting mechanism will decrease the overall shear force and significantly reduce the generation of secondary defects without sacrificing overall defect removal efficiency.

Chloe Gordon, Adam T. Caridi

Dr. Jason Keleher

30C Correlation of Large Particle Counts within Nanoparticle Dispersions to Primary Defectivity Generation during the Chemical Mechanical Planarization Process

Graduate Student Project in in Natural Sciences

As integrated circuit (ICs) technologies advance towards sub-3nm regions, there is an increased risk of defectivity generation (i.e., scratches, nanoparticle debris, organic residue) from slurries used during the Chemical Mechanical Planarization (CMP) processing of the various substrates within device ready ICs. Standard slurries incorporate nanoparticle dispersions (i.e., Alumina (Al2O3), Ceria (CeO2), and Silica (SiO2) with various chemical agents (i.e., oxidizers, complexing compounds, etc.) to increase the slurry-substrate interfacial interactions for improved material removal rates (MRR). Unfortunately, this process of surface modification can allow for primary defects to propagate on the substrate and can cause total failure if incorporated into a device. Traditional methods of monitoring these dispersions tracks the particle size distribution (PSD) within the slurries themselves, with average PSD of CMP slurries ranging from 50nm to 250nm. Large Particle Counts (LPCs), typically formed in slurry as particle aggregations, can range in size from 0.5μm to 2.0μm and account for the principal component in defect generation. This work investigates the Large Particle Count (LPC) results of several widely utilized nanoparticle dispersions correlated to with the CMP performance on the corresponding substrate materials. Initial results show that as a function

of primary size, the overall LPC generation respond differently in the three nanoparticle dispersions, in which colloidal SiO2 slurries having the smallest LPC size with a highest overall count while the Al2O3 slurries having the largest sizes with the lowest overall count.

Joseph Powel

Dr. Jason Keleher

33C Optimization of Post Synthetically Modified MOFs to Enhance Photodegradation of Anionic, Catonic, and Zwitterionic Dyes

Graduate Student Project in Natural Sciences

Metal Organic frameworks (MOF) are porous inorganic structures that have recently been explored for different applications in catalysis. MOFs are excellent at facilitating guest-host interactions, but most MOFs have high band gaps and are poor conductors, making them unsuitable for photocatalysis. To combat these issues, post synthetic modifications (PSMs) can be added onto the framework of MOFs to alter their photophysical properties. In this study, modifications to a titanium-based MOF, MIL-125- NH 2 , were explored to enhance surface area, reduce band gap, and subsequently enhance photocatalysis. These modifications included the addition of a cocatalyst, ZIF- 67 and TiO 2 , to the surface of the framework. The post synthetically modified MOFs were characterized and investigated for enhanced surface area and reduced band gap using a surface area analyzer and Diffuse Reflectance UV-vis spectroscopy. Photodegradation of solutions containing cationic methylene blue, anionic phenol red, or zwitterionic rhodamine B dyes were conducted under simulated sunlight to test catalytic performance. It was found that MIL-125-NH 2 @ZIF67 was most effective at degrading the anionic dye phenol red compared to the MOF alone and TiO 2 cocatalyst.

Nolan Hooper, John Kurowski

Dr. Daniel Kissel

36C The Development and Characterization of Secondary Redox Modification to MOF-199 with Application to Water Remediation

Graduate Student Project in Natural Sciences

Metal organic frameworks (MOFs) are coordination polymers composed of metal ions linked by organic ligands that form porous centers, exhibit large surface areas, and are highly tunable. These characteristics make MOFs excellent at guest-host interactions, making them suitable candidates for storage, drug delivery, or even a selective filtration system. MOF-199 (or HKUST-1), a copper-based metal-organic framework, already demonstrates antimicrobial activity due to the copper ions embedded within the structure. This study focuses on the development, characterization, and application of post synthetically reduced MOF-199 and MOF-199 composite polymers. PXRD, IR, TGA, and SEM are techniques that were used to characterize the product. The characterization techniques proved that the reduction of MOF-199 by sodium borohydride yields spherical copper nanoparticles that are antimicrobial by nature. Methylene blue dye was used in this investigation to monitor the adsorption and desorption of the reduced HKUST-1 composite to evaluate the material's adsorption mechanisms and properties.

Kaitlyn Palmer

Dr. Daniel Kissel

39C Non-Pharmacological Acute Pain Management

Graduate Student Project in Nursing & Health Professions

Pain is an exigent topic for many people and a complex obstacle for healthcare organizations to attain. The patient's experience with pain is individualized and each patient is looking for diverse methods that fit their needs and lifestyle. Some advantages of providing non-pharmacological methods to patients for pain management is that there are fewer side effects, reduced risk of drug dependency, and lower healthcare costs. Taking a holistic approach to pain relief through aromatherapy, music, guided imagery, and/or distraction methods will not only benefit pain alleviation, but potentially increase autonomy for patients and staff, reduce opioid usage, decrease readmission rates, and decrease length of stay in the hospital. Best practices to incorporate the holistic approach is to employ a toolkit of complementary alternative methods (CAM) and provide patients with a comfort menu. The comfort menu allows the patient to be engaged in their pain care plan. This project focused on standardizing a process for non-pharmacological, alternative methods to assist in acute pain management for patients postoperatively. Project managers used a quality improvement process known as the Plan-Do-Study-Act (PDSA) cycle to implement various non-pharmacological methods via the nursing staff. Findings indicated an increase of nurses' comfort with the use of aromatherapy from 55% to 71.4% and music therapy from 60% to 71.4%. Results for organizational recommendation also suggested an enhancement in the patient experience when the target score of 80 was achieved. It is recommended that the healthcare organization add holistic, non-pharmacological methods to its current pain management workflow for continued success in improving the patient experience.

Raven Woodard, Agata Wojtyczka, Alexis Johnson

Dr. Michele Kramer

42C Teletherapy for Voice? It's Your Choice: A Scoping Review

Graduate Student Project in Nursing & Health Professions

Teletherapy for voice disorders has grown in use over the past 10 years. SLP services have required adaptation to modes of delivering therapy through changing times. The area of voice disorders as a whole, lacks extended research comparing the effectiveness of teletherapy to in-person services. A scoping review was completed to determine if patients participating in voice therapy received just as effective treatment via telehealth as compared to the in-person model within the past ten years. An organized search on PubMed, CINAHL, and Medline for articles focusing on in-person and teletherapy for voice disorders. 104 studies were yielded, eight were duplicates and 80 did not meet the criteria; resulting in 16 studies. The inclusion criteria includes: peer reviewed, published in English between 2013 and 2023, clients 18-64 years. Resulting studies were compared by the study titles, authors, date of publication, population, interventions, and results. The effectiveness of voice therapy via telehealth is equivalent to receiving therapy in person. This was measured by attendance, access to therapy, need for services, and patient outcomes. The number of clients seeking therapy did not necessarily change but there was an increase in teletherapy attendance. Environmental factors have increased the demand for telehealth services and the effectiveness of different voice therapies received positive feedback. Telehealth is as effective of a method for voice therapy delivery as in-person. Further studies should be conducted to analyze delivery with specific voice disorders through telehealth as well as the adolescent through geriatric population.

Lauren Colby, Kassidy Collins, Jaci McNeill, Lisette Rodriguez

Lisa Gardner, Dr. Mary Reynolds

45C Code-Switching: The Bridge Between Communication Breakdowns in Multilingual Aphasia

Graduate Student Project in Nursing & Health Professions

Aphasia is an acquired language disorder that can impair an individual's receptive and/or expressive language skills. Code-switching is the act of switching between languages in a single context. At this time, there is limited research to support the manifestation of code-switching in multilingual people with aphasia (MPWA) and what speech-language pathologists (SLPs) should consider when treating this population. The purpose of this scoping review was to examine the implications of code-switching on lexical retrieval, grammaticality, and semantic representation in MPWA. Using the Arksey and O'Malley (2005) guidelines, this scoping review used three databases (CINAHL, Pubmed, Proquest) to explore the literature. Articles that met the inclusion criteria included those that were published between 2000-2023 and were peer-reviewed, group or single-

subject design, and involving individuals 18 who were bi- or multilingual with aphasia. Exclusion criteria included articles that were published in languages other than English. The searches identified articles addressing the effects of code-switching on lexical retrieval, grammaticality, and semantic representation in bi-or multilingual adults with aphasia. All aphasia types and severities along with all languages were considered during article selection. A total of 2,024 articles were identified through an initial search, and 19 articles met the inclusion criteria. The research revealed that in MPWA, code-switching is used to enhance overall communication by supplementing anomic blocks, ungrammaticality, and speaking fluency. Code-switching occurs most frequently during the expression of function words compared to content words. Code-switching is found to be more prominent in an individual's less dominant language and when constrained to a single-language context. It is important to understand the nature of code-switching in MPWA, as it presents differently across individuals, and it is impacted by an individual's language dominance. In order to provide the most effective patient-centered care to MPWA, treatment must be done in the languages spoken by the individual.

Emilia Gladysz, Ruby Vasquez, Sharon Campos, Gisel Hernandez

Dr. Ann Guernon

48C Aspects of Pelvic Floor Therapy Influencing Quality of Life for Individuals who Experience Trauma

Graduate Student Project in Nursing & Health Professions

The purpose of this critically appraised topic is to determine aspects of pelvic floor therapy that influence the quality of life for trauma survivors in order to inform future occupational therapy practice. Researchers conducted a critical appraisal utilizing a systematic review of evidence relating to the current research question utilizing key search terms (i.e. 'pelvic floor', 'women's health', 'occupational performance', etc) and inclusion criteria of all articles had to be peer-reviewed and published between 2006-2023. Six articles fit inclusion criteria and were critically appraised for aspects of pelvic floor therapy that improve quality of life. Levels of evidence include one level 1, one level 4, one level 5, two level 6, and one level 7. The articles indicate that psychosocial interventions, occupation-based sessions, education, and skill-based interventions are effective in promoting quality of life. There is still minimal research in the field of pelvic floor therapy, limiting the availability of evidence relevant to the current research question. Further research is needed to strengthen the results of this study. However, there is moderate evidence that occupational therapists should focus on psychosocial interventions, occupation-based practice, education, and skill-based interventions for trauma survivors receiving pelvic floor therapy.

Jenna Beardsley, Kayla Quinlan, Hannah Tegtmeyer

Dr. Allison Richardson

51C Social Media and Chronic Disease Management

Graduate Student Project in Nursing & Health Professions

Statistics show 67.7% of males and 71.1% of females over the age of 55 are diagnosed with at least one chronic condition (CDC, 2015). Health education is imperative to learn self-management techniques to maintain an individual's wellness and prevent future complications. Despite healthcare provider education, many patients use social media to learn additional information about their condition. Social media creates a space for individuals to exchange information and self-management strategies in ways they cannot in the physical world. Social media increases the accessibility of health information, which benefits minority communities that encounter challenges in obtaining healthcare (Surani et al., 2017). Through a critically appraised topic, we aim to understand how social media influences the self-management of chronic diseases. Results of the study found that individuals with chronic conditions seek out individuals with the same condition to exchange knowledge, which may improve self- management of the disease (Patel et al., 2015; Smailhodzi et al., 2016). However, there is a risk of spreading misinformation that can lead to a worsening of the condition due to the lack of credibility that is required to post information on social media (Smailhodzi et al., 2016; Zenone et al., 2021). Therefore, social media can be an educational tool for health management, but higher-level evidence is needed to derive correlations between risks and benefits associated with the management of chronic conditions.

Francesca Persiani, Samantha Gould, Kelly Hyde

Dr. Eron Bozec

54C Pre- and Post- Injury Substance Use and Traumatic Brain Injury: A Scoping Review

Graduate Student Project in Nursing & Health Professions

The primary goal of this scoping review was to synthesize the wide range of available information regarding substance use and TBI. Individuals with traumatic brain injury (TBI) are more likely to engage in substance misuse. Individuals with a history of substance misuse prior to injury had a greater likelihood of relapse, especially during the first year of recovery. The effects of substance misuse on individuals with TBI must be researched to prevent relapse. Substance misuse prevention becomes part of the TBI recovery process. The objective is to identify correlations between substance misuse on brain injured patients. The severity of and recovery from the TBI was assessed based on pre- and post-injury substance use. Articles were searched through CINHAL Complete, Cochrane Central Register of Controlled Trials, Academic Search Complete, and MEDLINE Complete databases. The search yielded 950 prospective articles relevant to this study. Article titles and abstracts were analyzed via the following inclusion criteria: year of publication, human subjects, age, and documented substance use. A total of 12 articles met all inclusion criteria. Findings suggest substance use prior to injury increased the probability of a more severe TBI, however, survival rates were increased if a patient's toxicology reports showed positive levels of tetrahydrocannabinol (THC). There is a strong relationship associated with substance misuse after TBI compared to non-injured groups. It was found that substance use decreased within the first 4 months following TBI but gradually increased by the end of the first year. These results indicate a positive correlation with TBI and substance misuse. The severity levels of TBI were increased when toxicology reports showed high levels of alcohol. Mortality rates following TBI were decreased when individuals tested positive for THC. When patients had a positive history of substance misuse before the TBI, the likelihood of relapse was high within the first year of recovering from the injury.

Tessa Troike, Carrie Hosteny, Liz Thorsoj, Kelli Ferraro

Dr. Ann Guernon

57C Caregivers' Perspectives on Covid-19's Impact to Occupations and Well-being

Graduate Student Project in Nursing & Health Professions

As Covid-19 continues to impact the world, this critically appraised topic (CAT) research explores the impact that the pandemic has on caregivers' occupational balance, and how it has impacted their well-being and quality of life. To explore the impact, we used various search engines including the National Library of Medicine, Google Scholar, American Occupational Therapy Association, and the American Journal of Occupational Therapy. We then used inclusion criteria to explore articles using certain search terms such as caregivers, Covid-19, pandemic, children, stress, parent, anxiety, physical health, coping and more to find evidence on the impact that Covid had on caregivers. The timeframe of the studies used for this research are from 2021-2023. High evidence was found relating to an increase in anxiety and depression, leading to a decrease in the physical and mental health of caregivers. Additionally, it was found that Covid had affected caregivers' wellness, and created additional challenges while adapting to new roles and routines during the pandemic (Dellafiore et al., 2022; Rodríguez-Rabassa et al., 2023). Through these findings, we can gain a better understanding of the long-lasting effects of the pandemic on mental and physical health. OT practitioners can utilize this information to create relevant interventions to help caregivers prioritize and manage their overall health leading to improvements in their quality of daily life.

Kayla McLain, Sara Kulton, Bethany Keith

Dr. Megan Eads

60C Toward Consistency of Judgement In Pediatric Voice Evaluation: Establishing a Community Resource

Graduate Student Project in Nursing & Health Professions

Dysphonia is defined as a voice with abnormal characteristics. It can affect people across the lifespan, including about 30% of children. Dysphonic people may seek help from a speech language pathologist (SLP) to improve their voice quality. The gold standard assessment of vocal quality is subjective, meaning that there may be significant differences in how voices are perceived by different listeners. Consistency of subjective ratings can be improved through training, discussions, and more. This results in more universal agreement, and understanding, of the judgments of vocal quality. In order to achieve this, listeners - including students, novice, and experienced SLPs - need voice samples for training. There are some resources for adult voices, but not for children. The vocal qualities of children and adults are different, due to anatomy, as well as vocal changes that occur during puberty. This project aims to develop the world's first-ever pediatric dysphonia voice bank, consisting of voice samples collected as part of a separate, IRB-approved, research project conducted at Lewis. Voice recording procedures across participants were consistent, and the CAPE-V tool was used to assess the presence, nature, and severity of dysphonia. The voice recordings were rated independently by 2 SLPs with 10 years of experience in voice. Voices with 100% agreement on the presence, nature and severity of dysphonia will be included, as reference points for listeners to benchmark their perceptual judgments. This poster will outline the methodology that was used to establish the voice bank, as well as the proposed infrastructure, and user interface.

Mari Isabel Ilano

Dr. Victoria Reynolds, Kristin Scavo-Smith

63C Effectiveness of Occupational Therapy Interventions with Type II Diabetes Mellitus

Graduate Student Project in Nursing & Health Professions

The number of children diagnosed with Type 2 Diabetes Mellitus (T2DM) is increasing; however, there is minimal research that explores the impact of the diagnosis on effective interventions for this population. Client-centered and holistic occupational therapy (OT) interventions support this population to improve quality of life (QoL) and research has shown effective interventions for adults with T2DM. This critical appraisal will summarize current knowledge on effective OT interventions for children/young adults with T2DM to guide OTs on best practice. Search engines that were utilized include Google Scholar, the American Journal of Occupational Therapy, and PRIMO. Inclusion criteria were articles no more than 8 years old, work with children and/or young adults under age 18. Search terms were: children with type 2 diabetes mellitus; young adults with type 2 diabetes mellitus; type 2 diabetes mellitus; etiology of type 2 diabetes mellitus; occupational therapy and type 2 diabetes mellitus; occupational therapy interventions for type 2 diabetes mellitus; and type 2 diabetes and quality of life. Search resulted in 22 abstracts, with four meeting all inclusion criteria for critical appraisal by researchers. Articles include two level I randomized control trials, one level V case report, and one level V scoping review. Interventions within articles included routine management, health management, and lifestyle modifications. Evidence suggests that OT interventions of routine management, health management, and lifestyle modifications are moderately effective in improving QoL of children/young adults with T2DM. Future research is needed to confirm which interventions are most effective with this population.

Nora Brown, Hannah Evenson, Rachel Richter

Dr. Allison Richardson

66C Ultrasonic Sensors and their Efficiencies in Navigation

Undergraduate Student Project in Engineering, Computer Science, and Mathematics

The self-driving car market has been on the rise as seen by more and more competitors investing in their research and development. This raises the question, how does one of these cars navigate? Autonomous vehicles use digital maps as well as many different sensors to detect their surroundings to navigate an area. This experiment aims to understand how the sensors play a role in their navigation. In this project, an RC car is to be modified with sensors to navigate a maze that simulates an urban environment. The RC car will be coded to detect the walls of a maze and must execute directional changes based on the received data. The distance at which the Ultrasonic sensor detects the initial wall, the distance at which the car starts its turn, as well as the time it takes to get to a certain destination will be tested amongst three different sensors. These results will then be analyzed to determine which sensor is best for navigating the maze. Once the sensors have been characterized, the code is to then be optimized to create a shorter time to get to the destination providing a more efficient navigational plan.

Sean Coffey

Dr. Philip Chumbley

69C A Scoping Review: Cognitive Function Deficits Secondary to Chemotherapy Treatment

Graduate Student Project in Nursing & Health Professions

Chemotherapy as a treatment for oncology patients is investigated by many researchers; however, the presenting effects for specific domains of cognition are not fully known. The purpose of this scoping review is to better understand the extraneous factors that may affect cognition given chemotherapy treatment. A series of information was analyzed, such as the current literature for domains of cognition that were found to be affected, the types of cancers that produce more cognitive deficits, and which areas of the brain can be affected. To reach this objective, MedLine, Wiley, CrossRef, PubMed, and CINAHL-Ebsco were utilized to find relevant studies within the last 10 years that could potentially answer the research question. 4,123 articles were found and 14 articles were determined to be compatible with the following inclusion and exclusion criteria. Studies were required to be peer-reviewed, quasi-experimental designs conducted with adult participants who have undergone or currently undergoing chemotherapy, were English speakers, had a decline in their cognitive state related to chemotherapy, and included cognitive testing completed pre- and post-treatment. A full-text review was conducted across the 14 studies. There were different themes identified in the research. There were numerous self-reports of cognitive decline specifically within the breast cancer population as opposed to other types of cancer diagnosis. The domains of cognition most affected included memory, attention, and executive functioning. There were more subjective reports of decreased quality of life post-chemotherapy. This research suggests a strong positive correlation between chemotherapy treatment and cognitive status in adults. Memory and attention were identified as the primary cognitive domains consistently affected. There is a need for more evidence-based literature about identifying the underlying causes for successful treatment and intervention rehabilitation outcomes. Overall, research should be conducted to determine the relationship between cognition and external factors related to cancer treatment to gain further expertise for clinical decision-making.

Claudia Gonzales, Mya Amendola, Anna Sitar, Madison Tryner

Lisa Gardner, Dr. Ann Guernon, Dr. Victoria Reynolds

72C Improving Patient Fall Outcomes Through Learning From Near-Miss Fall Events

Graduate Student Project in Nursing & Health Professions

Falls are an ongoing problem in healthcare organizations. Many strategies have been tried to reduce patient fall rates and fall with injury rates. This DNP Project in will take a novel approach utilizing a sociotechnical human factors framework and a new post-fall debrief tool to improve patient fall outcomes by learning from near-miss fall events. The target population for this DNP Project in is hospitalized adults aged 18 years and older on medical and surgical units in a suburban Chicago acute care hospital. The study intervention is implementation of the Johns Hopkins Post-Fall Debrief Tool and interdisciplinary team debrief process. The desired outcome is to reduce patient falls by 10.5% and falls with injury by 17.3% over an eight-week intervention period.

Kerrie Samuelian

Dr. Eleftheria Karapas

75C Dentist & Caregiver Perceptions on Dental Visits for Children with Autism Spectrum Disorder (ASD)

Graduate Student Project in Nursing & Health Professions

The aim of our work was to identify caregivers and dentists' perceptions of dental visits for children with Autism Spectrum Disorder (ASD). Our goal was to identify common themes, problems, or strategies for dental visits for children with ASD. We hypothesized that parents and dentists would perceive dental visits for children with ASD negatively due to the change in routine and different sensory stimuli present within a dental visit. We also hypothesized that environmental modifications would be an effective strategy used. For our critically appraised topic we used search engines such as Google Scholar, EBSCOhost, AOTA, and AJOT to find current studies ideally within five years and maximum eight years which provide information answering our research question. We used search terms such as: dental experiences, children with disabilities, children with autism, caregiver perceptions, satisfaction of dental visits, and dentist perception. While the literature suggests the importance of OT within dental visits, it focuses on a narrowed scope and the specific population of children with ASD and limited studies with a broader scope of disabilities. Research shows that sensory-adapted dental environments and collaboration with parents improves dental experiences for children with ASD. This research emphasizes the importance of caregivers' perspectives on dental visits for children with ASD as well as identify supports and barriers and/or factors influencing the participation within dental visits. Through qualitative research this study can further identify areas OTs can address within sessions for dental visits and potential future collaboration with dentists.

Madeline Davis, Arianna Galetta, Cassandra Miller, Madelyn Tepe

Dr. Megan Eads, Dr. Allison Richardson

78C Occupational Therapist Perspectives of Including Spirituality into Practice with Clients Who Have Experienced Trauma

Graduate Student Project in Nursing & Health Professions

Many clients receiving occupational therapy (OT) have experienced trauma, requiring a trauma-informed and holistic approach. Spirituality based interventions are one way to implement this approach in OT. The aim of this study was to examine spirituality interventions from trauma survivors' perspectives.

A critical appraisal was conducted through systematic review of current literature utilizing Primo and the American Journal of Occupational Therapy databases for articles from 2000 - 2023. Search terms included spirituality, occupational therapy, and trauma. No articles were found to meet inclusion criteria of looking at trauma survivors' perspectives. Researchers approached the literature to examine use of spirituality within OT practice. Four of seven articles met all inclusion criteria and were selected for appraisal.

Levels of evidence included one level III, one level IV, one level V, and one level VII. Articles discussed a need for more education and research on utilizing spirituality within OT, as practitioners feel unprepared to implement spirituality from lack of understanding practical application. Spiritual interventions include praying, use of spiritual language, and discussing belief systems (Taylor et al., 2000). Spirituality was found to be unique to each patient and used as a coping strategy for trauma survivors (Miliken, 2020). Low evidence for inclusion of spirituality into OT practice for trauma survivors might inform the reasoning of no research on trauma survivors' perspectives of spirituality interventions. While more research is required, spirituality interventions can help individuals who have experienced trauma enhance their coping skills, improve occupational participation and individualized to client's needs, values, and beliefs.

Kamryn Hensley, Migle Skindaraite, Angela Flisk, Alissa Millar

Dr. Allison Richardson

81C Task-Oriented Home Training for Post-CVA in Minority Populations

Graduate Student Project in Nursing & Health Professions

Researchers from the American Heart Association state minority populations have a higher risk for cardiovascular accidents (CVA) compared to their white counterparts (Javed, et al., 2022). One activity-based intervention that supports upper extremity (UE) neuromotor motor recovery post-CVA is task-oriented training (TOT) (Rozevink et al., 2021). The purpose was to complete a literature review to critically appraise how TOT programs improve mild UE motor deficits post-CVA in minority populations.

Several databases were used to gather studies on this topic: PubMed, AJOT, EBSCO, National Library of Medicine, Primo, and NIM. 36 abstracts were reviewed to target studies that had TOT for minority populations post-CVA. Article inclusion criteria consisted of study participants identified as a minority population and participated in TOT. Excluded criteria included article publication greater than 10 years ago. Five articles were included due to the limited number of studies that included minority populations as participants. Results of the literature review concluded that TOT facilitates neuromotor recovery in the general population (Choi, 2022; Kuo et. al., 2022; Sabbah, et al., 2020); however, there is lack of research within minority populations and therefore limits the generalizability of TOT. Occupational therapy practice implications include practitioners should consider the feasibility and effectiveness of TOT due to a small sample size compared to the large population of stroke survivors with UE neuromotor limitations. Future research should include bringing awareness among occupational therapists of the lack of research on TOT within minority populations and determining the feasibility and effectiveness of TOT in minority populations.

Adriana Alvarez, Maricruz Robles, Bradley Foster, Samantha Newtoff

Dr. Eron Bozec

CONCURRENT SESSION 1

THURSDAY

1PM–2PM

AS-150-A

MODERATOR: Dr. Ryan Hooper

42 Synthesis and Characterization of Antimicrobial Nanoparticles Infused in Biopolymeric Nanocomposite Systems for Antimicrobial Applications

Graduate Student Project in Natural Sciences

Doherty Center for Aviation and Health Research

The current wound healing market is projected to reach $17.7 billion by 2027. However, drawbacks of current wound healing materials (i.e., cell adhesion, bacterial infection, antibiotic resistance, dehydration of the wound bed, etc.) continue to persevere. Hydrogels have risen as a promising candidate for these materials due to their intrinsic properties (i.e., swell, strength, modification). These non-cytotoxic, noncovalent materials can be synthesized from natural polymers (i.e., alginate, pectin, and cellulose) and multifunctional additives such as crosslinkers, amino acids and antimicrobial nanoparticles. The antimicrobial nanoparticles in this study were photochemically prepared by exploiting the band gap of TiO2 to reduce Ag and Cu onto the surface. The nanoparticles were incorporated into the alginate network to alter the scaffolding and provide functionality. Results show that upon incorporation of the nanoparticles there is an increased ordering of the network resulting in a more controlled swell and increased tensile strength. The nanocomposite also exhibits increased antimicrobial effectiveness within 5 minutes upon exposure to *E. coli* observed using an epi-fluorescent optical tweezer. This is due to the surface contact mechanism of bacterial cell death which is a direct result of Ag incorporated into the network. More specifically, upon surface contact, there is a localized pH gradient between the cell-nanocomposite interface releasing Ag or Cu ions that then initiate bacterial cell death through various mechanisms.

Katey Sheets

Dr. Jason Keleher, Dr. Mallory Havens

72 Comparison of Oxidizing Agents within Silicon Carbide Slurry Formulations for Chemical Mechanical Planarization

Graduate Student Project in Natural Sciences

Silicon carbide (SiC) has shown promise as a semiconductor material due to the intrinsic properties (i.e., high capacitance, thermal stability, and wear resistance) of the material. As a result, the Chemical Mechanical Planarization (CMP) process utilizes aggressive chemical conditions (i.e., strong oxidizers, redox active additives, etc.) and increasing shear forces to obtain the desired material removal rates (MRR) and surface quality. The CMP process employs functionalized slurries that use chemical agents (i.e., potassium permanganate (KMnO4), hydrogen peroxide (H2O2), etc.) to oxidize the surface of the SiC to SiO2, allowing for the abrasive nanoparticles (i.e., Alumina (Al2O3)) to remove the material more readily from the substrate surface. This presentation will cover current research that investigates H2O2 based SiC slurry formulations compared to KMnO4 slurries as competitive oxidative pathways for SiC-CMP. KMnO4 is used as an oxidizing agent over H2O2 due to its strong electrophilic nature derived from its Mn+7 center, which allows for it to participate in both adsorption and oxidation on the SiC surface. Initial results show that KMnO4 slurries generate a much higher MRR response when compared to H2O2 only slurries, with the KMnO4 slurries having baseline MRR of 2976nm/hr while H2O2 only slurries having a baseline MRR of 56nm/hr. The H2O2 slurries can simulate a MRR response similar to KMnO4 through the improvement of the interfacial interactions between the slurry and the SiC surface using redox active additives. Initial results have shown improved CMP performance although at significantly lower removal rate than KMnO4.

Joseph Powell

Dr. Jason Keleher

CONCURRENT SESSION 1

THURSDAY

1PM–2PM

AS-155-A

MODERATOR: Dr. Mike Cherry

29 Healthcare Sentiments on Firearm Safety Education in Prenatal and Pediatric Settings

Undergraduate Student Project in Education & Social Sciences

Summer Undergraduate Research Experience (SURE)

According to the CDC, nine children and teens are killed each week with a firearm. Though much attention is given to mass shootings and violence in communities, more often children are shot accidentally or with self-inflicted gunshot wounds, including suicides. With nearly 400 million firearms owned by civilians across the country, there are numerous opportunities for firearms to be left improperly secured. Primary prevention strategies suggest one way to prevent these unnecessary injuries and deaths is through primary prevention screenings and discussions in prenatal and primary care settings with families. The American Association of Pediatrics states that firearm safety is a primary concern of doctors, yet evidence shows that the actions necessary to indicate this importance do not occur with individual doctors. As part of the Firearm Safety Education in Prenatal and Pediatric Settings study, we conducted interviews with healthcare workers ranging from perinatal educators to pediatric emergency room doctors and primary care doctors. Findings from these interviews highlight the many opinions of healthcare professionals on this topic, ranging from concerns about its political nature to doubts about parents feeling comfortable discussing it during appointments. While patients receive limited educational resources, healthcare professionals recommend implementing policy changes and recognizing the severity of firearm injuries in children. The issue from the perspective of healthcare providers is hyper-local with professionals making their own decisions, without considering the thoughts of parents.

Daisy Collazo

Dr. Hannah Klein

32 Parental Sentiments on Firearm Safety Education in Prenatal and Pediatric Settings

Undergraduate Student Project in Education & Social Sciences

Summer Undergraduate Research Experience (SURE)

Firearms have become the number one cause of death for youth in America. Primary prevention strategies suggest one way to prevent these unnecessary injuries and deaths is through primary prevention screenings and discussions in prenatal and primary care settings with families. As part of the Firearm Safety Education in Prenatal and Pediatric Settings study, Illinois parents participated in an online survey to collect their opinions regarding firearm safety education in these settings. Findings indicated that parents reported a lack of firearm safety being mentioned in healthcare settings, yet a majority expressed their comfortability with such topics being discussed. While parents are receptive to firearm safety education, many expressed they do not believe their healthcare provider is sufficiently educated in the subject to do so. Overall, the findings have highlighted the need for more education for all healthcare professionals to learn about firearm safety to better assist families and provide reassurance to healthcare providers that this is information that families would like shared with them.

Julianna Henrichs

Dr. Hannah Klein

53 A Content Analysis of Published Firearm Safety Education in Prenatal and Pediatric Settings

Graduate Student Project in Education & Social Sciences

Summer Undergraduate Research Experience (SURE)

The American Academy of Pediatrics (AAP) has long stated that firearm safety is a priority for pediatricians and doctors working with families. Illinois's AAP highlighted gun violence and firearm safety as the biggest health risk for youth here in Illinois at their 2023 conference. Through interviews and surveys, research findings suggest that doctors do not share information directly with patients, though. The support for firearm safety education and action has not trickled down to on-the-ground efforts for those that meet with children and their families directly. This research has sought to identify whether or not healthcare systems have shared safety information with the families they serve in any accessible ways. Through a content analysis of baby safety books offered by healthcare systems across the state, this research has found that most healthcare systems do not highlight firearm safety in their safety guides, and when firearms are listed, the information is rarely best practice. This research seeks to highlight the means with which firearm safety information is shared with families and whether that information is considered best practices. In addition, this research seeks to identify practical policies and actions that healthcare systems can take to educate families.

Jakub Kmiecik

Dr. Hannah Klein

CONCURRENT SESSION 1

THURSDAY

1PM–2PM

AS-156-A

MODERATOR: Dr. Megan Eads

62 Analyzing Seasonal & Event-Based Trends in Email Phishing Targeting Universities to Improve Security Awareness Training

Graduate Student Project in Engineering, Computer Science, and Mathematics

Phishing is a cybercrime where attackers deceive individuals into revealing information through fraudulent emails. Rising use of generative AI for crafting sophisticated phishing attacks has posed a serious threat to many organizations. For universities, dynamic academic settings can make it challenging to update security training and effectively schedule distribution of materials to educate the university population on the latest threats. In response to this issue, this project aims to analyze a corpus of university phishing emails with natural language processing (NLP) techniques to identify common annual recurring patterns and any other unique event-based triggers. Research began with building a series of web-scraping scripts to gather up-to-date phishing examples from 13 universities which was combined with an existing corpus making a total of 15 unique universities. Once data is processed, NLP techniques such as keyword extraction will be applied to analyze and categorize prevalent phishing themes and tactics. The categorized data can then be mapped against a year-long timeline and compared with university calendar events to discern seasonal trends. Additional comparison across a longer period may reveal major event triggers like global health crises and geopolitical conflicts. Example training material will be created to accompany the project based on observed trends. The findings are intended to inform the distribution timing and content of security awareness materials within university settings. Aligning distribution of updated training materials to identified peak phishing periods can ensure that awareness is heightened when the risk of being targeted by phishing is greatest.

Jocelyn Murray, Provance Jade

Dr. Ray Klump, Dr. Rami Khasawneh

118 Bridging the Gap: A Comparative Analysis of Operational Technology (OT) and Information Technology (IT) Datasets in Machine Learning

Graduate Student Project in Engineering, Computer Science, and Mathematics

This research delves into the challenges associated with processing and analyzing Operational Technology (OT) data compared to Information Technology (IT) data in machine learning contexts. We explore the inherent differences between OT and IT datasets, focusing on factors like data structure, noise characteristics, and stationarity. Through experimentation, we investigate the complexities encountered when applying machine learning models and conducting dimensionality reduction techniques on both types of data. Our study assesses the presence of noise and the stationarity of time series data, crucial for understanding model performance and generalizability. We examine the implications of these challenges on the effectiveness of machine learning algorithms, highlighting the need for tailored methodologies to accommodate OT data intricacies. By systematically comparing OT and IT datasets in the realm of machine learning, our research enhances comprehension of the unique obstacles in handling operational data. Our findings aim to inform the development of more robust approaches for leveraging OT data in industrial applications, fostering improved efficiency and reliability in complex systems.

Sai Sree Koneru

Dr. Jake Cho

CONCURRENT SESSION 1

THURSDAY

1PM–2PM

AS-157-A

MODERATOR: Dr. Anne Rapp

36 Synthesis and Analysis of Defective Zr(IV)- and Ti(IV)-Based Metal-Organic Frameworks for Photocatalysis

Undergraduate Student Project in Natural Sciences

There is a pressing need for efficient and green production of fuel sources that has increased research interest in solar-based energy technologies. One area that has attracted a great deal of interest is solar water electrolysis for hydrogen production using technologies such as Photoelectrochemical cells (PEC). Unfortunately, low solar-to-hydrogen (STH) efficiencies and higher material costs have limited the practicality of these technologies. Designing an effective photocatalyst for PEC could optimize STH to be cost-competitive in the energy sector. Metal-organic frameworks (MOFs) are unique materials of interest being explored for their wide range of applications because their porosity and high surface area can be exploited for chemical separations and catalysis. Incorporating water-stable MOFs with modifications that enhance photoreactive properties could be useful in the photocatalysis of water splitting in PEC. The introduction of structural defects is one unique way to impart modifications in a cost-effective manner. All MOFs are susceptible to structural defects, but these defects can actually improve stability, adsorption, and catalytic activity. Using formic acid, acetic acid, and temperature as modulators, defects states were introduced to UiO-66-NH2 and MIL-125-NH2 to explore their effect on photocatalytic properties. Preliminary data shows an increase in photo reactivity as a result of increasing modulator concentration in UiO-66-NH2 and MIL-125-NH2.

Emily Pearce

Dr. Daniel Kissel

65 Targeting Persistence: Case Studies Reveal Strengths and Challenges in Chemistry and Biochemistry Undergraduate Student Development

Graduate Student Project in Natural Sciences

Student mindset and identity play a significant role in STEM persistence. On average, half of STEM majors leave their program without earning a degree, many within the first two years of study. Qualitative analysis of surveys and self-reflection writings of under- and upperclassmen in the chemistry department at Lewis revealed traits in upperclassmen that were not thoroughly established in underclassmen. These traits include shifts towards growth mindset, more developed STEM identity, embracing challenge, and recognizing value in learning from failure. This points to existing strengths within the department, such as undergraduate research experiences, as well as targets for future interventions to improve these traits earlier in the students' university careers with the hope of increasing persistence.

Alec Werner

Dr. Teresa Bixby

126 Application of Post Synthetically Modified Metal Organic Frameworks for Photocatalysis and Hydrogen Evolution

Graduate Student Project in Natural Sciences

Metal Organic Frameworks (MOFs) are inorganic structures with high porosity and have many applications for photocatalysis. Titanium based MOFs such as MIL-125-NH2 are especially interesting for their potential in hydrogen evolution reactions in photoelectrical chemical (PEC) cells. These MOFs are also tunable with post synthetic modifications to enhance properties such as surface area, band gap, and photocatalytic efficiency. With modifications such as Ni2P and Black TiO2, it is more possible to increase the effectiveness of the MOF to generate hydrogen in photocatalysis. Other modifications such as ZIF67 will increase the surface area and allow our MOF to photodegrade anionic dyes. The MOFs were characterized with techniques such as IR spectroscopy, BET surface area analysis, PXRD, and band gap analysis. Experiments were done to measure photocatalytic efficiency and degradation of cationic, anionic, and zwitterionic dyes with post synthetically modified MOFs. Preliminary experiments were also conducted to measure photocatalytic hydrogen production using a cost-effective water displacement apparatus and using a cost-effective PEC cell apparatus.

John Kurowski

Dr. Daniel Kissel

CONCURRENT SESSION 1

THURSDAY 1PM–2PM

AS-158-A

MODERATOR: Dr. Mark Schultz

83 Shakespeare Studies: Shakespeare on the Human Body

Undergraduate Student Project in Humanities & Communication

The perspective that many people have on the idea of disability is something more fluid than one might expect. What one might consider being disabled can be completely different from someone else who has either direct, indirect, or no experience in the realm of disabilities. My essay wants to find the link between the early Shakespearean views on disabilities and the virtues found in Roman literature. I believe throughout his works such as "Coriolanus", Shakespeare is trying to get our perception of the human body, which can make us feel an assortment of emotions that can be considered nonexistent. However, in the modern day, it not only fails to reflect on the experiences of disabled people but also implicitly draws on the disabled body to articulate the limited conditions of what a majority of society would consider freedom. My hope looking at this can help us re-shape our minds and to see if Shakespeare's idea says anything about the longer we rationalize these ideas about disability, they only reflect that. Dealing with studies conducted by Rachel Sanders, and Mardy Philippian, found that not thinking in such ways that early literature is more in touch than we are. Potential teaching more of these texts mainly how they portray the human body might help highlight the reflections that Shakespeare has shared regarding the human body. If only it makes us think about our reflection on disability and how that bleeds into our expectations for it and for people who we consider disabled.

Jovaughn Williams

Dr. Mardy Philippian

97 Shakespeare Studies: The Use of "Coriolanus's" Body in Society and Politics

Undergraduate Student Project in Humanities & Communication

For thousands of years, human variation was seen as something that should be fixed, rather than studied. Today, our society still succumbs to the thought that human differences should be fixed, rather than make accommodations to such variations. Shakespeare's "Coriolanus" uses the titular character's disabled body to symbolize the struggles he encounters within different realms. In my essay, I examine two different realms in which "Coriolanus" encounters struggles. The first realm I explore is the societal realm, where "Coriolanus's societal status and rigid personality affect his ability to connect with the people of Rome. The second realm I examine is the political realm, where his body is used to coerce the people of Rome to support "Coriolanus's political contributions. Through both of the realms, I dig deeper into how the political, societal, and maternal aspects of "Coriolanus" ultimately leave him mentally challenged and incapable of creating relationships with others. Alex Equestri notes that some individuals experience a different type of liminal disability that seems "invisible" to others. Both Equestri's work and the other primary sources have pointed towards the "invisible" disability in which "Coriolanus" possesses.

Tess Spacil

Dr. Mardy Philippian

98 Shakespeare Studies: Representation of Disability in Shakespeare's "Coriolanus"

Undergraduate Student Project in Humanities & Communication

The incorporation and inclusion of disabilities is not a new concept in today's society, but rather has been done to some degree and extent within the English renaissance including with Shakespeare in the late sixteenth-century with his plays. Specifically, a play that he wrote later in his career, "Coriolanus", where in a subtle way the difficulties involved with having a disability are portrayed by the main character and the receiver of the tragedy, "Coriolanus". In this essay, I use multiple sources that dive into the details of how disability is represented in Renaissance literature in order to elaborate further on how Shakespeare's "Coriolanus" raises questions of disability during that time period. While "Coriolanus" is not a likable character and is portrayed as self-centered and prideful, that doesn't mean that his disability is any less prevalent which is what I use my essay to explain. Despite disability having some representation in this time period of literature, it does fail to recognize that not all disabilities are physical and some in fact are truly hidden.

Catherine Fatigato

Dr. Mardy Philippian

105 Shakespeare Studies: "Coriolanus" Impaired Pride

Undergraduate Student Project in Humanities & Communication

Using the term "impairment" to refer to a disability is at most times offensive because people with disabilities do not believe that they are impaired. Rather, society labels them as so and sets itself up in a way that restricts these individuals from living their lives with the same ease as people without disabilities would. Disability as a concept has roots that date back to the sixteenth and seventeenth centuries, yet is incorrectly perceived as a universal vulnerability or setback by the majority of people. The term "normal" is an off-putting term because it suggests that difference is abnormal and disruptive, yet the people experiencing these differences would disagree with this verdict. They would fail to feel different if they were never outcasted by society in the first place because all individuals are inherently different. In this essay, I use a disability studies approach to explore disability within the context of Shakespeare's tragedy and "Coriolanus". I use the word impairment in sarcastic reference to the character "Coriolanus"' pride because it is a flaw subjected by the character to the character, and it takes form as a result of his physical disability. I explore "Coriolanus"' pride through disability theory in Shakespearean studies and I particularly reference scholars like Alice Equestri, David Wood, Eve Rachele Sanders, Zvi Jagendorf, and Tobin Siebers to supplement my claims about the intersectionality of pride, identity, and societal expectations through "Coriolanus"' refusal to reveal his wounds and "impaired" body and the moral dilemmas that arise from his decision.

Lama Abdelhamid

Dr. Mardy Philippian

107 Shakespeare Studies: The Common Human Disability of Lacking Empathy: From the People of Rome for the Tragic Hero "Coriolanus"

Undergraduate Student Project in Humanities & Communication

In ancient Rome, the practice of showing off one's wounds as marks of valor was common tradition to gaining political power and a right of passage. However, in my essay on disability in "Coriolanus" I discuss the Roman people's expectations of "Coriolanus"' abilities, from his time as a soldier, and his human form demonstrate the human disability of lacking proper empathy to make "Coriolanus"' experiences equitable to those who have not served Rome to the same extent when championing their political campaigns. This can be seen through the expectations demanded of him, his name bearing both the weight of his accomplishments, the expectations of the people of Rome, and prophesied the outsider and betrayal that will come of him, the lack of empathy towards his asking for modesty and respect, the possible implications of his mental health, and the overall expectations and treatment of "Coriolanus" throughout the play.

Hannah Smrcka

Dr. Mardy Philippian

CONCURRENT SESSION 2

THURSDAY

2:15–3:15PM

AS-150-A

MODERATOR: Stephen Sherwin

70 Chemical Activation of Polymeric Media for Applications in Chemical Mechanical Planarization

Graduate Student Project in Natural Sciences

As integrated circuit and logic device feature sizes approach the 3-nm node, limiting induced defectivity during the Chemical Mechanical Planarization (CMP) and p-CMP processes is critical to advance integration schemes. According to the formation mechanisms, these defects can be classified as mechanical, chemical, or physiochemical. A post-polishing cleaning step is employed to combat defects on the wafer surface. This work emphasizes defect control via the post-synthetic modification of polymers that alter the kinetic/thermodynamic processes at the substrate interface. More specifically, these synthetic alterations to the base material properties will modulate the interactions present at the material/substrate interface, resulting in a lower-stress environment. Initial results have shown that the surface functionalization of these polymers is achievable and ultimately leads to a more chemically active environment. Additionally, a crucial component in the CMP process, that is susceptible to surface functionalization, are nanoparticles (NPs). In the system, NPs are introduced as a transient species during the polishing process that serve as abrasives and enhance the chemistry transport to the substrate. This work focuses on the surface functionalization to enhance chemical transport and increase chemistry/substrate interactions. Preliminary results have shown that the NPs increase the electrochemical activity at the substrate/pad interface when integrated into the slurry.

Adam Caridi

Dr. Jason Keleher

CONCURRENT SESSION 2

THURSDAY

2:15–3:15PM

AS-155-A

MODERATOR: Dr. Ann Guernon

17 Communicatin' 9 to 5: Navigating Employment Using Augmentative and Alternative Communication and Opportunities for Inclusive Employment

Graduate Student Project in Nursing & Health Professions

Individuals who use augmentative and alternative communication (AAC) are routinely screened out of job interviews. Despite the capability and desire of many individuals who use AAC to be meaningfully employed, 85% of individuals who require AAC are unemployed. This scoping review aims to investigate the workplace and work-related experiences of AAC users, including issues pertaining to securing and maintaining employment in the open marketplace. Data were collected through a systematic search of articles from CINAHL, Google Scholar, EBSCOhost, and cited reference searching. Qualitative research, surveys, and case studies were included in the selection of articles. A total of 14 articles were appraised for this scoping review. The researchers found that AAC users obtained more than 50 different types of employment positions that ranged from jobs in customer service, health care, business administration, and volunteer positions. However, there was limited data disclosing their salary or wages. Qualitative data represented the experiences of individual AAC users in the workplace and revealed the challenges faced in the search for inclusive employment. The current literature on the employment experiences of AAC users remains limited. Even among the available research, wages were not explicitly discussed and most of the literature failed to divulge wages at all. This suggests that advocacy and education related to AAC and the use of high-tech methods that are used to communicate are imperative for employment opportunities and outcomes.

Ariana Bermudez, Magdalene Bandyk, Allison Coulson, Demenica Gomez

Dr. Victoria Reynolds

19 We Actually Don't Have Ways of Making You Talk: Encouraging Production of Vocal Targets in Running Speech Sampling

Graduate Student Project in Nursing & Health Professions

Summer Undergraduate Research Experience (SURE)

Speech samples are essential when conducting pediatric voice and language evaluations. Currently, the means of acquiring speech samples in voice evaluations may not provide adequate length to make valid and reliable judgments regarding vocal qualities. Discourse sampling practices are used to assess pediatric communication skills. It is unclear whether such tasks are representative of everyday voice use. As part of a larger project, this study aims to analyze the McDonald's Story, from the Test of Narrative Language. The aim is to investigate the likelihood that children will produce a vocal target, following a model. There were 43 participants. The first author transcribed and analyzed narrative retell tasks using the examiner protocol and a count of target yield produced following the prompts outlined in the examiner's manual. There was a large individual variation in percent yield. When characterized by story elements, factors motivating action being the lowest (44.19%) and settings/characters being the largest (72.09%). Actions were 63.72%, and consequences a yield of 61.63%. It is hypothesized that the reason setting/characters have the largest yield is due to saliency, and simplicity. Setting and characters are the most basic story elements. As the story progresses, it becomes more cognitively complex. For example, even though the initiating event was semi-consistently present, the character's internal response was rarely present. These data will be used to inform the development of a story stimulus for use in pediatric voice evaluations, with a focus on loading desired vocal targets into the simpler story elements.

Isidro Galvez

Dr. Victoria Reynolds, Dr. Kristin Scavo-Smith

68 Should Speech-Language Pathologists Leave the Sideline and Team Up with Executive Function Coaches?

Graduate Student Project in Nursing & Health Professions

Executive Function Coaching (EFC) is a growing service being recommended for students with ADHD. The observed deficits of ADHD fall under the executive function umbrella in the field of speech-language pathology when an impact on cognitive communication and language is present. The aim of EFC is to increase a person's participation and efficiency in daily life by helping the individual to utilize compensatory strategies to improve their attention, organization and planning, and self-management skills. The prevalence of ADHD within adolescence is a growing concern: nearly 10% of children (aged 3-17) are diagnosed with ADHD and experience various deficits relating to inattention, impulsivity, and hyperactivity. A scoping review into the evidence base around executive function coaching, and speech-language pathologist directed intervention, for speech and language sequelae of executive function deficits in ADHD was conducted. Five articles met inclusion criteria to include within this scoping review: 1 within EFC literature and 4 within SLP intervention literature. The main themes within the EFC literature explicitly pertained to EFC and its application. The main themes within the SLP intervention literature pertained to the implicit treatment of EF deficits in the realm of language impairments (e.g., working memory), knowledge of EF, and comfortability treating EF. There was no research found on SLP direct intervention for EF. There is an overall lack of research within the field of speech-language pathology. However, EF deficits fall explicitly within the SLP scope of practice under the cognitive communication domain. Despite this, there is a lack of evidence for the efficacy of intervention for speech and language sequelae of EF in ADHD. SLPs should begin to make advances in this area to establish an evidence base for such interventions.

Grace Petersen, Cassidy Peterson, Briana Discipio, Bridget Olu-Alabi

Dr. Victoria Reynolds, Dr. Carol Szymanski

CONCURRENT SESSION 2

THURSDAY

2:15–3:15PM

AS-156-A

MODERATOR: Dr. Hannah Klein

47 Impartial Geodetic Games on Graphs

Undergraduate Student Project in Engineering, Computer Science, and Mathematics

Summer Undergraduate Research Experience (SURE)

Throughout history, many mathematical fields, such as linear algebra, trigonometry and even calculus, were proven to be essential when it comes to game development since they are used to improve crucial components of these games such as optimization or discovering winning strategies. In this research, we explore winning strategies for two new variations of the impartial geodetic games played on connected graphs that were first introduced by Buckley and Harary which they named as the achievement and avoidance games. First, an impartial game is a 2-player game in which the possible moves are the same for each player in any position and no position can be visited twice. We play our combinatorial games on graphs; a geodesic on a graph is the shortest path between two vertices, and the geodetic closure of a set is the set of vertices contained on geodesics between all pairs of vertices in the set. Both games proceed as players alternate choosing vertices on the graph, and in the original games, the geodetic closure is computed after each turn. In our new games, we look at the vertex-set geodesic, which is the union of the set and the shortest path between the vertex and the set. We solved these new games on the following graphs: paths, complete, complete bipartite, cycles, and wheel graphs.

Laila Mahrat

Dr. Marie Meyer

76 Mathematically Modeling the Immune Response of Celiac Disease

Undergraduate Student Project in Engineering, Computer Science, and Mathematics

Celiac disease is a hereditary autoimmune disease that affects approximately one in 133 Americans. It is caused by a reaction to the protein gluten found in wheat, rye, and barley. After ingesting gluten, a patient with celiac disease may experience a range of unpleasant symptoms while small intestinal villi, essential to nutrient absorption, are destroyed in an immune-mediated process. The only known treatment for this disease is a lifelong gluten-free diet and there is currently no drug treatment. This work uses a system of ordinary differential equations to track changes in small intestinal cell densities. The model can be used to investigate and analyze the immune response by focusing on understanding the dynamics of the small intestine in situations mirroring healthy function and celiac disease. By doing so, we can investigate potential therapies to mitigate the negative effects of celiac disease.

Olivia Adamic

Dr. Cara Sulyok

CONCURRENT SESSION 2

THURSDAY

2:15–3:15PM

AS-157-A

MODERATOR: Dr. Anne Rapp

35 Using an Electrochemical Deblocking Step in ASO Synthesis to Produce Quicker and Higher Yields of Oligonucleotides

Undergraduate Student Project in Natural Sciences

Machado Joseph Disease is an autosomal dominant genetic disease caused by excessive glutamine repeat in the Ataxin protein. To treat the repeating protein, oligonucleotides are synthesized that act as primers to create new strands of DNA or RNA to correct the genetic sequence causing the disease. The conventional synthesis method requires a five-step approach, using phosphoramidites anchored to solid supports. Deblocking is the first step of this cycle, where the phosphoramidite blocking agent is chemically removed. Traditionally, dichloroacetic acid in methanolic acid is used to remove the blocking group, N, N-Dimethyltryptamine, and replace it with a reactive alcohol group. The efficiency of the deblocking step can vary depending on a variety of factors including the amount of experience the experimenter has, the purity of the reagents, and the amount of time needed for the reaction. Using an electrochemical deblocking step, however, limits the number of factors by delivering the acid to a specific region on the Phosphoramidite thereby directing nucleotide addition at a chosen site. Creating a more direct addition allows for more precise synthesis resulting in higher yields and more complex oligonucleotide chains. This work reports the synthesis and characterization of a novel ASO synthesized using an electrochemical deblocking step.

Austin Rockaitis

Dr. Daniel Kissel

48 Biochar as an Amendment to Improve Microbial Activity in Soils

Undergraduate Student Project in Natural Sciences

Biochar is a sustainable solution to increase soil health and productivity that can address extensive soil degradation issues due to the combined effects of pollution, climate change, and the use of agrochemicals. The purpose of this experiment was to determine the effects of biochar on microbial activity and plant growth in agriculturally relevant plants. Two separate experiments using sterilized and unsterilized soil from the campus prairie plot were utilized to grow three different crop types: cilantro, onion, and lettuce, in the presence or absence of student-made biochar. After 12 weeks of growth, plants were removed and weighed. Soil samples were collected for EcoPlate analysis and plate counts were performed. There were weeds in every treatment of unsterilized soil, which may have affected the results, as germination in sterilized soils had greater germination rates than unsterilized soils. The microbial activity of the initial soil was similar to the observed activity of all treatments at the end of the experiment. The plate counts did not indicate any differences in microbial densities among biochar and soil treatments, but there was a significant difference between plant types. EcoPlate analysis did not indicate any significant differences in treatments with biochar additions. The literature supports biochar as an amendment for degraded soil; however, the soils utilized in this study were collected from a prairie plot which may have been too fertile. Future studies will utilize soils that better reflect the properties of the degraded soils in Colombia.

Jenna Staszewski, Alex Krupa, Angelina Martinez

Dr. Jerry Kavouras

61 Antimicrobial Properties Osage Orange Fruit Extract

Undergraduate Student Project in Natural Sciences

Doherty Center for Aviation and Health Research

Numerous bacterial pathogens are associated with resistance to routine antibiotics commonly administered in treatments. Studies have shown that the natural products found in the fruit of the Osage orange tree *(Maclura pomifera)* exhibit antimicrobial properties. The purpose of this study was to investigate the degree to which extracts from the Osage orange fruit inhibited microbial growth. Extracts were prepared by pulverizing the orange into a paste and then using a standard ethanol extraction protocol. Various concentrations of extract were added to tubes of sterile TSB, which were inoculated with 100 uL of selected species of microbes, including Gram positive and Gram negative bacteria. After 18 hours of incubation at 37°C, the turbidity of the samples was measured using a spectrophotometer. Overall, samples of microbes inoculated with a higher concentration of extract generated lower absorbance values, which resulted in lower turbidity due to the inhibition of microbial growth. This indicated that an inverse relationship existed between turbidity and extract volume. On average, concentrations of 1.33% extract were the most effective. Gram-positive bacteria, including multiple species of *Staphylococcus*, two Gram-negative species, *P. putida* and *E. coli*, and a fungus, *S. cerevisae*, all displayed similar trends. In conclusion, the extract obtained from the *Maclura pomifera* fruit has shown appreciable antimicrobial activity against select Gram-positive species, as well as several Gram-negative species and fungi.

Ashley Miller, Maciej Zalinski

Dr. Jerry Kavouras, Dr. James Rago

CONCURRENT SESSION 2

THURSDAY

2:15–3:15PM

AS-158-A

MODERATOR: Dr. Mike Cherry

69 Debating the Ethics of Theranos

Undergraduate Student Project in Business

In this panel discussion, senior Business Administration students will discuss the ethical challenges contributing to the collapse of Theranos. A historical overview of the company and founders (Elizabeth Holmes) will be provided, and students will debate the following topics.

- What were the main failure points and who is most accountable for the failure of Theranos?
- Which ethical perspectives could have prevented these problems?
- Which procedures or programs would have helped the most?
- Are there unique risks in introducing new technologies to the public and if so, what are the moral principles governing the imposition of such risks?
- Do any laws, regulations, systemic procedures and/or industry norms need to be changed to prevent this in the future?

Annabella Zambrano

Dr. Elizabeth Belgio

CONCURRENT SESSION 3

THURSDAY

3:30–4:30PM

AS-150-A

MODERATOR: Kayla DeCant

44 Analysis of CURE Survey Data During Online Instruction

Graduate Student Project in Natural Sciences

Lewis University implemented a semester-long course-based research experience (CURE) in general chemistry lab in the two years prior to COVID. With the COVID-19 global pandemic came many challenges to laboratory teaching. At Lewis University all curriculum transitioned to online learning to combat potential spread of the virus. This new approach limited the extent to which students could engage in research at that level. However, elements of a research experience were still incorporated into the online curriculum. To compare the impact of the online curriculum to the pre-COVID experience, Lopatto's CURE survey was administered in the spring of 2021. Students reported lower gains than pre-COVID, but responses remained either statistically similar or better than benchmark data. Several scaled-down yet impactful strategies for engaging students in research practices can be identified.

Matthew Kubacki

Dr. Teresa Bixby

101 Lewis University International Student Help

Graduate Student Project in Engineering, Computer Science, and Mathematics

This project seeks to centralize crucial information for the success of students at Lewis University, focusing on the challenges faced by international students, such as expensive accommodation and limited transportation in Romeoville. The objective is to create a comprehensive database encompassing housing, transportation, employment, and essential resources to empower students and facilitate seamless integration into university life. The proposed system aims to collect data directly from students through online forms and surveys, supplemented by information from online directories like Google Business and Yelp for details like health insurance. Benefiting a diverse user base, the database serves those seeking housing, transportation services, and connections with peers sharing similar schedules. It streamlines access to resources, fosters a sense of community, and encourages collaboration, ultimately contributing to a positive student experience. The implementation involves a user-friendly application with distinct sections for housing, transportation, course registration, and extracurricular activities. This platform allows easy access to relevant information, peer connections, and advice sharing through messaging systems or forums. The integrated approach aims to enhance the overall student experience, simplifying the navigation of academic and personal aspects of life at Lewis University within a concise and efficient framework.

Bharath Kumar Tella, Vidhyasagar Janga, Purna Chandra Raju Pallapati, Vathsalya Vailla

Dr. Young June Kim

CONCURRENT SESSION 3

THURSDAY
3:30–4:30PM

AS-155-A

MODERATOR: Stephen Sherwin

51 Law Enforcement Perceptions of Co-Responder Programs

Undergraduate Student Project in Education & Social Sciences

Co-responder programs are a fairly new initiative where a trained mental health clinician works with law enforcement officers to respond to mental health calls. The goal of these programs are to reduce the incidence of arrest, injury, or death to an individual having a mental health emergency. In 2019, the first co-responder program was initiated in Orland Park, IL in partnership with Trinity Services. Since then, 5 additional departments have developed their own teams to work with Trinity Services' mental health professionals. While these departments collect significant data on the interactions with community members, there has been no data collection about the feelings of the law enforcement officers who partner with Trinity to identify training and implementation improvements. For this research, I had the opportunity to interview several individuals about the creation of the partnership and their experiences to answer these gaps in the research. This study aims to get the opinions and sentiments of law enforcement officers to assess their attitudes towards the training, the partnership, and the challenges of the program. I conducted focus groups with officers to understand their perspective of the collaboration with Trinity Services in response to mental health calls.

Sarah Bourell

Dr. Hannah Klein

95 Examining the Effects of Religious/Spiritual and Educational Resources on Mental Well-Being of Incarcerated Individuals in IDOC

Undergraduate Student Project in Education & Social Sciences

The experience of incarceration has been associated with a number of negative effects on an individuals' mental health. For example, the level of suicide rates has been rising inside carceral systems. Many resources have been created to help provide incarcerated individuals with vocation and purpose during their sentence. Two resources that have received empirical examination are the influence of spirituality/religiosity and that of educational advancement (Stansfield, 2019). Much of this research, however, has been relatively limited, due to the difficulty to measure the effects of these support systems and less interest in previous years on the subject. The purpose of this study is to determine the effectiveness of spiritual and religious vocational programs in the Illinois Department of Corrections (IDOC). Willing participants will be mailed anonymous surveys featuring the DASS-21 (a measure of mental well-being) and a short educational/spiritual questionnaire with questions about experiences with spirituality and educational programs. A multiple linear regression analysis is planned to examine the influence of spirituality and educational resource programs to predict mental well-being. The goal of this work is to provide foundational evidence on the awareness and use of spirituality and educational resources within the carceral system to buffer against symptoms of negative mental well-being in individuals with long-term sentences.

Katareina Curry, Joshua Moellenhoff, Brooke Willard

Dr. Philip Blankenship, Dr. Christine Billups

CONCURRENT SESSION 3

THURSDAY

3:30–4:30PM

AS-156-A

MODERATOR: Dr. Mark Schultz

93 The Taylor Swift Phenomenon

Undergraduate Student Project in Humanities & Communication

Taylor Swift, a global pop star whose music has captivated millions worldwide, not only for their catchy melodies but also for their profound lyrical content. This analysis delves into the intricate inner workings of Swift's lyrics, where she explores themes of love, heartbreak, resilience, and self-discovery. Through lyrical analysis and thematic interpretation of her albums, we uncover the multifaceted layers of imagery and symbolism woven within her songs. Through this exploration, we aim to shed light on Swift's cultural impact through her music and how her lyrical imagery interweaves listeners so deeply, developing parasocial relationships between Swift and her fanbase. We coded her lyrics by analyzing 5-6 songs from each of her 10 albums, 52 songs in total. We coded for the type of song, the portrayal of men and love, the cause of the breakup, the target of revenge, audience lessons, Swift's lessons, imagery, and symbolism. Theories present in the analysis include a lens into parasocial relationships through Albert Bandura's Social Learning Theory, along with incorporating ethical theories of relativism, truth, and deception.

Gianna Francone, Kaley Murray, Anthony DeNardis

Dr. David Anderson

116 Public Relations With a Purpose

Undergraduate Student Project in Humanities & Communication

Our PR writing class collaborated with local nonprofit Ezio Community Development Services to strategically develop, design, and execute elements that brought awareness to their cause. By highlighting key strategies and tactics, we articulated our findings into headlines, taglines, messages, and graphics unique to the client's mission. This real-world experience resulted in work that expanded brand awareness, encouraged donations, and connected the organization with its community.

Olivia Brzek, Bridgette Zarazua, Cassandra Botello, Grace Sueflohn

Jennifer Murdaugh

CONCURRENT SESSION 3

THURSDAY

3:30–4:30PM

AS-157-A

MODERATOR: Dr. Mark Schultz

88 Water Remediation Using a Biocatalyst Built via Click Chemistry

Graduate Student Project in Natural Sciences

Effluent containing synthetic dyes from the textile industry pose dangers to the environment requiring innovative technologies to remove pollutants. Environmentally benign biochemical methods of dye degradation have the potential to outcompete traditional methods of dye removal in efficient, sustainable, and cost-effective ways promoting greener chemistries. Enzymes, such as chloroperoxidase, are important catalysts of nature where some are capable of oxidizing dyes into less harmful components. The resilience and activity of enzymes can be improved by immobilizing them onto metal-organic frameworks (MOFs). MOFs, such as UiO-66-NH2, are highly porous structures composed of inorganic nodes and organic linkers that can be used to enhance the functionality of enzymatic activity where improved dye decomposition can occur. To covalently link the enzyme-MOF composite, copper azide-alkyne cycloaddition (CuAAC) click chemistry can be recruited generating a clicked biocatalyst in neutral conditions, without harmful byproducts. These catalytic systems are capable of biodegradation by enzymatic oxidation due to the creation of active oxidants generated by the enzyme's catalytic cycle. For these purposes, verification of a clicked composite will be done using an alkyne attached to green fluorescent protein and azide-functionalized UiO-66-NH2. The results will be presented.

Norman Paz-Ramirez

Dr. Kari Stone

120 Inhibition of Clinically-Relevant Zinc Hydrolase Enzymes by 8-Hydroxyquinoline and its Derivatives

Graduate Student Project in Natural Sciences

Zinc hydrolases are a broad class of zinc cofactor enzymes with a wide array of implications in disease and human health. Inhibition of these enzymes often have therapeutic effects in a multitude of diseases. 8-hydroxyquinoline (8HQ) and its derivatives have shown promising inhibitory effects on numerous zinc hydrolases. From microbial infections to neurological disorders and many forms of cancer, 8HQ shows promise as a privileged, modular compound to be tested in a variety of enzymes and disease states. This study specifically focused ocoffey

n the effects of 8HQ inhibitors on the histone deacetylase (HDAC) family of enzymes. HDACs are involved in the regulation of cellular processes via covalent modifications to histones and nonhistone proteins and inhibition of HDACs has shown to be an effective therapeutic for cancer. Derivatives of 8HQ were tested on recombinantly expressed human HDAC 8 to determine their ability to efficiently inhibit HDACs. The results of this study will be discussed.

Anthony Baudino

Dr. Kari Stone

BUSINESS PITCH FINALISTS

THURSDAY APRIL 18, 2024

1–4:30PM

CONVOCATION HALL

MODERATOR: John Wightkin

1 Gardun - Personal Knowledge Management App

Undergraduate

Nana Asante

2 College Dorm Room Cleaning Service

Undergraduate

Kody Hammond, Danny Stoddard

3 Drone Business for Real Estate and Light Shows

Undergraduate

Ben Johnson

4 Pediatric Dysphonia Voice Bank Education Consulting

Graduate

Mari Isabel Ilano

Dr. Victoria Reynolds
Kristin J. Scavo-Smith

5 Latino Grocery Story with Community Center

Undergraduate

Christian Malagon-Bravo

Dr. James Oakley

6 Flamethrower Baseball Pitcher Bag

Undergraduate

Seth Nanna

7 Rate My Politician App

Undergraduate

Gisele Perez

8 CoShop Grocery Shopping App

Undergraduate

Julian Rocha, Amna Tasneem

9 Cyber Security Services for Small Businesses

Undergraduate

Nicholas Rowden

10 Mobile App for Recreational Sports

Undergraduate

Kirill Sidorko

11 Up and Down Aviation

Undergraduate

Caswell Bloomquist, Colin Borowiak

PRESIDENT'S 16TH ANNUAL ART EXHIBITION

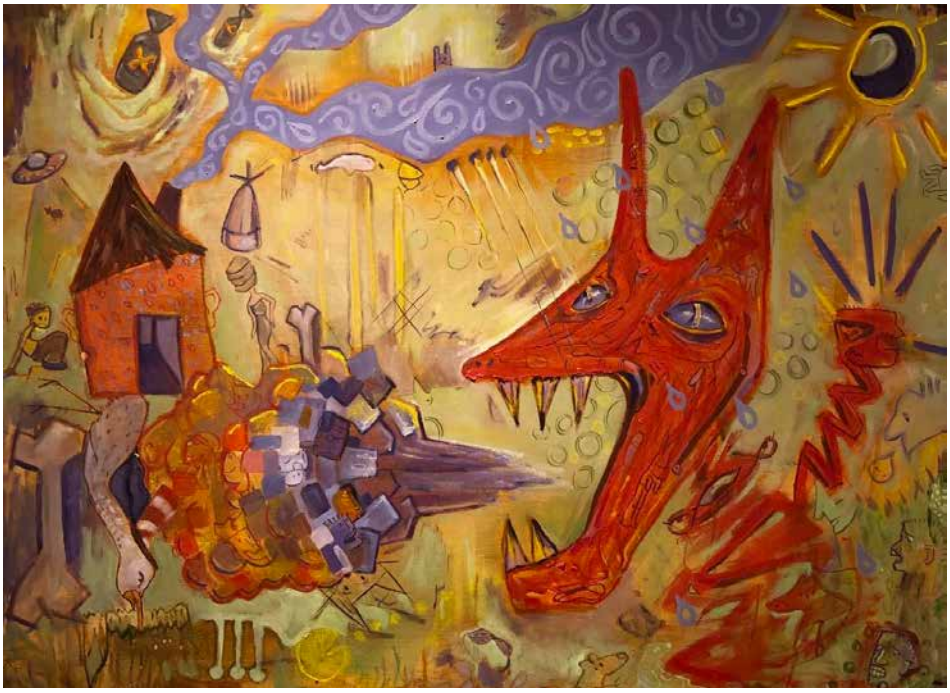
APRIL 4–26

9AM–9PM
ART GALLERY

Art exhibits will be displayed all day in the Art Gallery.

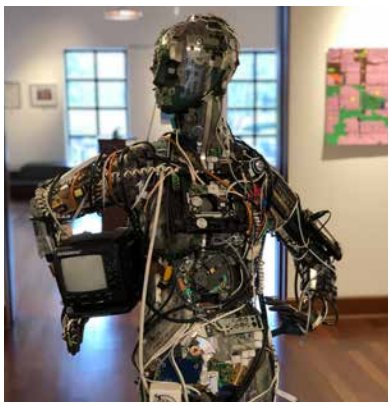
A Gallery Talk, representing winners from the President's Art Exhibition, will take place on Thursday, April 18 from 2-3 PM.

Cash prizes donated by Dr. David J. Livingston, Lewis University President



First Place $300

Katie Melzer – "When Fear Comes Knocking", Oil Painting

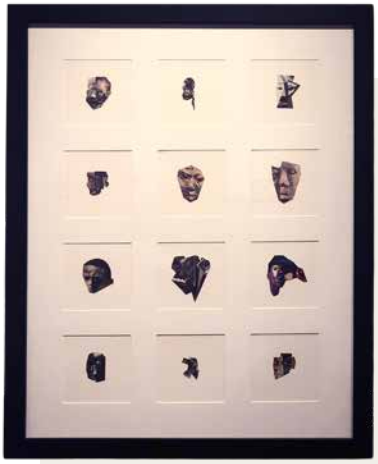


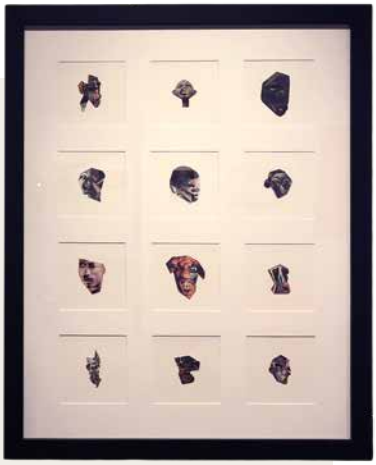
Second Place $200

Morgan Vergo – "Show Me: The Artist of the Future", Mixed Media, Broken Technology Sculpture

Third Place $100

Jasmine Pryor – "Untitled", Acrylic Painting





Alumni Award $25

Gift Card Donated by the Wadsworth Family Gallery

Milton B. Harmon ('23) –
"The Extinction Agenda: Exhibit A"
"The Extinction Agenda: Exhibit B" (Diptych)," Collage

Honorable Mentions $50 each

Meghan Check – "Father," Oil on Canvas Painting

Bowie Dauner – "I Am the Person I've Been Waiting For," Acrylic and Oil on Canvas Painting

Jocelyn Murray – "Summer at Smolak," Watercolor Painting

Erika Ornelas – "Dolly," Charcoal Drawing

Drew Orr – "The Dichotomy Between Presumptions and Respect," Pencil and Ink Drawing on Bristol Board

Raven Chanelle Robinson – "First Day," Oil on Canvas Painting

Kyle Starks – "Socratic Scatter," Acrylic on Canvas Painting

Morgan Vergo – "After," Mixed Media – Fabric, Acrylic Paint – Model Figures

CREATIVE WORKS

THURSDAY

3:30–4:30PM

STUDIO THEATRE

MODERATOR: Kristin Callahan

The Art of Compassion

Undergraduate Student Project in Visual Arts
Exhibit

Finding empathy in the nooks of life is its own art form. Expressing compassion is a result of recognizing these spaces, and then choosing to act kindly within them. I doodle with care in the corners of my homework, books, and sketches- and I hope to find the same blank spaces to fill with kindness in the corners of my life.

Katie Melzer

Leslie Colonna

Love, Imagination, and Representation

Undergraduate Student Project in Visual Arts
Exhibit

These paintings are my way of showing affection. The pieces express the respect I have for the individual or subject I am painting. I attempt to represent the essence of the individual via detail as-well as close observation. The art pieces start off as ideas and then evolve. They also are made to represent the individual they are meant for. These paintings are an exploration of making gifts that I hope will manifest joy.

Meghan Check

Leslie Colonna

An Exploration of the Form of Humanity

Undergraduate Student Project in Visual Arts
Exhibit

The works in this series are attempts to distance my understanding of the human body from viewing it as a solely a vessel through which we experience life and the sensations therein, to a beautiful work of art in it's own right which catalogues our life and experiences.

Erika Ornelas

Leslie Colonna

Fostering Creativity with a Beginner's Mindset

Undergraduate Student Project in Visual Arts
Exhibit

Beginners are unburdened with tradition and best practices, allowing them to naively approach a new medium without the baggage of an old-timer steeped in the "right way" to do things. This panel will discuss how design students use a beginner's approach to develop a novel aesthetic or technical approach to motion graphics. Students will share their process during the panel discussion and present their observations, research, and experimentation.

Christian Tishka, Nana Asante, Nicholas Aguilar, Aaliyah Jenkins, Madison Sea-Macak

Kristin Callahan

Introspection

Undergraduate Student Project in Visual Arts
Exhibit

"Introspection" is a series of 3-D tactile expressionist paintings and sculptures that explore complex human emotions. These art pieces dive right into the hard topics that I, as the artist, express through my art and the viewer has the chance to feel seen in their struggles. Each one is titled in a way as to lead the viewer in what it could mean but it is still left open for viewers to create their own relationship with the art.

Bowie Dauner

Leslie Colonna

CO-CHAIRS

Dr. Matthew Domico

Dr. Marie Meyer

COORDINATING COMMITTEE

Dr. Kari Stone
Chair, Abstracts and 3MT Competition

Dr. Brittany Stephenson
Chair, Poster Sessions and Judging

Dr. Jason Perry
Chair, Concurrent Sessions

Kristin Callahan
Chair, Creative Works and HASS Slam

Natalie Swain
Member, Creative Works

John Wightkin
Business Pitch Competition

Jenn Murdaugh
Chair, Marketing and Communications

Dr. Erik Baker
Chair, Schlachter Award

Dr. Philip Blankenship
Member, Schlachter Award

Kelley Plass
Library Services

Dr. John Parker
STEM Slam

Lisa Heizer
Meetings, Events, and Conferences

Jim Cowan
Program Development

Deborah Vincent
Executive Assistant

FACULTY / STAFF VOLUNTEERS

POSTER JUDGES

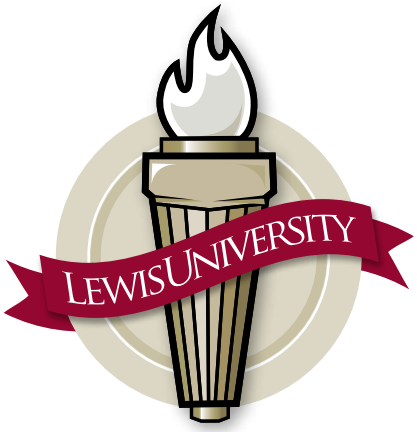
Adam Schultze
Allison Richardson
Ann Guernon
Ann Jordan
Arsalan Memon
Br Pierre
Cara Sulyok
Chris Breier
Edson Chipalo
Eleftheria Karapas
Eron Bozec
Eunjung Lee
Fadi Wedyan
Hannah Klein
Hayley Miller
Holly Snyder
Jake Cho
Jeannine Haberman
Joe Kozminski
Kathleen Hillsman
Kayla DeCant
Keith Lavine
Kristin Scavo-Smith
Matt Plass
Maureen McCormick
Michael Smith
Natalia Tapia
Paul Kim
Peter Hamot
Rachel Wells
Rocio Rodriguez
Samantha Ivetic
Sarah Drake Brown
Sarah Powers
Simon Dai
Sung Kim
Ting He
Toni Fitzpatrick
Tricia Littig
Vesna Markovic
Victoria Reynolds
William Kraatz
Yazan Alsmadi
Ziad Al-Sharif

CONCURRENT SESSION JUDGES

Ann Guernon
Anne Rapp
Br Tom Dupre
Carol Szymanski
Edson Chipalo
Hannah Klein
Huma Zia
Kayla DeCant
Kristin Scavo-Smith
Mark Schultz
Megan Eads
Reza Gharoie Ahangar
Ryan Hooper
Shanon Gillette
Stephen Sherwin
Therese Jones
Toni Fitzpatrick
William Kraatz

MODERATORS

Ann Guernon
Anne Rapp
Hannah Klein
Kayla DeCant
Mark Schultz
Megan Eads
Mike Cherry
Ryan Hooper
Stephen Sherwin



TWELFTH ANNUAL

CELEBRATION OF SCHOLARSHIP

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