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## Fall 2024 Student Scholar Symposium Abstract Volume

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# STUDENT SCHOLAR SYMPOSIUM

FALL SESSION

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December 4 - 5, 2024

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Greetings and welcome to the Fall 2024 Chapman University Student Scholar Symposium!

Student Scholar Symposium which is held once each semester celebrates the remarkable scholarship and creativity conducted by Chapman undergraduate students. Our student presenters reflect the diversity of academic and creative disciplines thriving within the Chapman community. The Symposium allows them multiple ways to showcase their research and creative projects.

Please take some time to stop by and wander through the vast array of student poster presentations or attend the oral discussions to discover the kind of work our students are engaged in here at Chapman University. Student Scholar Symposium is education in action, a true example that Chapman students are pursuing anything imaginable.

The Student Scholar Symposium is sponsored by the Center for Undergraduate Excellence, which is the first stop and the central hub for students to learn about and engage in undergraduate research and creativity activity; and to discover the wide range of prestigious external scholarships available.

Our symposium would not have been possible without the extraordinary effort by the CUE staff, Lisa Kendrick, Operations Manager, and Lauren Sieberg, Graduate Assistant, who have designed, developed, and organized the event. A special thanks to all of them!

Thanks to all the student presenters, their faculty mentors, our faculty moderators, and staff volunteers.

Enjoy the Symposium!

Dr. Julye Bidmead

Director of the Center for Undergraduate Excellence at Chapman University

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## Acknowledgements and Schedule of Events

The Center for Undergraduate Excellence gratefully acknowledges the following individuals and program for their support:

### Student Scholar Ambassadors

#### Oral Presentation Moderators:

Dr. Julye Bidmead	Dr. Ronald Steiner	Jessica Bocinski
Dr. Jocelyn Buckner		

#### Staff Volunteers:

Carmen Chavez	Erika Martinez	Hilary Anderson
Jackie Coyne	Jessica Bocinski	Lisa Beesley
Samuel Lee		

### Presentation Schedule

#### Wednesday, December 4

Oral Session 1	Argyros Forum 209	11:30 - 12:30 PM
Oral Session 2	Argyros Forum 209	1:00 – 2:00 PM
Oral Session 3	Argyros Forum 209	2:30 – 3:30 PM

#### Thursday, December 5

Poster Session 1	Sandhu Conference Center	9:30 – 11:00 AM
Poster Session 2	Sandhu Conference Center	12:30 – 2:00 PM

**AF209A**

Moderator: Dr. Ronald Steiner

**Psychology**

**An Analysis of Factors in Pilot Aircraft-Assisted Suicides**

**Presenter(s):** Emma Kochenderfer

**Advisor(s):** Dr. Mykel Kochenderfer

The Federal Aviation Administration (FAA) puts in place medical requirements with the aim of increasing air safety. Several of these medical requirements relate to factors impacting mental health, such as pilot usage of selective serotonin reuptake inhibitors (SSRIs). This paper studies factors that are present in pilot aircraft-assisted suicides. These factors are important in order to create policies that are effective in risk mitigation while still giving a space for pilots to come forward with honesty about their mental health issues and receive the help that they need. Existing literature indicates that pilots often feel compelled to misrepresent their mental health situation and avoid seeking treatment or communicating treatment to the FAA out of fear of losing their medical certificates, upon which their hobbies or career might depend. From the period of 1989–2021, the National Transportation Safety Board (NTSB) database contains 43 aircraft-assisted suicides initiated by the pilot. This study investigates a variety of factors, ranging from class of certificate, age, gender, medication, negative life events, and alcohol usage.

**Data Analytics**

**Early Performance Prediction for Loosely-Timed Contention-Aware Models of GoogLeNet**

**Presenter(s):** Maha Bhatti

**Advisor(s):** Dr. Emad Arasteh

Transaction-level modeling (TLM) is a high-level abstraction that models hardware and software and their detailed interactions, enabling performance analysis in the early stages of the embedded system design. For efficient embedded system design, architects design, configure, and simulate TLM models to explore the design space and find the optimal candidate for implementation. Running a multitude of TLM simulations is a time-consuming and inefficient process. The objective of our project is to design a machine-learning model that captures and learns the complexities of the TLM model of a deep neural network (DNN). Specifically, we focus on predicting simulated time for SystemC TLM-2.0 loosely-timed contention-aware (LT-CA) models, which consider the effect of memory and interconnect contention in system-level design and performance estimation. We design linear regression and neural network models that describe the relationship between system-level configuration knobs, such as computational capacity and memory access latency, on simulated time of the TLM-2.0 LT-CA models of GoogLeNet, a state-of-the-art DNN for image recognition. Our proposed predictive models analyze TLM simulation logs as data for training and validation to learn patterns and relationships

between the system configurations and performance. Our experimental results on the TLM-2.0 LT-CA models show the high accuracy of our proposed predictive model and deliver promising results to enhance the overall efficiency of system-level modeling.

## **Political Science**

### **American Republicans and Democrats on Ukraine and Gaza**

**Presenter(s):** Isaiah Kilian

**Advisor(s):** Dr. Ann Gordon

The ongoing US election of 2024 sees Republicans and Democrats divided over many issues to justify their decisions on who to vote for, one of which is U.S. foreign policy. The Biden administration saw the outbreak and subsequent involvement of the United States in several overseas events, including the War in Gaza, Russo-Ukrainian War, the Middle East proxy conflicts of Iran, Chinese American Relations, the withdrawal of Afghanistan, and so on. The oncoming presidential candidate to be elected will oversee an overwhelming international predicament. Each one of them represents the strong opinion of their respective political party. But what exactly is the consensus opinion of foreign policy for each political party? How much do they differ from not only each other, but their respective candidates' opinion? How does the opinion of each side compare with that of independents? The following paper will narrow this question down to the opinion of the most current American involvement in both the Ukraine War and the War in Gaza. The findings will derive from the American National Election Studies data of 2024. The hypothesis of this paper holds that analyzing this data might prove Democrats to be more in favor with American foreign involvement in both the Ukraine War and the War in Gaza (both of which are under the leadership of a Democrat Administration). However, the War in Gaza is an anomaly in the sense that humanitarian support and aid to Israel suffer from two opposing aspects of modern Democrat ideology. If the hypothesized results are found, it may suggest that both sides find some form of dissatisfaction with the status quo in regard to America's foreign policy, which could relate to their own decision regarding the election this November.

## AF209C

Moderator: Dr. Jocelyn Buckner

### Theatre

#### **Bridging Realms: Adapting the Scenic Design of "My Neighbor Totoro" from Film to Theatre**

**Presenter(s):** Chieh (Jessica) Ning

**Advisor(s):** Dr. Jocelyn Buckner

This thesis explores the role of a scenic designer in adapting the iconic screenplay of "Totoro" for both theatrical and film productions. It examines the particular difficulties and creative solutions scenic designers run into while adapting a screenplay for different types of mediums. The physical constraints of the stage and a live audience frequently place constraints on theater designers, who must create adaptable and durable sets that support the spontaneity and dynamic of live performance while enabling seamless transitions. Film production design, on the other hand, makes it possible to create more intricate and location-specific sets. This is made possible by various camera angles and takes, which when combined allow the visual story to be told beyond the limitations of a single stage. In crafting my scenic design for Totoro, I am combining practical and theoretical insights from key resources to bring the film's magical world to life. This blend of research and practical application helps me emphasize the convergent and divergent features of scenic design in translating Totoro for theater and film. Ultimately, my thesis highlights the flexibility and creativity inherent to the field through a thorough comparison of space use, audience involvement, and artistic expression, illustrating how the same story can take on new forms across different mediums.

#### **The Rustic Runway of Radiator Springs: Driving the Cast of Cars to the Stage**

**Presenter(s):** Kylie Pickering

**Advisor(s):** Dr. Jocelyn Buckner

Lights up. A lone figure sits onstage. She wears a teal fluffy sweater. Wow, you think to yourself. 'That's so ugly. Why would someone ever put that abomination on stage?' Yes, it may seem ugly, but the character might not think so, or, more importantly, the costume designer might think it's perfect. Through character analysis, the actor and the designer may discover that while working in her small-town diner, this character likes to stand out. Perhaps it's teal because the leather seats in her diner are teal and she likes things to match. It's fluffy because, to her, fluffy equals fabulous. The audience may or may not be able to make these connections by the time the show concludes, but these are the choices a costumer needs to make in hopes of serving an audience in their understanding of a production, whether consciously or subconsciously, by manifesting a character's personality into a wearable ensemble. In alliance with this concept, my thesis project will adapt the 2006 Pixar classic Cars for the stage using deep character analysis in tandem with my costume design skills. This project will include character study, mood boards, sketches, and final renderings; an overview of the extensive research involved in costuming; and a record of the

design process from concept to completion. Furthermore, my chosen film includes extensive character variety, and adapting inanimate objects to humans will pose an additional challenge. Ultimately, my work intends to shed light on the costume design process and show how – even when choices seem minuscule – they all contribute to creating a visual aid that helps guide an audience through a story. At the conclusion of this project, I hope to help audience members understand that it's not just a fluffy sweater. It's a FLUFFY sweater.

**Daisy: A Multimedia Experimental Theater Love Letter Exploring Self, Love, Growth, and Human Connection Through the Dual Sides of a Young Woman's Soul**

**Presenter(s):** Daisy (Rong) Shang

**Advisor(s):** Dr. Jocelyn Buckner

Daisy is a 90-minute multimedia experimental theater production that I have written, directed, designed, and performed as a solo piece, delving deeply into the inner world of contemporary young women. Life originates from love, and women love from the heart. This work explores this theme through two strikingly contrasting characters: one wearing a yellow dress, symbolizing fiery passion, vitality, and the pursuit of life; the other in a white dress, representing purity, self-awareness, and authenticity. These dual personas reflect the inner conflicts and awakenings young women experience in their pursuit of self-worth and emotional growth.

**Was It Good? A Look at the Golden-Ticket Question of Societal Preferences in Theatre**

**Presenter(s):** Carina Leland

**Advisor(s):** Dr. Jocelyn Buckner

As a multimedia artist with a diverse background, I have incorporated film media, visual and auditory art, and immersive performance into this production to explore themes of self-worth, personal growth, love, sexuality, family, friendship, and community. Daisy is not only a part of my artistic exploration but also one of the most treasured gifts of my undergraduate journey. The production will be presented in both English and Chinese, showcasing cultural diversity and linguistic richness.

**Silver Screen-agers: The Actor's Guide to Podcasting**

**Presenter(s):** Emma Gibson

**Advisor(s):** Dr. Jocelyn Buckner

This work aims to transcend traditional forms of artistic expression, presenting the complexities of modern women's journeys toward self-realization and emotional growth while offering a fresh perspective on the boundless creativity of multimedia art. Inspired by my personal life experiences, Daisy is both a bold experiment in multimedia fusion art and a cornerstone for my future endeavors in novel writing and filmmaking. To my dearest Daisy—a namesake of my own—I offer this blessing to every woman with a dream: you are always uniquely you, and no one else can take your place.

**AF209A**

Moderator:

**Political Science**

**Voices from the Homeland: Mixed Experiences under the Hawaiian Homes Commission Act**

**Presenter(s):** Kiana Cablayan-Kennedy

**Advisor(s):** Dr. Ronald Steiner

The Hawaiian Homes Commission Act (HHCA) of 1920 was enacted to address the socio-economic disparities faced by Native Hawaiians, particularly in the aftermath of the overthrow of the Hawaiian Monarchy by the United States in 1893. It allocated over 200,000 acres of land for Native Hawaiian homesteading with the aim of preserving culture and promoting self-sufficiency. Despite its intent, the HHCA has faced numerous challenges, culminating in landmark legal cases like *Kalima v. State of Hawaii* (1991–2023), which highlighted the state’s failure to meet its obligations regarding land ownership rights. These cases underscore the enduring structural barriers that prevent many Native Hawaiians from benefiting from the HHCA. My research investigates these systemic issues through a mixed-methods approach, combining qualitative data from interviews with Native Hawaiians affected by the HHCA and meta-analyses of court cases and legal documents. I conducted fieldwork in Hawaii, interviewing beneficiaries of the Hawaiian Homes program to understand the intricacies of the process, uncovering loopholes, and learning how some applicants navigate or expedite the system. I also gathered perspectives from those struggling with the application process, shedding light on financial barriers and bureaucratic inefficiencies that exacerbate frustration within the Native Hawaiian community. Moreover, my research delves into the financial challenges many face when qualifying for the HHCA, as well as concerns about homelessness among Native Hawaiians, which some believe could be mitigated with a more transparent and efficient HHCA. Exploring my lineage through archival research provided insight into the blood quantum requirements, a key factor in eligibility. I also consulted with a professor specializing in surveys of Native Hawaiian populations, further enriching my understanding of the cultural and social dimensions at play. Ultimately, my research seeks to expose the structural flaws within the Hawaiian Homelands program and advocate for reforms that empower Native Hawaiians.

**Biochemistry and Molecular Biology****Efficacy of a Dietary Buttermilk Powder Enriched in Milk Fat Globule Membrane Concentrated with Gangliosides for Treatment of Pediatric IBD with Possible Dependence on SNPs in Ganglioside Metabolism Enzymes****Presenter(s):** Sophie Alter**Advisor(s):** Dr. John Miklavcic

IBD is a condition affecting about 0.5% of the western world and prevalence is rising globally and it can be debilitating for pediatric patients. Dietary gangliosides have been proposed as a new potential treatment for IBD. However, human sialidase enzymes may modify the treatment efficacy by catabolizing ganglioside GD3 to GM3 and then into lactosylceramide by the successive removal of sialic acid. The aim of the study assess the feasibility of a dietary buttermilk powder treatment for IBD and to explore how endogenous ganglioside metabolism alters the efficacy of dietary buttermilk powder. A double-blind randomized placebo-controlled clinical trial involved patients (n=11) aged 9 – 21 years with mild-moderate IBD from June 2022 to February 2023. Participants assigned to the treatment group consumed 5 grams of buttermilk powder daily enriched in milk fat globule membrane. Participants were evaluated via complete metabolic panels, PGA, pUCAI, pCDAI, CRP, IMPACT-III questionnaires, and SNPs in genes for ganglioside metabolism: NEU3 (rs544115), NEU4 (rs2293761). Patient pUCAI and pCDAI declined over the study duration, while CRP demonstrated a 42.5% reduction as well. At baseline, the average albumin level for patients with wildtype NEU4 (AA) was 4.83 (+/-0.44) g/L, compared to 4.04 (+/-0.35) g/L for carriers of the minor allele (G). Treatment with dietary ganglioside reduced albumin level by 16% in the wildtype group, but albumin was unchanged in carriers of the minor allele in NEU4. Carriers of the minor allele in NEU4 who received the placebo showed an elevation in albumin by 13.8% from the beginning of the trial.

These findings suggest that genetic variation in ganglioside metabolism pathways may influence the indicating feasibility of dietary interventions with milk fat globule membrane for pediatric patients with IBD. Further research is needed to better understand how SNPs in genes for ganglioside metabolism may alter the efficacy of treatment for clinical outcomes including disease activity index and physician global assessment.

**Upcycling Pineapple Peel Waste to Obtain Ferulic Acid****Presenter(s):** Norra Anprea**Advisor(s):** Dr. Cedric Owens

Ferulic acid (FA) is an antioxidant and anti-aging ingredient that can be found in high end cosmetics. The current methods to obtain FA are through synthesis and solvent extraction. These methods are problematic because they use hazardous chemicals and require a large amount of energy. Therefore, we have proposed a better extraction method through the use of enzymes. FA is typically bound to plant matter through an ester bond. Enzymes, such as esterases, can cleave at the ester site in order to obtain FA. Interestingly enough, it has been found that there is a high

amount of FA in pineapples, specifically within the peel. Pineapple peel waste is a concern because it contributes to environmental pollution. For example, if it is not discarded properly, it can end up contaminating water sources with its organic matter. Thus, we plan on upcycling pineapple peel waste to obtain FA by enzymatic extraction. Three ferulic acid esterases will be expressed and purified: *A. shashii* (AsFAE), *L. buchneri* (LbFAE), and *L. helveticus* (LhFAE) so that we can see which one has the best activity against the FA in the pineapple peel. This is done by bacterial transformation, cell lysis, column separation, dialysis, and concentration. These three enzymes will go through hydrolysis, extraction, and rotary evaporation. The results were compared with alkaline extraction by high performance liquid chromatography and it was found that LbFAE and LhFAE had obtained 0.60 mg/mL FA and 0.48 mg/mL FA respectively, while the alkaline extraction method had obtained 0.68 mg/mL FA. It could be concluded that enzymatic extraction has a high amount of potential of being used to obtain FA from pineapple peel waste.

## **Computational Science**

### **Personalized Virtual Reality Gait Training System for Full-Body Obstacle Avoidance Using Real-Time Motion Analysis**

**Presenter(s):** Alexandra Fomina, Quillan Gee, Laurel Latt

**Advisor(s):** Dr. Trudi Qi

This research presents a personalized virtual reality (VR) gait training system that merges advanced motion tracking and real-time analysis to enhance user experience and safety in immersive environments. Leveraging Sony Mocopi wearable sensors and the Meta Oculus Quest 2 headset, the system operates within Unreal Engine 5 to simulate realistic, full-body obstacle scenarios, such as tree branches and rocks. Users perform movements like ducking, stepping over, and side-stepping, which are classified using a decision tree algorithm based on sensor data and pre-established motion thresholds. For example, users must duck at least 12 cm to avoid overhead obstacles and lift their feet 11.5 cm to step over ground-level barriers. The algorithm efficiently distinguishes movement types, ensuring accurate, real-time motion detection.

To address common challenges in VR systems, such as sensor drift and synchronization issues, a real-time bidirectional calibration mechanism was developed. This feature enables seamless positional and rotational data integration, ensuring the virtual avatar accurately mirrors the user's movements. A user-friendly calibration interface simplifies setup, requiring only a single click for accurate alignment. Initial tests confirm that the improved calibration reduces the need for manual adjustments, enhances usability, and accommodates diverse user heights.

Additionally, adaptive motion algorithms were implemented to improve avatar fluidity and reduce motion sickness, a frequent issue in VR. By analyzing real-time foot movement data and mitigating inconsistencies, the system provides smoother transitions during self-paced treadmill walking, enhancing immersion and comfort. Future efforts will focus on refining these models and conducting extensive user studies to further optimize obstacle-avoidance strategies and motion synchronization.

**AF209C**

Moderator: Dr. Jocelyn Buckner

**Theatre**

**The Room Where It Happens: The Power of Single Set Stories**

**Presenter(s):** Zoe Wall

**Advisor(s):** Dr. Jocelyn Buckner

In his Poetics, Aristotle ordered plot, character, thought, diction, spectacle, and song as the key elements of drama. Different eras of theatre have reflected different needs and uses of these elements, with more recent trends having seen an increase in the prioritization of spectacle with advancements in technology and design. Still, some of the most recognized and renowned works of the past century have relied solely on their characters's connections to each other and their plot's connections to the audience. Plays such as Night Mother, Twelve Angry Men, and Horse Girls utilize single settings, real-time format, and minimalist approach as a method of adding stakes and accelerating tensions. While these works are frequently revived and revisited due to their cost effectiveness, the play's timelessness comes from the playwright's utilization of constraints of time and space to mirror real-life experiences, conflicts, and connections. In this project, I will examine how stripped-down, single-location plays have been able to reach and sustain their success with audiences while competing with more spectacle-heavy experiences. I will explore the pros and cons of these more content-focused works to uncover how imposing limits in playwriting can provide greater opportunities for depth and development of content and characters. To demonstrate the significance of this play type, I will write a short one-act play utilizing the pillars and parameters found within the closed space, closed time format. Through this, I will demonstrate how the single-set foundation has the potential to impact audiences through intimacy, engagement, and proximity to the story.

**Exploring the Sublime through Sound Design: A Multiplatform Approach**

**Presenter(s):** Elsie Mader

**Advisor(s):** Dr. Jocelyn Buckner

The world around us has always vibrated with constant sound. That audio provides context for everyday activity, the background against which all life is played. To highlight its significance in the human experience, this study explores the impact of audio on emotion through my sound design for Brandon Jacobs-Jenkins' morality play Everybody. Creating and describing the design process, this study seeks to discover how sound influences emotional response, shapes mood, and complements visual elements. Aiming to discern what soothes or incites audiences, the design focuses on a juxtaposition between familiar and unfamiliar sounds. Special attention is paid to base elements like strings, human voices, and synthesizers, which are used to create a soundscape that resonates with both familiarity and novelty. Sonification, the study of turning data into sound, also informs the design of specific auditory elements, allowing for the translation of information to sonic experience that engages the audience on multiple levels. Similarly,

exploration of the use of sound in horror genres on radio and film aids in the creation of suspenseful, unsettling soundscapes that can further evoke fear or unease in the audience. Additionally, a deeper look at the psychology of music's emotional effects informs an understanding of how music affects human brain function, central to designing a soundscape that capitalizes this modern information in order to resonate with the audience on a deeper psychological level. The utilization of several tools such as Ableton Live, QLab, and Logic Pro are essential in the creation of the design. An abstract auditory mirror reflects and amplifies the emotions depicted on stage through the soundscapes and musical pieces that grow and change over the duration of *Everybody*. The information gained through research deepens our understanding of sound design's ability to enrich a story, offering valuable insight for the field of auditory aesthetics.

**Sustainability in a Theatre Career: the Power of Passion and Partnership****Presenter(s):** Jane Broderson**Advisor(s):** Dr. Jocelyn Buckner

Artistic burnout has been a long-accepted reality for theatre professionals and is consequently a common fear for many young artists looking to enter the entertainment industry. Traditionally and infamously, theatre jobs are associated with long hours, significant emotional investment, financial insecurity, criticism, and rejection, which can diminish one's love for their craft. While this may ring true as an unfortunate reality of professional theatre, artists such as myself continue to strive toward the successful and rewarding paths that a select few have managed to achieve, raising the question: how do people sustain a career and vocation in theatre? My aim is to provide answers to this question by examining three effective methods of sustaining theatrical enthusiasm: participating in passion projects, working amongst strong collaborators, and fostering a solid artistic community. I will analyze these approaches in relation to my experience as a director and examine the successes of prolific modern artists who have applied them to demonstrate their value. My thesis will culminate in a tangible application of my findings: a workshop-style production of *tick, tick... BOOM!* by Jonathan Larson – my favorite musical and ultimate passion project – as produced alongside my most capable and trusted collaborators, to whom I am connected through my artistic home (Chapman Student Organized Productions). By drawing parallels between my own efforts toward creative fulfillment and those of professionals whose careers I aspire to, I hope to encourage other artists to prioritize finding joy in their work, an encouragement our industry often lacks.

**Sonic Transformations: Exploring the Evolution of Acoustics in Southern California****Presenter(s):** Sophie Little**Advisor(s):** Dr. Jocelyn Buckner

Starting in the 5th century with Ancient Greek theatre, live performance has sought to engage large audiences through amplification techniques. Initially, this involved the strategic use of architecture and natural acoustics to enhance sound distribution, which has now evolved into using modern technology as well. While some venues were initially designed to support live

music, others were designed to host sporting events; both of these are some of the top concert venues today. In this paper, I will explore how venues of varying sizes and architectural designs use their natural acoustics and the ever-changing technologies of today to create soundscapes for concerts. In addition, I aim to gain an understanding of how audio engineers work within these vastly different venues and how these differences shape them as artists. Specifically, I will investigate The Musco Center for the Arts, The Hollywood Bowl, and The Forum, all of which are top venues in Southern California that host various events. Initially, I will delve into the historical context of these venues, understanding why they were built and how they initially addressed acoustics for live performance. Additionally, I will analyze how the original acoustics have been upgraded as technology has advanced and how this has affected live performance. Last, I will use personal anecdotes from professional sound engineers to understand how these different spaces have shaped their careers and how they approach each of these spaces. This exploration combines scholarly research with personal anecdotes, providing a holistic view of how our acoustic landscape has become what it is today and why this has, in turn, affected the job of an audio engineer.

**Stories Untold****Presenter(s):** Elena Bisharat**Advisor(s):** Dr. Jocelyn Buckner

This thesis project explores the critical issue of female ethnic representation in the film and performance industries through an online interview panel featuring six women of colour, all whom I have had a personal experience with. The panel aims to shed light on the challenges and successes these women face, providing an insightful discourse on diversity and inclusivity in entertainment.

The panel will commence with individual interviews, where each guest will share their journey, challenges, and insights. This will be followed by an open discussion, allowing for a deeper dive into common themes and unique perspectives. By bringing together diverse voices, the panel aims to create a rich tapestry of experiences that underscores the importance of representation. By integrating these elements, the project not only aims to raise awareness but also to inspire actionable change within the industry. It seeks to empower women of colour by validating their experiences and providing a platform for their stories to be heard and celebrated. Through this panel, I aspire to contribute to the ongoing dialogue about diversity and inclusion, advocating for a more equitable and representative entertainment industry.

**AF209A**

Moderator: Dr. Julye Bidmead

**English**

**Birth of the Magic Baby: An Exploration of Motherhood and Anti-Abortion Sentiments in Young Adult Fiction**

**Presenter(s):** Kylee Schwartz

**Advisor(s):** Dr. Julye Bidmead

A new literary trend is being born in the young adult fiction genre: the female protagonist and her Magic Baby. In this trope, young, white, economically stable female protagonists in relationships have an unplanned pregnancy that jeopardizes both the mother's and child's life. After the mother prioritizes the child's life, she is rewarded with a beautiful, supernaturally gifted baby. The birth, idealized qualities of the Magic Baby, and the baby's relationship with their mother reveal harmful anti-abortion sentiments; an obligation to keep the baby despite dangers to the mother's life due to the child's future potential, a glorification of life-endangering birth, and the idealization of self-sacrifice in motherhood that devalues the woman. Under the lens of anti-abortion and abortion arguments, interpretation of novels containing *The Magic Baby*, *Breaking Dawn*, *A Court of Silver Flames*, and *The Scarlet Letter*, and *Dune*, in conjuncture with peer-reviewed research papers based on teen pregnancy portrayals, stereotypes in young adult fiction, and how stories influence people, will be guiding the analysis. Overall, these extremely popular novels set a disturbing precedent by portraying unrealistic, dangerous, and anti-abortion expectations and valued qualities of motherhood, influencing young women's perceptions of motherhood. The Magic Baby model of the perfect mother comes at the expense of real women.

**Trans Panic: The Consequences of Queerphobic Rhetoric**

**Presenter(s):** Wren Taylor

**Advisor(s):** Dr. Linda Hall

This project investigates the rhetoric underpinning the dangerous anti-transgender sentiment that has exploded in contemporary discourse. By analyzing claims spread across modern media, we explore key narratives that perpetuate prejudice against transgender individuals. The study employs both qualitative content analysis and quantitative research to assess the way that popular political rhetoric affects public understanding of queer and trans issues, and the tangible consequences of these widespread beliefs. The shaping of public perception directly affects the wellbeing of the communities themselves, as findings demonstrate a significant correlation between increased stigma and worsened outcomes for LGBTQ+ populations. Diving into historical examples of anti-queer moral panics and their relationship to current discourse, we can analyze recurring patterns of language used for fear mongering and for scapegoating non-heteronormative groups. Focusing on the inflammatory and disingenuous “groomer” narrative in particular, we can identify the ways that language is used to make a particular out-group a target for hatred and even violence- regardless of the truth behind the accusations. By framing

queerness as an ever-escalating threat to both the hegemonic values of Western society, and to the lives of children, this rhetoric not only perpetuates, but encourages, overt discrimination against one of our most vulnerable and marginalized populations.

## **Biological Sciences**

### **Transcriptome and Metabolome Analysis Reveals the Effect of Drought on *Borago officinalis***

**Presenter(s):** Borey Kong

**Advisor(s):** Dr. Hagop Atamian

Drought is one of the most threatening environmental stressors, with a wide range of direct and indirect economic, environmental, and social impacts. Thus, plants are manifesting an array of adaptive mechanisms to survive and thrive under diminishing water resources. One plant that could potentially adapt these defense mechanisms is *Borago officinalis*, or borage, an annual herb belonging to the family Boraginaceae that is well known for relieving the symptoms of anti-inflammatory diseases. To understand the response of borage to drought on the molecular level, we utilized high throughput transcriptome sequencing (RNA-seq) and untargeted metabolomics to profile these adaptive mechanisms. Seeds of borage were germinated and exposed to well-watered and drought conditions for four weeks, and then the leaves and roots were sentenced to RNA extraction and metabolome profiling. The transcriptome identified differentially expressed genes (DEGs) in the leaf, root, and common between both tissues. DEGs in the root were upregulated in the drought for substance transport and biosynthetic processes, while DEGs in the root were upregulated for ribosome assembly. Also, leaves and roots were both highly upregulated in hormone-signaling pathways, such as the abscisic acid (ABA) pathway. Furthermore, the metabolome identified differentially accumulated metabolites (DAMs) in the root and leaf, including highly abundant sterols and lipids across the leaves and roots. Through these findings, we were able to identify the molecular responses that contribute to borage's ability to thrive under drought conditions.

### **AF209C**

Moderator: Jessica Bocinski

## **Electrical Engineering**

### **Machine Learning for Photonic Applications: Optical Forces and Beyond**

**Presenter(s):** Ponthea Zahraii

**Advisor(s):** Dr. Nasim Mohammadi Estakhri

A deep-learning approach can be valuable for modeling optical structures, specifically near-field optical forces and local trapping potentials in complex nanostructure configurations. Traditional full-wave simulations are notoriously time-consuming and computationally expensive, so a deep-learning approach is preferred for highly accurate approximations of the response based on their

metastructure geometries. We propose using an inverse tandem design approach with residual blocks to traverse effectively and efficiently through the deep neural network. A tandem approach is preferable due to its unique architectural paradigm consisting of two interconnected models, as it inherently addresses the non-uniqueness problem present in optical force predictions. Our model architecture is capable of predicting optical forces in the x and y-direction at both 30 nm and 50nm above the surface. We report successful results in using inverse tandem residual networks to design optical traps, which have implications for future advances in nanotechnology and optics and create a valuable tool for designing optical nanotweezers.

## **Chemistry**

### **Sequential One-Pot Oxidative Boron-Heck and Heck Reactions to Generate Disubstituted Arenes**

**Presenter(s):** Nyssa Arai

**Advisor(s):** Dr. Houston Cole

The Heck reaction, described generally as the vinylation or arylation of olefins is extensively used in chemical synthesis owing to its efficiency, versatility, and simplicity. Heck methodology can accommodate a wide variety of olefins, catalysts, and other reaction parameters making it adaptable to diverse synthetic needs. Ongoing interest in optimizing Heck reactions in specific applications have brought about improvements such as the reduction of synthesis steps, the elimination of protection/deprotection procedures, increased selectivity, efficiency and yield. In particular, procedures for one-pot tandem processes in Pd-catalyzed oxidative boron-Heck type and Suzuki reactions have been developed to circumvent the need for purification or additional catalyst between steps. O'Neill et al. (2008) reported moderate to good yields of biaryl derivatives synthesized via this approach with substrate variability. One-pot synthesis of biaryls can further benefit from using appropriate mechanisms in each step. In a similar work, O'Neill found that asymmetric coupling between trisubstituted linear olefins and arylboronic acids via oxidative Heck-type chemistry along with the use of chiral bidentate nitrogenous ligands resulted in yields and enantioselectivities superior to previously known studies at the time. In this study, the potential to similarly optimize a sequential boron-Heck and Heck reaction is explored with these prior works on boron-Heck and Suzuki serving as a foundation.

## **Physics**

### **Fiber Optic Polarimetric Stress Sensor for Characterizing Biomaterials**

**Presenter(s):** Max Randall

**Advisor(s):** Dr. Mark Harrison

The progression of various diseases like cancers, osteoarthritis, and atherosclerosis is closely associated with tissue stiffness. High precision, non-destructive analysis of the mechanical characteristics of soft tissues would allow more consistent diagnosis of these diseases. A fiber

optic stress sensor for characterizing heterogeneous, biological materials is under development. When a bare section of fiber is stressed, the polarization state of the light in the fiber will change proportional to the stress. This change can be measured to generate stress-strain curves for a material placed on the fiber. The device has been able to successfully differentiate samples of salmon with collagen lines oriented parallel and perpendicular to the fiber, and differentiate cartilage resected from three different parts of porcine knee joints. Our research aims to make the stress sensor more suitable as a diagnostic tool by simplifying setup, measurement, and analysis. Previously, a polarimeter has been used to measure all 4 Stokes parameters for a complete picture of the polarization of the light. We will show that a simpler measurement of polarization is sufficient for characterizing biomaterials. We are designing a small photonic integrated circuit to replace the expensive polarimeter, power meters, and potentially the laser, 3d printing a user-friendly sample area and fiber holder, and making an open-source software to control every device and analyze data all in one place.

## **Biochemistry and Molecular Biology**

### **1. Exploring the Mechanical and Physical Properties of Ultra-Soft Colloidal Microgels**

**Presenter(s):** Hatte Hamilton, Anne Marie Santich

**Advisor(s):** Dr. Andrew Lyon, Eliff Narbay

Soft colloidal particles have garnered significant attention due to their broad range of applications in material science and bioengineering. Among these, ultra-low cross-linked (ULC) microgels form a distinct category defined by their exceptional softness. These particles display unique characteristics, such as high compressibility and sensitivity to external stimuli like temperature and ion concentration. Our study focuses on the highly packed colloidal assemblies of ULC microgels in the form of microgel pastes, where the microgels are significantly compressed, leading to unique mechanical behaviors. Through detailed investigations into their rheological properties, dissolution stability, and internal structure—utilizing techniques such as rheometry, optical and atomic force microscopy, and dynamic light scattering—we have discovered that the mechanical and swelling/dissolution behaviors of these pastes are closely linked to the softness of the microgel particles and their interactions, which are influenced by charge-compensating counterions. Understanding these physical and mechanical properties is vital for optimizing the material's potential in various biological applications.

### **2. Synthesis and Fluorescence Imaging of Dye-Labeled Microgels and their Incorporation into Microgel Pastes**

**Presenter(s):** Joshua Abuyog, Abby Caine

**Advisor(s):** Dr. Andrew Lyon, Elif Narbay

Ultra-soft microgels made from poly(N-isopropylacrylamide) (pNIPAm) have contributed significantly to various biomedical and bioengineering applications, including drug delivery, biosensing, and cellular scaffolding. To improve our understanding of their role in these applications, this project aims to develop fluorescence imaging detection techniques to investigate the structure and dynamics of complex fluids composed of ultra-soft microgels, such as microgel 'pastes'. These microgels were fluorescently labeled for imaging under a 3D confocal microscope via the EDC/NHS crosslinker reaction. In this reaction, EDC activates carboxylic acid groups on the microgel, forming a highly reactive O-acylisourea intermediate. This intermediate is then coupled to NHS to form an NHS ester, which will undergo a nucleophilic attack by a primary amine. Thus, an amide bond is formed between the carboxyl and amino group, yielding the desired crosslinked protein. These 'zero-length crosslinking' reactions label the particle with fluorescent dyes, allowing for visualization under wide-field fluorescence and confocal microscopes. Importantly, these microgels permit probing of vital paste properties, including their structure in collagen:microgel composites, and their dynamics in controlled paste erosion studies. Future steps for this experiment include investigating new types of fluorescent probes synthesized via the interaction between 4-aminobenzophenone-modified carboxylated and fluorescent polystyrene (PS) core particles that have been synthesized using the EDC/NHS

synthesis pathway, and the subsequent photocrosslinking of microgel “shells” onto the PS cores. These microgel shell-PS core complexes form ‘raspberry-like particles’ that may be used as colloidal probes of these complex fluids and examine how their structure and dynamics can be tuned to further enable applications in various biomedical and bioengineering fields.

### **3. Collagen Assembly in Crowded Microgel Environments to Construct Tunable ECM Scaffolds**

**Presenter(s):** Abbygail Caine

**Advisor(s):** Dr. Andrew Lyon, Elif Narbay

Collagen is the most abundant fibrous protein in the body's extracellular matrix (ECM), traditionally assembled in hydrated environments under moderate crowding conditions that allow for proper cell proliferation. Achieving collagen assembly in highly crowded environments is paradoxical to conventional wisdom in that overpacked environments are not conducive to protein/peptide self-assembly. In this work, we employ poly(N-isopropylacrylamide) ultra-low crosslinked microgel (ULCs) pastes as a tunable, crowded environment within which collagen can be assembled. The combination of ULC pastes and collagen provides us with a new tool to control ECM mechanics, structure, and bio-integration. Indeed, ULCs are a particularly attractive colloidal building block owing to our synthetic control over their crosslinking, degradability, surface chemistry, and more. Here, we describe the development of composites of varying paste concentrations, visualize collagen assembly, and investigate mechanical properties. By successfully integrating these components, we provide methods to develop dense collagen-based materials with controllable properties.

### **4. Identifying Nitrogenase's Protective Mechanisms when CO Inhibits**

**Presenter(s):** Katie Sanders

**Advisor(s):** Dr. Cedric Owens

Nitrogenase is a bacterial enzyme that converts nitrogen gas into ammonia, an important plant nutrient. Nitrogenase is a protein complex consisting of a homodimeric reductase (Fe-protein) and a catalytic subunit (MoFeP). The biological gas and pollutant carbon monoxide (CO) inhibits nitrogenase. To protect nitrogenase from CO, many nitrogen fixing organisms express a small protein, CowN, which interacts with MoFeP to weaken carbon monoxide inhibition. The goal of this research was twofold. First, we aimed to identify if other proteins bind to MoFeP under CO-stress conditions. Second, we wished to determine if CowN interacts with other proteins besides MoFeP. To do so, cross-linking and pulldown approaches were utilized. A series of cross-linker, including EDC, BS3 and SIAB, were tested to capture protein-protein interactions in cell lysate. When cross-linking with BS3 and SIAB, the interaction between MoFeP and CowN was found, confirming that the experimental approach detects known binding partners. Post-pulldown analysis by SDS-PAGE gels revealed several bands that may correspond to novel crosslinked complexes. Further analysis of the potential cross-linking bands by mass spectrometry to identify the proteins within these bands, however, were inconclusive. Experiments using different cross-

linkers are underway to determine the CowN and MoFeP interactions with other proteins under CO stress.

#### **5. Upcycling Pineapple Peel Waste to Obtain Ferulic Acid**

**Presenter(s):** Norra Anprea

**Advisor(s):** Dr. Cedric Owens

Ferulic acid (FA) is an antioxidant and anti-aging ingredient that can be found in high end cosmetics. The current methods to obtain FA are through synthesis and solvent extraction. These methods are problematic because they use hazardous chemicals and require a large amount of energy. Therefore, we have proposed a better extraction method through the use of enzymes. FA is typically bound to plant matter through an ester bond. Enzymes, such as esterases, can cleave at the ester site in order to obtain FA. Interestingly enough, it has been found that there is a high amount of FA in pineapples, specifically within the peel. Pineapple peel waste is a concern because it contributes to environmental pollution. For example, if it is not discarded properly, it can end up contaminating water sources with its organic matter. Thus, we plan on upcycling pineapple peel waste to obtain FA by enzymatic extraction. Three ferulic acid esterases will be expressed and purified: *A. shahii* (AsFAE), *L. buchneri* (LbFAE), and *L. helveticus* (LhFAE) so that we can see which one has the best activity against the FA in the pineapple peel. This is done by bacterial transformation, cell lysis, column separation, dialysis, and concentration. These three enzymes will go through hydrolysis, extraction, and rotary evaporation. The results were compared with alkaline extraction by high performance liquid chromatography and it was found that LbFAE and LhFAE had obtained 0.60 mg/mL FA and 0.48 mg/mL FA respectively, while the alkaline extraction method had obtained 0.68 mg/mL FA. It could be concluded that enzymatic extraction has a high amount of potential of being used to obtain FA from pineapple peel waste.

#### **6. Efficacy of a Dietary Buttermilk Powder Enriched in Milk Fat Globule Membrane Concentrated with Gangliosides for Treatment of Pediatric IBD with Possible Dependence on SNPs in Ganglioside Metabolism Enzymes**

**Presenter(s):** Sophie Alter

**Advisor(s):** Dr. John Miklavcic

IBD is a condition affecting about 0.5% of the western world and prevalence is rising globally and it can be debilitating for pediatric patients. Dietary gangliosides have been proposed as a new potential treatment for IBD. However, human sialidase enzymes may modify the treatment efficacy by catabolizing ganglioside GD3 to GM3 and then into lactosylceramide by the successive removal of sialic acid. The aim of the study assess the feasibility of a dietary buttermilk powder treatment for IBD and to explore how endogenous ganglioside metabolism alters the efficacy of dietary buttermilk powder. A double-blind randomized placebo-controlled clinical trial involved patients (n=11) aged 9 – 21 years with mild-moderate IBD from June 2022 to February 2023. Participants assigned to the treatment group consumed 5 grams of buttermilk powder daily enriched in milk fat globule membrane. Participants were evaluated via complete metabolic panels, PGA, pUCAI, pCDAI, CRP, IMPACT-III questionnaires, and SNPs in genes for ganglioside

metabolism: NEU3 (rs544115), NEU4 (rs2293761). Patient pUCAI and pCDAI declined over the study duration in treatment group, while CRP demonstrated an average 42.5% reduction as well. At baseline, the average albumin level for patients with wildtype NEU4 (AA) was 4.83 (+/-0.44) g/L, compared to 4.04 (+/-0.35) g/L for carriers of the minor allele (G). Treatment with dietary ganglioside reduced albumin level by 16% in the wildtype group, but albumin was unchanged in carriers of the minor allele in NEU4. Carriers of the minor allele in NEU4 who received the placebo showed an elevation in albumin by 13.8% from the beginning of the trial. These findings suggest that genetic variation in ganglioside metabolism pathways may influence the indicating feasibility of dietary interventions with milk fat globule membrane for pediatric patients with IBD. Further research is needed to better understand how SNPs in genes for ganglioside metabolism may alter the efficacy of treatment for clinical outcomes including disease activity index and physician global assessment.

### **7. Rheological Insights into Microgel Behavior: Modeling Velocity Profiles and Flow Characteristics**

**Presenter(s):** Megan Hicks

**Advisor(s):** Dr. Andrew Lyon, Dr. E. Daniel Cárdenas-Vásquez, Elif Narbay

The velocity profile of a fluid is characteristic of most essential processes and is determined by factors such as flow geometry, the properties of the fluid itself and the pressure it undergoes. Understanding microgels' physical principles and statistical relationships is crucial to the success and advancement of biomedical and pharmaceutical applications. Viscosity measurements across multiple temperatures (20°, 27°, 32°, and 37 ° C) and microgel concentrations (50, 100, and 150 mg/mL) in 100 mM NaCl and water allows for the determination of the velocity profile at each concentration. The experimental data obtained were fitted to a Herschely-Bulkley model, an effective model for representing the behavior of a non-Newtonian fluid like microgels. The rheological analysis of microgels provided crucial insights into the concentration-dependent flow behavior and may aid in optimizing various biomedical applications such as drug delivery.

## **Biological Sciences**

### **8. Evaluating the Long-Term Effects of Natural CO<sub>2</sub> Fertilization on Soil Microbial Processing**

**Presenter(s):** Carlos Alderete, Jocelyn Valdivia, Colin Jackson, Alyssa Kimura, Mirabella Romano

**Advisor(s):** Dr. Cassandra Zalman, Dr. Gregory R. Goldsmith, Dr. Joshua Fisher, Dr. Javier Espeleta

Atmospheric CO<sub>2</sub> concentrations are at their highest and are projected to double by the end of the century. To better understand how rising CO<sub>2</sub> levels will affect biological processes, sites naturally elevated in CO<sub>2</sub>, such as tropical volcanic forests, can be examined. Flanks of active volcanoes are often elevated in CO<sub>2</sub> concentrations following diffusion from surrounding magma.

Plants growing on these flanks often exhibit higher CO<sub>2</sub> uptake and rates of photosynthesis in the short term. Subsequently, increased growth can have impacts on belowground soil microbial processing through stimulation of metabolism. The objective of this study was to investigate the effects of volcanically derived CO<sub>2</sub> on microbial processing. Soils (0-120 cm) were collected from 4 elevated CO<sub>2</sub> and 4 control sites in and around Rincon de la Vieja National Park, Costa Rica. In the laboratory, soils (3 g soil: 10 mL DDI) were incubated at ambient temperatures (77 deg FÂ°) for 2 weeks under anaerobic conditions and soil CO<sub>2</sub> production was measured over a 10-week period on a gas chromatograph. Preliminary data suggests that soil microbial CO<sub>2</sub> production was not affected by elevated CO<sub>2</sub> availability. Although studies have shown that exposure to elevated CO<sub>2</sub> concentrations often increases microbial metabolic processing, this effect may not persist over longer time scales. With tropical forests storing 25% of the total biomass carbon, it is essential to understand how increasing atmospheric CO<sub>2</sub> concentrations associated with climate change may affect carbon balance.

### **9. The Morphometrics of Hagfish Eggs**

**Presenter(s):** Hannah Choi, Caroline Gallagher

**Advisor(s):** Dr. Douglas Fudge

Hagfish are benthic marine animals with unknown reproductive behavior and methods. Females deposit eggs characterized by unique anchor filaments at the poles of the main egg capsule, facilitating attachment. We conducted micro-CT scans on unfertilized eggs from several species to investigate the mechanics and morphology of hagfish egg structure and attachment. Using 3D Slicer software, we analyzed these scans to visualize and study the egg structures in detail. Additionally, we have captured photographs of the poles of the eggs utilizing a Zeiss Stereo Zoom Microscope. These photographs include the poles of eggs with developed filaments and the poles of eggs that have undergone dissection to reveal the development of filaments underneath the surface. Our findings include observations on anchor filament diameter, filament stalk diameter, lobe count, filament count, and developmental photographs of the stages of filament growth, allowing the categorization of egg morphology traits across several different specimen.

### **10. How Do You Like Your Eggs? An Exploration of Hagfish Reproduction**

**Presenter(s):** Lillian Holmberg, Kareena Setya

**Advisor(s):** Dr. Douglas Fudge

How does burrowing influence Hagfish reproduction? Hagfish reproduction has never been observed in captivity. Our hope is that the burrowing simulator will encourage reproduction so as to determine the methodology of fertilization (e.g. direct fertilization, ingestion, etc.). We installed the custom-built burrowing simulator with Pacific Hagfish on the bottom layer, and Atlantic hagfish on the top layer. We modified the burrowing simulator by adding a GoPro rod in order to get footage of burrowing behavior.

**11. Energetics of Atlantic Hagfish (*Myxine limosa*)**

**Presenter(s):** Renata Spinelli

**Advisor(s):** Dr. Douglas Fudge

Hagfishes are jawless fishes resembling eels that live in the deep waters of the world's oceans and are well known for producing slime to ward off predators. As scavengers that feed on dead marine organisms on the seafloor, hagfishes can withstand extreme conditions within animal carcasses, such as low oxygen, high carbon dioxide, and high ammonia. However, previous observations of hagfishes dying when transferred directly from 11°C to 1°C indicate they do not tolerate excessively cold temperatures. Some research has been conducted on the effects of temperature on the metabolic rate (MR) of Pacific hagfish (*Eptatretus stoutii*), but less on that of Atlantic hagfish (*Myxine limosa*). In this series of experiments, MRs of *M. limosa* will be determined by measuring the oxygen consumption rates of *M. limosa* in a respirometry chamber in increments of 2°C from 11°C to 1°C. We hypothesize that hagfish MRs will be more sensitive to temperature change than those of fishes that live in variable environments because hagfishes live in highly stable thermal environments.

**12. Analyzing Microplastic Concentration in *Eptatretus stoutii***

**Presenter(s):** Miya Escalante, Ari Dedeoglu

**Advisor(s):** Dr. Douglas Fudge, Dr. Andrew Lowe

Microplastics are plastics that have been degraded to be less than 5 mm in size and are contaminants with adverse effects on the physiology, health, and reproduction of marine life. Hagfish are deep-sea (benthic) scavengers that may uptake microplastics due in particular to two aspects of their lifestyle - burrowing in sediments and scavenging on animal carcasses. This study will analyze microplastic concentrations in different hagfish (*Eptatretus stoutii*) tissues. The gastrointestinal tract, muscle, viscera, and skin tissues were digested using 10% potassium hydroxide (KOH) for 24 hours in 60°C conditions. This was then filtered through microporous glass fiber filters. The filters were analyzed for the presence of microplastic size, shape, color, and concentration. Preliminary data shows a high presence of blue, red, and translucent microplastics, as well as the presence of microplastics in all analyzed tissues. This is one of the few studies that looks at microplastics in benthic scavengers, which will aid in identifying how microplastics travel throughout trophic levels and the ecosystem.

**13. Unraveling the Mechanism of Hagfish Slime Deployment**

**Presenter(s):** Jewelz Cook

**Advisor(s):** Dr. Douglas Fudge

Hagfishes are unique marine animals known for their defense mechanism of secreting slime, which quickly expands and clogs the gills of predators. This slime consists of mucous vesicles and tightly coiled thread skeins that rapidly unravel when exposed to water. How the thick glandular exudate transforms into ultra-dilute slime in a fraction of a second is poorly understood, especially regarding the mucous fraction. This study investigates the hypothesis that turbulent forces cause the mucous vesicles to transform from swollen disks to expanded sheets, to "hole" sheets, and

finally to mucous filaments with a diameter of about 200 microns. In the experiment, hagfish were anesthetized using a clove oil mixture, and slime exudate was extracted and placed into 20°C deionized (DI) water. Samples were subjected to varying degrees of mixing, controlled by tube inversions, to simulate different levels of water turbulence. Following freezing in liquid nitrogen and lyophilization, samples were observed under scanning electron microscopy (SEM) to assess different stages in thread skein unraveling and changes to mucus vesicle morphology. With this approach, we can further understand the biophysical mechanisms underlying hagfish slime deployment, and help us design bio-inspired materials that can replicate the behavior and performance of hagfish defensive slime.

#### **14. Transcriptome and Metabolome Analysis Reveals the Effect of Drought on *Borago officinalis***

**Presenter(s):** Borey Kong

**Advisor(s):** Dr. Hagop Atamian

Drought is one of the most threatening environmental stressors, with a wide range of direct and indirect economic, environmental, and social impacts. Thus, plants are manifesting an array of adaptive mechanisms to survive and thrive under diminishing water resources. One plant that could potentially adapt these defense mechanisms is *Borago officinalis*, or borage, an annual herb belonging to the family Boraginaceae that is well known for relieving the symptoms of anti-inflammatory diseases. To understand the response of borage to drought on the molecular level, we utilized high throughput transcriptome sequencing (RNA-seq) and untargeted metabolomics to profile these adaptive mechanisms. Seeds of borage were germinated and exposed to well-watered and drought conditions for four weeks, and then the leaves and roots were subjected to RNA extraction and metabolome profiling. The transcriptome identified differentially expressed genes (DEGs) in the leaf, root, and common between both tissues. DEGs in the root were upregulated in the drought for substance transport and biosynthetic processes, while DEGs in the leaf were upregulated for ribosome assembly. Also, leaves and roots were both highly upregulated in hormone-signaling pathways, such as the abscisic acid (ABA) pathway. Furthermore, the metabolome identified differentially accumulated metabolites (DAMs) in the root and leaf, including highly abundant sterols and lipids across the leaves and roots. Through these findings, we were able to identify the molecular responses that contribute to borage's ability to thrive under drought conditions.

#### **15. Chia as a Potential Replacement for Water-Demanding Alfalfa**

**Presenter(s):** Sophie Pel

**Advisor(s):** Dr. Hagop Atamian, Dr. Lillian Senger

Alfalfa is a nutritious livestock feed source but poses significant challenges in drought-prone areas due to its high water requirements. Chia is an emerging crop that uses up to 38% less water while being able to thrive in the same environments as alfalfa. This is significant as replacing alfalfa with chia would help conserve water. The goal of this project is to use proximate analysis to assess the nutritional quality of chia leaves. Using the kjeldahl method, the crude protein of alfalfa and chia

leaves were quantified. The results under our experimental conditions indicated that chia leaves have around 22% crude protein compared to 15% in alfalfa. Moreover, our amino acid analysis identified similar amino acid profiles between alfalfa and chia. However, there were significant differences in the quantity of some amino acids. Finally, our analysis of the phenolic acid profiles of chia and alfalfa, using high performance liquid chromatography, identified seven distinct phenolic acids in chia leaves, which were different from those identified in alfalfa. These findings suggest that water efficient chia could serve as a sustainable alternative to water demanding alfalfa, resulting in significant water conservation benefits.

#### **16. Factors Shaping Students' Study Strategies in an Introductory Biology Classes**

**Presenter(s):** Makaylee Dahms, Molly Niswender

**Advisor(s):** Dr. Jeremy Hsu

Promoting students' use of effective study strategies is critical in introductory biology courses, particularly since many students rely on less productive study strategies upon entering college (Walk-Shannon et al., 2021). However, despite this, it remains unclear how students develop these study strategies and what may motivate students to change their strategies. Past work examining student study strategies in biology have largely been conducted at large, research-intensive universities (i.e., R1 universities) (e.g., Walk-Shannon et al., 2021), with only limited work exploring how students study at non-R1 universities. Therefore, we conducted a study to answer the research questions: 1) How do students in an introductory biology class for undergraduate STEM majors study at an open-enrollment and R2 university? 2) Where do students learn about their current study strategies? 3) What factors cause students to change their study strategies, if at all? We designed an interview protocol following an iterative process. First, multiple researchers independently brainstormed questions before discussing. Next, we conducted cognitive process interviews to support the validity of the questions, refining questions as needed. We then conducted semi-structured interviews with STEM majors taking an introductory biology course at an open-enrollment university. We are in the process of interviewing more students and will transcribe the interviews and conduct thematic analyses. Our preliminary analysis suggests that students tend towards having more active study strategies as they progress through college. Most students indicated individuals such as peers, family, or professors had a strong influence on their study strategies. Students also highlighted having a surface approach to learning and lacking metacognitive abilities. Our work adds to the existing literature related to how students study. Understanding how students develop their study strategies and what sparks changes in their studying can facilitate future interventions that promote effective studying.

#### **17. What do students think of STEM course office hours at a two-year college?**

**Presenter(s):** Grace Holick

**Advisor(s):** Dr. Jeremy Hsu

Office hours are key supports in STEM courses, yet little research has examined office hours at two-year colleges (2YCs), which enroll a quarter of all STEM students and serve a more diverse

population than four-year colleges (4YCs) (AACC, 2021; NSF, 2019). Our study addresses three research questions: 1) What motivates students at a 2YC to attend office hours, and what barriers exist? 2) Do instructors' perceptions align with students'? 3) What strategies do instructors use to encourage attendance? We applied expectancy value theory (EVT) to understand students' motivations; under EVT, students' likelihood of attending office hours is influenced by their perceived value, costs, and expectations of success. Building on research about office hours at 4YCs (Hsu et al., 2022; Forsythe et al., in review), we surveyed 324 students and 19 instructors in introductory STEM courses at a public 2YC in Southern California. We conducted thematic analysis of free-response questions, achieving high reliability (Cohen's kappa  $>0.69$ ) for coding, and one coder analyzed the remaining responses. Students primarily cited course content clarification as a benefit, a motivator instructors also emphasized. However, students identified scheduling conflicts, lack of specific questions, and feeling intimidated as barriers that lowered their expectancies of success. In contrast, instructors viewed intimidation as the most significant barrier but did not recognize the same structural issues students reported. Instructors used various strategies to encourage attendance, including frequent reminders and discussions of the benefits and norms of office hours. Our findings reveal similarities and differences between 2YC and 4YC students' perceptions: both groups largely noted similar motivations for attending office hours, yet 2YC students identified fewer benefits. This research underscores the need to address specific barriers at 2YCs to improve office hours attendance, especially as it affects students' academic experiences and access to support.

### **18. Exploring the Role of Linguistic Capital in Asian American Students in STEM**

**Presenter(s):** Tammy Bui, Jessie Tsai

**Advisor(s):** Dr. Jeremy Hsu

Asian Americans are the largest minority in STEM. However, their experiences, challenges, and motivations in STEM are underexplored, with many viewing Asian Americans as a monolith. We seek to understand how different Asian Americans navigate STEM by utilizing Community Cultural Wealth (Yosso, 2005). This framework proposes different cultural capitals that students draw upon to navigate a discipline. Here, we concentrate on linguistic capital and address the question: How do Asian American undergraduates utilize linguistic capital in and outside of STEM? We conducted 43 semi-structured interviews with AA STEM students from three universities: a private R2 university in California, a research-intensive public university in California, and a private baccalaureate college in Minnesota. Following transcription, two researchers independently read 60 excerpts and developed a consensus codebook. Next, the two researchers independently coded another 15 excerpts, with Cohen's kappa at 0.74 (Cohen, 1960). One researcher then coded the remaining excerpts. We found several themes relating to linguistic capital. First, many students reported that proficiency in a second language was advantageous for their career goals, especially in healthcare, where it allowed them to connect with patients. Secondly, many students use codeswitching (Lin & Li, 2015) to navigate different environments, adopt formal language, primarily English, in professional settings, and use an informal tone in casual interactions. We found that some students would, at times, use their artistic interests to relieve stress from what

they perceived as an intense academic environment within STEM. Lastly, other students reported that speaking a second language strengthened their cultural identity and sense of belonging on campus. Our study offers insight into how linguistic capital shapes AA STEM students' academic experiences. Our findings suggest that STEM programs should seek to understand the diverse linguistic and cultural assets of AA students, as these impact their sense of belonging within their fields.

## Chemistry

### 19. Effects of Freezing and Organic Matter on Iron Oxyhydroxide Nanoparticle Aggregation

**Presenter(s):** Janelle Jacques

**Advisor(s):** Dr. Christopher Kim

Metal contaminants are a significant concern in a wide range of aquatic systems, which leaves a probable concern for human and environmental health. One way of reducing potential exposure to metals in aquatic systems is by adsorption of dissolved metal ions to a solid phase, like iron hydroxides, which are found in abundance in natural systems. After iron hydroxides form in natural waters, they often rapidly aggregate because of changing physical conditions, which will affect their effective sorption capacity. In the current study, we have explored the effects of freezing iron hydroxide suspensions and the presence of dissolved organic matter on iron oxyhydroxide nanoparticle aggregation. FeOOH (goethite) nanoparticles were synthesized through a flash microwave method. They were washed in 1000 MWCO dialysis tubing against DI water for 5 days, then stored in suspension at 4°C at their as-synthesized pH between 4.5 and 5.0. After synthesis, aliquots of the nanoparticle suspension were frozen for varying lengths from 0 to 65 minutes in a -70°C freezer, after which the remaining liquid was recovered and weighed to calculate the percentage of frozen suspension. This will simulate the freezing over of lakes and natural waters, showing us how our iron oxyhydroxide nanoparticles behave in those environments. Separately, aliquots of the nanoparticle suspension were exposed to fulvic acid in concentrations ranging from 0-150 mg/L for 5 days. This also shows the behavior of iron hydroxide nanoparticles under dissolved organic matter concentrations that are representative of the natural environment. All nanoparticle aggregates were then analyzed to determine their average size and size distribution using an SEM Micromeritics PSA and a Mobius Dynamic Light Scattering (DLS) instrument. The data collected from these two systems demonstrate an increase in aggregate size with progressive freezing and organic matter. Furthermore, aggregates show progressively lower levels of Cu(II) and Zn(II) adsorption and retention than non-aggregated nanoparticles.

**20. Characterizing Plasmonic Au Nanoparticle Core-Shell Catalysts through CO Oxidation****Presenter(s):** Melia Hernandez, Aidan Tran**Advisor(s):** Dr. Jerry LaRue

Being a world where transportation is crucial, catalysts are essential for speeding up the chemical reactions required to produce fuels. There are many different categories of catalysts ranging from organic to inorganic that can involve expensive materials and extreme chemical environment conditions to initiate the catalyst activity. In the place of expending higher temperatures and pressures to synthesize this outside energy source, a natural source of energy can be used instead, such as the sun. To be more energy efficient, photocatalysts, which require solar energy to initiate their catalytic activity, can be used. More specifically, using a photocatalyst comprised of a plasmonic gold core nanoparticles would be beneficial due to the presence of a collection of oscillating electrons in the core, which allow it to absorb light more efficiently compared to other materials. However, to tune the electronic structure of the gold to suit a wider variety of reactions, a gold core-transition metal shell structure can be used. To determine the most efficient core-shell ratio and transition metal type, starting with a well-known reaction, such as CO Oxidation, and progressing to more complex reactions, such as CO Hydrogenation, would allow the characterization of different shell variations to create a more effective photocatalyst for a wide range of reactions. Combining photochemistry with the catalys's plasmonic ability, selective bond activation can be accomplished, which can aid in reactions with a usually nonreactive species. This category of plasmonic bimetallic catalyst's can be further explored to synthesize a more energy efficient class of catalysts.

**21. Experimentally Determining pKa of a Morphine-Like Molecule using NMR****Presenter(s):** Anna Cuzick, Mia Sharma**Advisor(s):** Dr. Matthew Gartner

Molecular extension and dissection techniques are used to design a morphine derivative that promotes selective binding in inflamed tissue due to its lower pH while avoiding dangerous activation in the brain. Morphine, a benzylisoquinoline alkaloid, is a member of the opioid class of drugs and is used to treat pain associated with inflammation. While being effective analgesics, opioids carry the risk of central side effects, including addiction, respiratory depression, and sedation. Opioids are agonists that bind to the  $\mu$ -opioid peptide receptor (MOR) within central and peripheral nerves and act via a G-protein coupled receptor pathway. Deprotonation of the tertiary amine induces a negative charge on the nitrogen, discouraging binding at physiological pH (pH=7.4). Adding a fluorine atom on a carbon beta to the amine allows fluorine's inductive effects to decrease the pKa. Decreasing the pKa of the biochemically active amine group promotes selective binding in peripheral opioid receptors within inflamed tissue (pH=6-6.5). Protonation remains possible in inflamed tissue in lower pH environments. Previously determined computational pKa values of a morphine molecule provide insight into morphine's binding sites and how active they are. To validate the computationally determined pKa values, Nuclear Magnetic Resonance (NMR) analysis is utilized to experimentally determine these pKa values. Pyridine, with a known pKa value, is used as a model molecule during the NMR protocol

development to validate the pKa. Accurate pKa determination is crucial for understanding behaviors of opioid molecules such as solubility, absorption, and receptor binding. With NMR for this project, protonation changes can be monitored across various pH levels, which yields precise calculations of the analyte's pKa. By establishing a replicable protocol, computationally determined pKa values can be validated experimentally for different analgesics and morphine-like molecules. This research can pave the way for designing new and potentially non-addictive opioid derivatives.

## **22. Computational logP Calculations and Determination of Lipophilicity Values of Fluorinated Morphine Derivatives**

**Presenter(s):** Mirabella Romano, Allison Vu, Emily Chen

**Advisor(s):** Dr. Matthew Gartner, Nayiri Alexander

The addictive effect of opioids impacted 60 million people globally in 2023. This opioid crisis necessitates the development of opioid derivatives that maintain analgesic efficacy while minimizing addictive effects from opioid use. The present work focuses on morphine, a commonly prescribed opioid with high affinity to the mu-opioid receptor (MOR). Morphine binds non-selectively within both healthy and inflamed tissue. By modifying morphine's structure through fluorination to counteract its non-selective binding, the drug's pharmacological ability to provide effective pain relief comes with a lower risk of addiction. Specifically, the addition of fluorine to differing beta positions of the main binding site leads to the reduction in pKa (pKa: 6.1-7.83) in comparison to morphine's pKa (8.2). This reduction in pKa induces specificity to binding within inflamed tissues while avoiding binding within healthy central tissues. We aim to compare the lipophilicity of fluoromorphine derivatives and their connection to pKa and analgesic effects. Lipophilicity, often measured by the partition coefficient (logP), plays a crucial role in morphine's ability to cross lipid membranes, potentially influencing its interaction with MOR. LogP is calculated using  $\log P = (\text{Gibbs Free Energy (water) HFE} - \text{Gibbs Free Energy (octanol) SFE}) / RT(\ln(10))$ . Calculations are performed in the Keck Computational Research Cluster through the use of Gaussian 16 and Gaussview 6 to model the derivatives computationally. These results will provide insight into potentially increasing the affinity of binding selectively in lower acidity tissues through fluorination of morphine and increased lipophilicity, leading to increased analgesia.

## **Communication Sciences and Disorders**

### **23. Access to Books in a Family Homeless Shelter**

**Presenter(s):** Sarrah Wilkes, Sophie Mines, Lauren Fillet, Olivia Wallace

**Advisor(s):** Dr. Mary Fagan

Language, a central part of child development, is fostered not only through repeated speech to children, but also through reading to children. The number of words children are exposed to at a young age impacts their vocabulary and reading development. In particular, children from low-

income homes have faced more difficult challenges in developing age-level reading abilities (Dickinson et al., 2012). A lack of or shortage of reading materials can also contribute to academic and language delays. A previous research study found that families in a homeless shelter had comparatively fewer children's books, visited libraries less often, and were less likely to read to children daily (Fagan, 2022). That study, based on parent survey data, was limited by the questions presented. The purpose of the present study was to interview parents/caregivers in order to allow for more open-ended responses. The open-ended questions in the interviews, asked caregivers about their education backgrounds, duration of homelessness, access to libraries, and reading engagement with their children. The aim of the study was to explore how children and families may experience the effects of homelessness on access to books and other reading materials both prior to and during their time in a homeless shelter.

#### **24. Preactivation of Semantic and Phonological Information in Deaf Readers**

**Presenter(s):** Danielle Moraga, Lauren Fillet

**Advisor(s):** Dr. Zed Sehyr

Readers can use linguistic and contextual clues to predict upcoming words in a sentence. This predictive processing allows for more efficient recognition of upcoming words, particularly when the context of a sentence is predictable. Evidence suggests that for hearing readers, preactivation of word semantics and phonology facilitates the recognition of upcoming words in a sentence. Readers who became deaf/hard-of-hearing before learning a language rely primarily on visual rather than auditory input, and it is unclear if they engage in similar predictive processes. The study aims to investigate the extent to which deaf readers pre-activate semantic and phonological information during sentence comprehension. We recorded electroencephalogram data from deaf and hearing participants as each participant read 224 high-cloze probability sentences. Each sentence was presented one word at a time on the center of a computer screen, followed by a comprehension question. The critical words were always sentence-final and manipulated into four conditions: congruent, semantically incongruent, pseudo-homophone, and orthographic control pseudoword. Only correct responses were analyzed. It was hypothesized that, similarly to hearing readers, deaf readers will show semantic pre-activation but may differ in phonological pre-activation due to decreased reliance on speech sounds. Thus far, data has been collected from 22 participants (11 deaf signers, 19 hearing non-signers). Preliminary results demonstrated a typical N400 response for semantically incongruent words compared to congruent words. This indicates semantic pre-activation in both groups, consistent with our hypothesis. Interestingly, differences in the Late Positive Complex (LPC) indicate hearing readers exhibit a positive-going LPC for incongruent endings. In contrast, deaf readers showed negative going LPC for predicted sentence endings, suggesting continued semantic processing post-lexical access in deaf readers. Our findings contribute to understanding the process used during reading comprehension in deaf readers.

## Computer Science

### **25. Advancing Holographic Interactivity: Design Principles and User Engagement in HoloMind**

**Presenter(s):** Jaime Song, Hannah Bauer

**Advisor(s):** Dr. Franceli Cibrian

Our research project, HoloMind, explores the potential of developing interactive experiences using a holographic display to engage the audience in relevant education, and wellness outcomes. To accomplish this aim we are using the Dreamoc HD3.2 by Realfiction, which provides a passive playback of preloaded 3D visuals. The first step in our methodology is to get familiar with the Dreamoc HD3.2 hologram, create 3D visuals, and uncover design guidelines and best practices for creating 3D visualizations. To create 3D visualizations, we are using Adobe Substance 3D Stager. Then, we adapt Realfiction's template in Adobe After Effects to precisely fit the specific dimensions required for optimal visualization on the display and render the video to upload. To optimize our visuals, we ensure high contrast for clarity in low light, build scenes with balanced depth, and layer floating elements at different depths with subtle motion, such as orbit or spin, to enhance the 3D effect. To upload the information, this should be stored on a micro SD card with NTFS formatting to ensure it is readable by the hologram. Currently, we are collecting user feedback through our QR code and survey to provide personalized content and potential scenarios to develop content. In future work, we plan to integrate cameras that can detect movements and gestures, allowing specific holographic content to trigger in response. These motion detection algorithms will interpret user inputs along with the QR code functionality that will facilitate content customization. The expected results include an increase in user engagement, satisfaction, and interactivity across application scenarios, as well as insights into technical challenges and solutions for implementing the hologram. By enhancing Dreamoc HD3.2's functionality, our research aims to broaden the applicability of holographic displays, paving the way for a more immersive human-computer interaction framework and advancing interactive technologies.

### **26. Using Wearable Sensors to Improve Feedback Given to Dance Students**

**Presenter(s):** Yanelly Mego

**Advisor(s):** Dr. Franceli Cibrian

The structure of dance classrooms has remained largely unchanged for years, with minimal integration of technology to enhance teaching. This has motivated our research project, which aims to capture dance movements using wearable sensors and translate the information into meaningful visualizations to help dancers improve their skills. As the first step in addressing the research question "can data from commercial wearables differentiate between the movements of dancers and non-dancers?" we developed DANCETAG (Data Analytics and Notation with Captured Event Tagging), a platform designed for data collection and movement annotation. We utilized Sony's Mocopi sensors, a motion capture system with six sensors attached via velcro

straps. These sensors connect to Sony's app, transmitting data in Biovision Hierarchy (BVH) format for analysis. To answer the research question, we conducted a user study with 34 participants performing 30 movements. A professional dancer served as a baseline for comparing movements against other participants using the Dynamic Time Warping algorithm. Our initial visualization method generated heatmaps depicting these differences. Afterward, we grouped participants based on their dancing abilities: dancers (n=13), physically active individuals (n=18), and non-dancers (n=21). T-tests revealed significant differences between these groups, indicating that movements involving weight shifts showed greater similarity to the baseline than movements with more variation, such as walking. These findings suggest that wearable data analysis can effectively reveal movement similarities and differences among varying skill levels. We are currently developing alternative visualizations to provide practical insights for both instructors and students. Our goal is not to replace instructors with technology but to use it as a supplement to enhance feedback. This approach improves traditional teaching methods and introduces new possibilities for dance education. Future work will focus on refining visualizations and exploring additional technological applications.

**27. Creative Insights into Motion: Enhancing Human Activity Understanding with 3D Data Visualization and Annotation**

**Presenter(s):** Isaac Browen

**Advisor(s):** Dr. Trudi Qi

Understanding human behavior in virtual reality (VR) is a key component for developing intelligent systems to enhance human focused VR experiences. The ability to annotate human motion data proves to be a very useful way to analyze and understand human behavior. However, due to the complexity and multi-dimensionality of human activity data, it is necessary to develop software that can display the data in a comprehensible way and can support intuitive data annotation for developing machine learning models able recognize and assist human motions in VR (e.g., remote physical therapy). Although past research has been done to improve VR data visualization, little emphasis has been put into VR data annotation specifically for future machine learning applications. To fill this gap, we have developed a data annotation tool (MOVIAN) capable of displaying complex VR data in an expressive 3D animated format as well as providing an easily-understandable user interface that allows users to annotate and label human activity efficiently. Specifically, it can convert motion data files into a watchable 3D video, and effectively demonstrate body motion: including eye tracking of the player in VR using animations as well as showcasing hand-object interactions with level-of-detail visualization features. The graphical user interface allows the users to interact and annotate VR data just like they do with other video playback tools. To test the usability and effectiveness of this interface a user study was conducted which provided feedback of the usability and effectiveness of the tool in assisting with the visualization and analysis of human behavior. Our next step is to develop and integrate machine learning based clusters to automate data annotation. Currently, we are in the data processing phase, aiming to train a machine learning model to identify specific actions, which will enable the automatic annotation of motion data within the MOVIAN tool.

**28. Privacy-Aware System Failure Prediction Through Joint Longitudinal-Survival Modeling**

**Presenter(s):** Miles Milosevich

**Advisor(s):** Dr. Yuxin Wen

As manufacturing becomes increasingly data-driven, data privacy will become increasingly important for protecting sensitive data and ensuring the security and privacy of manufacturing operations. In this paper, we propose a novel data-driven joint longitudinal-survival modeling framework, which combines statistical survival models and federated learning methodologies to jointly model and extract degradation features, to predict the potential failure just-in-time while keeping the signals private.

**29. Using VR and AI to Enhance Fire Evacuation Training: A Study of Human and AI-Optimized Decision-Making**

**Presenter(s):** Nikhil Ahuja, Gabe Davidson, Caden Goodwin

**Advisor(s):** Jonathan Humphreys

This research investigates how virtual reality (VR) can enhance fire evacuation training by simulating realistic fire emergencies that elicit natural human responses. Traditional fire escape protocols often fail to consider instinctual behavior during high-stress situations, which can lead to inadequate evacuation protocols and training. Furthermore, fire evacuation training without practical exercise (e.g., "fire drills") can lead people to make decisions based solely on concept, as opposed to practical experience, resulting in unsafe decisions. This project addresses this gap by developing an immersive VR experience using the Unity game engine. Participants will navigate from the top floor of an apartment building as an active fire spreads around them. The simulation incorporates variables such as health and oxygen levels, dynamic fire propagation, intense auditory stimulation, and layers of visual feedback to replicate the psychological and physical symptoms that follow intense exposure to active fire conditions. By tracking users' actions and choices, we aim to identify patterns in instinctual decision-making under duress. This VR-based approach enhances the realism of fire drills and holds potential as a scalable tool for fire safety training, bridging the gap between theoretical protocols and practical human behavior.

**30. Mitigating the Risks of Fire Evacuations Through Virtual Reality and Artificial Intelligence**

**Presenter(s):** Gabriel Davidson, Nikhil Ahuja, Caden Goodwin

**Advisor(s):** Jonathan Humphreys

This research explores the application of artificial intelligence (AI) in optimizing fire evacuation strategies within a virtual reality (VR) simulation. Using Unity's ML-Agents reinforcement learning framework, AI agents are trained to navigate complex fire scenarios, identifying the most efficient and safest escape routes. These AI-optimized strategies are then compared with human participants' choices within the same VR environment to uncover discrepancies between instinctual decision-making and calculated optimal actions. While the simulation simulates auditory and visual stressors to replicate the pressures of a real-life fire, our AI model is not

impacted by these systems during training, which still aligns with the AI training objective to find the most optimized evacuation routes. Insights from this comparison aim to reveal potential gaps in current fire safety protocols and training, offering data-driven recommendations for improvement. This AI-driven approach demonstrates the potential for machine learning to complement human-based strategies, ultimately enhancing the design of more effective evacuation plans.

### **31. Measuring Bias Towards Women and People with Disabilities in Large Language Models**

**Presenter(s):** Sarah Fieck

**Advisor(s):** Dr. LouAnne Boyd, Chelsea Parlett-Pelleriti

In recent years, large language models (LLM) have become a prevalent topic in machine learning and artificial intelligence. Closed-sourced models owned by significant technology corporations, such as OpenAI's ChatGPT or Google's Gemini, have made it more accessible than ever for users to interact with highly complex and efficient generative models. While convenient, closed-sourced models can be mysterious in their development details, as little information is disclosed on what is used to create their product. In its architecture, LLMs are constructed to locate patterns in training text to make assumptions of what kind of phrases to follow. Due to the accessibility of the models, it is critical to ensure that they are free of bias in output. As part of the Master of Science in Electrical Engineering and Computer Science program, my thesis research focuses on analyzing bias in LLMs, particularly about gender and disability. Using psychological scales designed to detect and measure bias, LLMs will be treated as subjects, testing their output for biased responses when asked gender and disability-related questions. Several psychological evaluations involving Likert scales to specific scenarios have been used to assess LLM biases, such as the Social Dominance Orientation (SDO) scale, the Ambivalent Sexism Inventory (ASI) scale, and the Stigma Consciousness Questionnaire (SQC). Fourteen bias scales were used and performed on models ChatGPT, Gemini, and Anthropic's Claude. This research aims to locate any biased shortcomings in closed-source LLMs. We want to answer the question of how these commercial models react to certain scenarios to analyze outputs regarding women and people with disabilities, two populations often underrepresented. By locating any hostile rhetoric, developers can further adjust models for a safer user experience. The expected research is to find various outputs that feature differing opinions between models.

## Data Analytics

### **32. Evaluating A WhatsApp Tool for Tracking Developmental Milestones in Young South African Children**

**Presenter(s):** Diego Murillo

**Advisor(s):** Dr. Franceli Cibrian

This research aimed to assess the potential of Mazi Umntanakho ("Know Your Child") in tracking developmental milestones in young children. Mazi is a WhatsApp-based conversational agent that assists South African home visitors in evaluating and monitoring children's socio-emotional skills using the Strengths and Difficulties Questionnaire (SDQ) and the International Development and Early Learning Assessment (IDELA). A field study was conducted in low-income South African communities, where 95 home visitors assessed 1,208 children. This detailed analysis of the data was collected during that deployment, focusing on investigating whether assessment scores improved over time and whether the length of time between assessments impacted results.

To accomplish the aim, we followed a quantitative data analysis. Given that the data was collected in real conditions in a field study, we conducted an extensive data cleaning to filter out irrelevant or inconsistent entries, ensuring only significant and accurate data contributed to the results. From these refined datasets, we conducted an exploratory analysis and developed different data visualizations to illustrate score changes across various organizations and time intervals. From the datasets, we used a paired t-test, the analysis identified trends in score changes over a minimum number of days: >30, 60, 90, and 120 days. Results show no statistically significant difference overall, although scores tended to increase in follow-up assessments conducted after >90 days for SDQ and >60 days for IDELA.

Although there were non-statistical differences, our findings show that home visitors were able to use the Mazi app and collect relevant information from the children. More analysis will incorporate additional visualizations and cluster analyses to refine understanding of these assessments' effectiveness in varied settings.

**Acknowledgments:**

This study acknowledges the valuable contributions of Catherine E. Draper, Armando Beltran, and Gillian R. Hayes.

### **33. Analysis of Lattice Structures through Fused Deposition Modeling Manufacturing of Thermoplastic Polyurethane and Finite Element Analysis**

**Presenter(s):** Matthew Shugarte

**Advisor(s):** Dr. Nicole Wagner

There has been much investigation into additive manufacturing, specifically fused deposition modeling (FDM), of lattice structures and its range of capabilities for niche designs and various materials. Understanding 3D printed components with lattice structures via mechanical testing has been crucial in conveying the stress tolerances of each structure. These tests include tensile, compressive, and flexural strength evaluation for each structure. Through cyclic tests ranging

from ten to a hundred cycles, non-auxetic lattice structures have exhibited better tolerances for larger force loads. In contrast, auxetic lattice structures have demonstrated slower degradation rates. Analyzing the strength data prompted the use of finite element analysis (FEA) to better understand the stress limits of the designed, 3D-printed, and mechanically tested specimens and chosen material (thermoplastic polyurethane) via computer simulations. Via Autodesk Inventor, these structures behave similarly to the physically conducted tests in the designed simulations, which validate the reliability of these simulations. By not being limited to the physical limitations of conducting cyclic tests, simulations have demonstrated how these specimens fatigue in response to testing conditions that couldn't have been conducted in the laboratory.

## **Electrical Engineering**

### **34. A Wearable Knee Alignment Correction Device for Real-Time Monitoring and Feedback**

**Presenter(s):** Kourtney Barbour, Leeor Oshri, Miles Milosevich

**Advisor(s):** Tony Lemus

Knee misalignment during rehabilitation can lead to reinjury and hinder recovery outcomes. This wearable knee alignment correction device uses gyroscopic sensors to monitor knee positioning in real time, providing patients with immediate feedback when misalignment occurs. Sensors around the knee joint capture data on orientation, flexion, and alignment, which is continuously compared against thresholds set by clinicians based on the patient's stage in the recovery process. Upon detecting deviations from these personalized parameters, the device activates audible and visual alerts to prompt realignment. This system provides ongoing, real-time guidance, encouraging patients to maintain proper knee positioning in day-to-day life and avoid reinjury. Logged sensor data also allows physical therapists to monitor adherence to movement guidelines and adjust thresholds as recovery progresses. By supporting tailored treatment plans, this device helps ensure that patients meet their rehabilitation goals safely and effectively.

## **English**

### **35. The Reluctance to Write: Seamus Heaney's Poetry during the Troubles**

**Presenter(s):** Emily McEachin

**Advisor(s):** Dr. Justine Van Meter

In Northern Ireland, the late 1960s ushered in a period of devastating violence, sectarian conflict, and paramilitary involvement that lasted until 1998. These three decades of conflict, known as the Troubles, would irreversibly shape the lives of thousands, influencing the writers of the region. This project centers on one such poet, Seamus Heaney, and his struggle to determine how he wants his work to address the political issues of his time. It traces his journey from early nature-centric poems in *Death of a Naturalist*, where simple rural life is depicted with undercurrents of violence, to *North*, in which present violence is interwoven with references to

an anthropological past. This evolution culminates in works like “Casualty,” which directly confronts the immediate impact of the Troubles on individuals, effectively blending personal and political themes. The inclusion of “Summer 1969” in this study provides further insight into Heaney’s internal struggle to balance political realities with the aesthetic, reflecting his own questioning of the responsibility of a writer while vacationing in Spain. Through this lens, this project situates Heaney within the broader context of Troubles literature, examining his transition into a more politically engaged poet whose work helped chronicle and memorialize the turbulent experiences of his community.

## **Environmental Science and Policy**

### **36. Assessing the Impact of Weathering on Arsenic Bioaccessibility and Mine Waste Material at Empire Mine, California**

**Presenter(s):** Andrew Tahhan, Mariah Tsuruda, Elena Skender

**Advisor(s):** Dr. Christopher Kim

The mining industry has left an enduring environmental legacy in the form of numerous inactive mine sites across the state containing processed mine tailings elevated in potentially toxic metal(loid)s. Arsenic (As) is a naturally occurring metalloid that is commonly found in gold mine tailings, and ingesting As can cause health issues including respiratory, cardiovascular, and gastrointestinal issues. However, the potential risk posed by As in mine tailings is highly variable due to the wide range of As bioaccessibility (proportion of soluble As) within tailings. Developing more predictive methods of characterizing As bioaccessibility in tailings would improve exposure and risk estimates. This study focuses on Empire Mine, an abandoned gold mine located in Nevada County, California. Mine tailings were collected from several locations at Empire Mine as bulk grab samples and sieved into discrete size fractions. The samples are then measured for surface area using a BET surface area analyzer and exposed to a simulated gastric fluid (SGF) to simulate ingestion. After filtration, supernatants were analyzed for dissolved As using an ICP-OES to determine As bioaccessibility. The data is then analyzed to evaluate how particle size affects the bioaccessibility of As in these samples. We also evaluated the effects of physical weathering on As bioaccessibility by grinding selected size fraction, then repeating the SGF extraction process to compare As bioaccessibility pre- and post-grinding. The study will analyze a specific grouping of sites at the Empire Waste Dump area, where it is predicted that ground samples will generally have a greater percentage of As released. This suggests that As release is influenced by particle size, with finer fractions potentially releasing more As due to increased surface reactivity. Furthermore, as particles break down naturally through weathering, As ingestion can become more dangerous over time.

**37. Assessing the Impact of Weathering on Arsenic Bioaccessibility and Spatial Variation at Empire Mine, California**

**Presenter(s):** Mariah Tsuruda, Elena Skender, Andrew Tahhan

**Advisor(s):** Dr. Christopher Kim

The mining industry has left an enduring environmental legacy in the form of numerous inactive mine sites across the state containing processed mine tailings elevated in potentially toxic metal(loid)s. Arsenic (As) is a naturally occurring metalloid that is commonly found in gold mine tailings, and ingesting As can cause health issues including respiratory, cardiovascular, and gastrointestinal issues. However, the potential risk posed by As in mine tailings is highly variable due to the wide range of As bioaccessibility (proportion of soluble As) within tailings. Developing more predictive methods of characterizing As bioaccessibility in tailings would improve exposure and risk estimates. This study focuses on Empire Mine, an abandoned gold mine located in Nevada County, California. Mine tailings were collected from several locations at Empire Mine as bulk grab samples and sieved through into discrete size fractions. The samples are then measured for surface area using a BET surface area analyzer and exposed to a simulated gastric fluid (SGF) to simulate ingestion. After filtration, supernatants were analyzed for dissolved As using an ICP-OES to determine As bioaccessibility. The data is then analyzed to evaluate how particle size affects the bioaccessibility of As in these samples. We also evaluated the effects of physical weathering on As bioaccessibility by grinding selected size fraction, then repeating the SGF extraction process to compare As bioaccessibility pre- and post-grinding. The study will examine spatial variation through analyzing multiple sites composed of different material waste present at the Empire Mine. Initial results, where ground samples generally have a greater percentage of As released. This suggests that the chemical speciation and spatial distribution of As is more amenable towards As release in the finest size fractions. Furthermore, as particles break down naturally through weathering, the potential risk of ingesting As could become a greater issue over time.

**38. Adsorptive and Desorptive Behavior of Metal Cations on Iron Oxyhydroxide Nanoparticles Under Varying Salinity Conditions**

**Presenter(s):** Cristina Inboden, Miguel Olivas-Maldonado

**Advisor(s):** Dr. Christopher Kim

Metal contaminants in aquatic systems can be effectively sequestered from the dissolved phase through adsorption to mineral particle surfaces such as those of iron oxyhydroxides. However, the variable salinity of natural waters can complicate the adsorption, desorption, and retention of metal ions to such sorbents. This study characterizes the adsorptive and desorptive properties of zinc and copper metals in multiple saline conditions at concentrations ranging from those in freshwater to saltwater systems. This allows for the identification of which metal demonstrates greater retention or higher adsorption efficiency, and which salt most effectively facilitates the binding of metals to iron oxyhydroxides.

FeOOH (goethite) nanoparticles were synthesized through an established flash microwave method, washed in 1000 MWCO dialysis tubing against DI water for 5 days, then stored in suspension at 4°C at their as-synthesized pH between 4.5 and 5.0. The nanoparticle suspensions

were then exposed to 0.5 mM Cu (II) or Zn (II) with the pH adjusted upwards to 6.5 and 7.5, respectively, to induce metal cation adsorption to the nanoparticles. After a 24-hour adsorption period, the sorbed nanoparticle suspensions were exposed to sulfate, chloride, sulfate + chloride, or artificial sea water (ASW) at concentrations representing the range from freshwater to seawater. After an additional 18 hours, the suspension pH was reduced to 5.0 to induce metal cation desorption from the nanoparticles. The suspensions were then centrifuged, filtered through a 0.45 µm filter, and acidified to a pH less than 2 before the supernatants were analyzed using Inductively Coupled Plasma Optical Emission Spectrometry (ICP-OES). The percentage of metals absorbed and retained in the separate environments were calculated from the ICP-OES data. The results suggest that the salt conditions examined enhance the adsorption and retention of both metals in the following order: sulfate < chloride < sulfate + chloride < ASW, and that Zn (II) exhibits higher retention than Cu (II) in all environments.

**39. Evaluating the Role of Wetland Habitat Features in Shaping Bird Residence Patterns for Effective Conservation Strategies**

**Presenter(s):** Josie Lester

**Advisor(s):** Dr. Richelle Tanner

As climate change continues to impact ecosystems worldwide, wetlands have been disproportionately affected because they are close to human settlements. Wetland degradation is an essential focus for habitat restoration because increased connectivity of these sensitive habitats can significantly improve ecosystem function. The Los Cerritos Wetland (LCW) is an urban wetland fragment in Southern California in the pre-tidal restoration stage. Neighboring waterways are home to many animals, including sea turtles, fishes, and birds. We set out to understand the current use of LCW habitats pre-restoration to better track the impacts of tidal restoration on this wetland fragment. We focused on native birds because they utilize the habitat as part of their migration pattern. This study looked at the effects of wetland habitat features, like plant community composition, on native bird occupancy. We also looked at time of day use to determine bird residence time in the wetland. Birds were more frequently observed within salt marsh habitats containing native, shorter species like pickleweed compared with taller, invasive brush-like mustard grass. The most commonly observed species were egrets and swallows, which were more frequently observed at dawn and dusk during cooler times of day. Understanding the influence of wetland habitat features and bird residence patterns is crucial for informing conservation strategies that protect and enhance these critical ecosystems for native bird populations.

**FFC****40. Unfaithfulness in the Book of Faith****Presenter(s):** Chloe Pauls, Amalia Serrano, Alia Tomazic, Stone Foss**Advisor(s):** Dr. Julye Bidmead

The purpose of our project is to take texts from the Hebrew Bible that involve adultery and connect them to relevant modern day instances of adultery. For our texts from the Hebrew Bible, we will focus on Bathsheba (2 Samuel 11-12; 1 Kings 1-2) and The Test for an Unfaithful Wife (Numbers 5). In the story of Numbers 5 there is a law that if a woman goes astray and has sexual relations with another man while they are married and it is hidden from her husband then if he is suspicious then he can take her to the priest. He has to take an offering of a tenth of ephah of barley flour on her behalf. The priest takes the wife and has her stand before the Lord and makes a holy water drink in a clay jar. The drink is holy water, and dust from the tabernacle floor. She has to drink the water and place her hands in the grain. If she has not been unloyal that's the drink will cause her no harm but if she has been unfaithful then it will cause her womb miscarry and your abdomen will swell. In the story of Bathsheba, King David sees Bathsheba from his palace bathing. He wants her and calls her to his palace. He sleeps with her, even though she is a married woman. To cover up the adultery he puts Bathsheba's husband at the front lines of battle and he dies. Now Bathsheba is King David's wife. Our expected results are that there will be lots of parallels between adultery between biblical texts and our current time. However, we expect the modern-day stories/events to be simpler and less dramatic stories.

**41. Biblical Patriarchy in #MeToo****Presenter(s):** Landrigan Buzzi, Franny Greene, Lily Gundrey, Desiree Smith**Advisor(s):** Dr. Julye Bidmead

Ancient concepts of patriarchy are still relevant today. In our research, we will explore the influence of patriarchy specifically in the story of Eve (Genesis 1:1 - 3:24), the story of Lot's daughters (Genesis 19), and Jephthah's daughter (Judges 11) as well as modern patriarchal parallels. By comparing these biblical texts to modern societies this research aims to determine the long term effects of prominent themes of patriarchy in influential texts. The texts previously mentioned are examples of foundational stories that have influenced the way people think of gender and have acted as a gateway to the #MeToo movement and action against the ongoing issue of wage gaps based on gender. The #MeToo movement was created as a rejection of patriarchal power and focuses on changing the male hegemony while uplifting the voices of women who have endured abuse or harm by men and the societal structures that protect the abusers rather than the victims. The #MeToo movement is also viewed as a reaction to the deeply rooted gendered violence that is enabled through the idea of patriarchy. Furthermore, women have earned the fight to enter the workforce, but there is still the fight to win equal pay as their male counterparts. Even when women may be just as or more qualified to perform a job than their male peers, women may still be valued less and have to work twice as hard to prove

themselves. Our research will further explore the parallels between biblical texts and modern movements against patriarchy.

**42. Violence Against Women in Ancient Israel**

**Presenter(s):** Michelle Lavender, Adrienne Anderson, Kylie Wood

**Advisor(s):** Dr. Julye Bidmead

The Hebrew Bible presents numerous instances of violence against women without justice, revealing a culture that devalues women within Ancient Israel. Stories such as the Levites' concubine (Judges 19:1-20:7), where a woman is brutally assaulted and murdered, and Numbers 5, where a woman is subjected to trials that are meant to be humiliating and fatal, show the mistreatment of women under male authority. These narratives parallel contemporary situations in which violence against women still occurs such as honor killings and domestic violence where justice is similarly denied. The silencing of female figures in the Bible also parallels the marginalization of those who face domestic and sexual violence today. Through feminist criticism and the understanding that these stories were written by men and to reinforce male dominance, it's possible to view these stories through the lens of the viewpoints of the women in these stories. Analyzing these stories through this lens reveals the gender inequality embedded in these narratives which continue to influence modern cultural and societal values. When examining these Biblical texts it becomes more apparent that violence against women in the Bible serves to uphold patriarchal structures and highlights the gender inequality within Hebrew culture and religion.

**43. Discrimination Against LGBTQ Individuals in the Bible & Today**

**Presenter(s):** Percy Peck, Charlotte Abelman, Nikki Hensley, Ashley Castillo

**Advisor(s):** Dr. Julye Bidmead

We will discuss how Biblical laws in Leviticus (18:22 and 20:13) contribute to discrimination against the LGBTQ+ community. These verses state that male same-sex relations are an abomination, leading many to interpret them as condemning homosexual relationships. Despite "homosexual" being a term developed in the 19th century, these interpretations have resulted in violence and discrimination against LGBTQ+ individuals in modern America.

Biblical laws, such as Leviticus 18:22 and 20:13, have often been seen as banning same-sex relationships and gender nonconformity. These laws were created at a time when views on sexuality, gender roles, and family were very different from today. In some Christian groups, a strong emphasis on these laws has led to beliefs that look down on LGBTQ+ people, labeling their identities and relationships as wrong. Certain conservative churches interpret these passages literally, presenting LGBTQ+ identities as against their religious beliefs. As a result, many LGBTQ+ individuals face rejection or limited acceptance in these groups, which can harm their mental health, sense of belonging, and access to community resources. In contrast, many modern theologians and progressive churches support a more inclusive reading of the Bible, focusing on love and justice. The Hebrew Bible also includes laws traditionally viewed as prohibiting same-sex relationships and gender nonconformity. However, conservative interpretations still strongly

influence society, leading to discrimination both within religious communities and in the wider world.

The weaponization of these passages have caused rifts in religious communities and popularized literal interpretations of the Bible. We seek to deconstruct this conclusion and show how different Biblical translations have contributed to this narrative.

**44. Looking At Twelfth Night Productions Through Various Time Period Settings: 1600s, 1890s, 2000s**

**Presenter(s):** Autumn Sager

**Advisor(s):** Dr. Kent Lehnhof

Twelfth Night, or What You Will has been interpreted many times over in its 400 year history. Its combination of knotted love dynamics, comedy, and cross-dressing are the foundations each performance sits upon; however, as directors change the play to fit their visions, the setting, in regard to time period, is often switched to another time frame other than 1600s, both when Shakespeare wrote the play and when many scholars agree the work took place. Cultural differences that these settings changes bring about can affect how characters' gender expression and sexuality are performed and therefore how they are understood by the audience. A performance of Twelfth Night set in 1600s England like The Globe's Twelfth Night 2012 has different portrayals of gender and sexuality than one set in California in the modern era like She's The Man. These productions have well separated (many years between them) and distinctly different time periods to observe. With different time frames, one might assume that a character's gender and sexuality may become more free as the year the play is set in is closer to our own. I am looking to compare three productions of Twelfth Night to see if this idea is true, or if recency in the setting's time period does not correlate to depictions of freedom in gender and sexuality. Interpretations that will be included are The Globe's Twelfth Night 2012 (Elizabethan Era all male cast), Royal Shakespeare Company's Twelfth Night 2017 (Victorian Era), and She's The Man (2000s). The choices made in these works reflect the time period they are emulating, such as the all male cast for the 1600s performance. This would be typical for the time period, and these types of thoughtful choices are reflected in the other pieces. Subversion of gender norms and heteronormativity through time period are present in both movie and theater format, even though theater from a long time ago comes with a "stuffy" stereotype.

**45. The Masculine Macbeth**

**Presenter(s):** Arda Ugurlu

**Advisor(s):** Dr. Kent Lehnhog

Many of Shakespeare's plays contain commentary on the roles men and women play in society. Macbeth's main character, Macbeth, is used to explore the different aspects of masculinity and the pressure that comes with maintaining it. His perception of masculinity becomes skewed by Lady Macbeth, who humiliates him for not being "man" enough to kill King Duncan and take his place on the throne. His thought process changes, and he begins to believe that masculinity and violence go hand in hand, leading to his killing of King Duncan. Macbeth loses the qualities that

ironically made him such a great man, and he becomes a bloodthirsty and paranoid king. My goal is to explore how Macbeth defies Shakespeare's idea of masculinity at the beginning of the play and how his character changes to fit within those standards by the end. I also plan to examine how other characters react to his actions and analyze how Macbeth isolates himself while attempting to conform to those standards. This project will highlight the destructive nature of societal pressure and the consequences of conforming to gender roles. I will utilize the original Macbeth play, written around 1607, to find and analyze examples of Macbeth's dangerous masculinity.

**46. Viola Versus Sebastian: Gender in Shakespeare's Twelfth Night****Presenter(s):** Ella Murry**Advisor(s):** Dr. Kent Lehnhof

How does Shakespeare's Twelfth Night explore the idea of gender through twins Sebastian and Viola? Gender is highlighted as a fixed concept through the twins' differing characteristics in violence, romantic attraction, and passivity. These concepts set up the gender roles that Shakespearean critics C.L Barber and Jean Howard point to as the central focus of the play. Although Viola dresses up as a boy, Cesario, she maintains her femininity in both looks and actions. She avoids fighting, remains unattracted to women, and constantly relies on men to lead her, unable to fulfill the traditional roles of men that Sebastian sets up. In the period, gender was thought of as something fluid, with women as an underdeveloped form of men. Shakespeare questions this idea, however, playing with gender as a fixed concept. Today's society is often conflicted with these same ideas: gender as a fixed concept with expected roles or as fluid, with no distinction. Through this exploration of gender, Twelfth Night remains resonant with modern audiences. With the analysis of Shakespearean critics and noted differences in the play in violence, romantic attraction, and passivity, I will answer the question of how Viola and Sebastian ultimately portray gender as a fixed concept in a poster format.

**47. The Representation of Gender in Macbeth and Its Effect****Presenter(s):** Evelyn Rosas**Advisor(s):** Dr. Kent Lehnhof

In the Shakespearean play Macbeth the topic of gender in terms of masculinity and femininity become a prominent portrayal of the meaning of the play as a whole. We focused on how the representation of masculinity and femininity contributed to the downfall of protagonists Macbeth and Lady Macbeth. The message the play sends also influences the lives of the readers and their ideas of gender which is one that is toxic.

The goal of showcasing gender in Macbeth was to highlight the importance of gender and its effect on people. To obtain this understanding we focused on Macbeth and Lady Macbeth and how their actions and words throughout the play begin to shift as we enter a more complex idea of gender. We also focus on how the actions of multiple characters contribute to the downfall of Macbeth and Lady Macbeth. Various characters also serve as a contrast to the protagonists, introducing a more traditional perspective of gender and gender roles. Another influence

Macbeth has is on teenagers. The play is often taught in high school which adds onto the perception of gender Shakespeare expressed in the play which affects the lives of students who are still managing their own opinions and views on vital topics such as gender.

Once finishing our research we realized gender can be represented in various ways within a person, sometimes even contradicting oneself. The idea of gender can also change in a short period or be motivated by outside factors. Overall gender is complex in every aspect and must be managed tentatively in order to avoid ruining its perception or a person's life.

#### **48. Anxious Masculinity in Shakespeare's Macbeth**

**Presenter(s):** Finn Nowlin

**Advisor(s):** Dr. Kent Lehnhof

Anxious masculinity was a result of a differing view of gender and sex in the early modern era. Because there was no scientific research on biological sex, people of the era believed that sex and gender were extremely fluid and that anyone could move between masculinity and femininity. Despite these progressive ideals, sexism was still a major part of society in the early modern era. Due to its fluidity, men often became afraid of becoming feminine, so they compensated by becoming hypermasculine. Shakespeare wrote his plays in the early modern era, and the concept of anxious masculinity was woven into some of his characters. Specifically, the titular character of Macbeth is a prime example of anxious masculinity. Throughout the play, Macbeth gradually became more and more masculine. After being pressured by Lady Macbeth, he realized he was at risk of losing his masculine reputation. To compensate, he became overly masculine and committed violent murders to prove himself. His display of masculinity differs from other characters in the play, but he is the character that exemplifies the aspects of anxious masculinity the clearest. This project aims to explain and describe Macbeth's display of anxious masculinity. It also will show how the view of gender and sex from Shakespeare's era differs greatly from the views we have now. This project will explore how the people of the early modern era believed in gender fluidity, yet the issues concerning today's sexism and labels still existed. Connecting this concept with Macbeth will explain through the story and give examples from the play.

#### **49. Sexuality in Cassandra Clare's Jem Carstairs and Will Herondale**

**Presenter(s):** Scarlet Herr

**Advisor(s):** Dr. Kent Lehnhof

The project's purpose will be to explore the queer undertones and subtexts of Cassandra Clare's fictional characters Jem Carstairs and Will Herondale in Clockwork Princess. Specifically, the intimate connection the two characters share as they fall in love with the same woman while grappling with their mortality and their connection with their souls bonded together.

The two are "Parabata", in the fictional world it is a unique connection surpassing body and mind. The vows to become parabatai are reminiscent of wedding vows, "The Angel do so to me, and more also, If aught but death part thee and me."

Set in the Victorian era of London, sexuality is not explicitly discussed, but there are many underlying metaphors and quotes that, in any other context, would be love confessions.

The sexuality of the two characters is pushed aside in favor of telling the stories of them. There is no need for labels in the face of the utter devotion the two men have for each other, to the point that they would wait for each other in the afterlife, refusing to cross over without the other one, no matter how many centuries it would take.

I expect to find that the relationship between Jem and Will surpasses the need for distinct labels. There is no perfect way to encapsulate them, their sexuality, their connection, and their devotion to each other. In the end, the characters exist side by side, in life and death. The conclusion to hopefully be drawn is that there is no need for complete and utter sexual labels, they exist far past that.

### **50. Examining Portrayals in Twelfth Night: Embracing Gender and Sexual Fluidity**

**Presenter(s):** Sophie Lemire

**Advisor(s):** Dr. Kent Lehnhof

This project follows a historical analysis of past productions of William Shakespeare's romantic comedy Twelfth Night, emphasizing various portrayals of the sexual and gender ambiguous antagonists. Through a close examination of three productions from 1969 to 2023, this project takes a deep dive into the evolution of gender and sexual presentation on the stage and screen, exploring the versatility within each character's embodiment of either passive or active fluidity while they challenge traditional binary norms. Shakespeare merely provides the speech through which a director may interpret in countless ways concerning societal values and artistic choice.

The exploration of representation reveals the implications of gender fluidity in early modern performance, wherein boy actors portrayed female characters, creating layers of identity that still resonate with contemporary discussions of gender. On a seventeenth-century stage, the sex of the actor was seemingly irrelevant. This creates a double-play of suggested homoeroticism; occupying a space of ambiguity on the page, navigating between masculine and feminine identities within relationships. These past productions demonstrate the changes in societal beliefs about sexual and gender ambiguity, revealing both stark contrasts and similarities between different representations throughout time. My research will examine how Shakespeare seems to suggest that a person's "binary role" in life is more defined by what they wear and how they behave than by anatomy. I will further explore how this holds up in historical and modern productions.

### **51. Little Shop of Patriarchy: Breaking Down Constructed vs. Essential Gender Roles**

**Presenter(s):** Taylor Gadsden-Deterville

**Advisor(s):** Dr. Kent Lehnhof

Frank Oz's Little Shop of Horrors (1986) is more than a silly kooky musical. The comedic plot dramatically dances with themes of domestic violence, poverty, and sexism. For this project, my poster will explore the expectations and representations of femininity and masculinity set up at the film's beginning versus the end. The film's context will connect to research involving gender essentialism (innate, biological sex) and gender constructionism (socially constructed gender roles). I will analyze the roles of Seymour, Audrey, and Orin to exhibit how they discover their

constructed and essential gender identities. The film represents Audrey as a ditsy hyper-feminine character through physical and behavioral choices such as her high-pitched voice and submissive attitude toward her abusive boyfriend, Orin. Orin represents the toxicity of hyper-masculinity through his conceited mindset and the pain he inflicts on others. Seymour's gender identity is blurred, and similarly to Audrey, he is easily manipulated and strives to please everyone regardless of his own wishes. He commits cruel acts to produce the life he desires with Audrey, unknowingly contributing to his own demise. Through the analysis of these three characters, I expect to interpret their gender roles and the chronological process of their identities throughout the film.

**52. The Unnatural Creation of Life: Exploring Sexuality and Repressed Desire in Frankenstein**

**Presenter(s):** Bryce Rosenblum, Josh Kreider

**Advisor(s):** Dr. Kent Lehnhof

This project explores the themes of sexuality and intimacy in Mary Shelley's *Frankenstein*, addressing the research question: "How do themes of sexuality and gender norms in *Frankenstein* shape the characters, and what do these themes reveal about the consequences of isolation and repressed desire?" Focusing on Victor Frankenstein and his creature, this study examines how their complex relationships with sexuality contribute to their isolation and eventual tragedies. Victor is consumed by his scientific research, willing to go to any lengths to achieve success. He disregards the natural reproductive process, a clear rejection of traditional sexuality, choosing instead to create life without conception. During his studies, Victor isolates himself entirely, which may stem from his rejection of traditional gender norms and potentially reflects a distaste for human connections. The creature, on the other hand, spends his life searching for companionship, even pleading with Victor to create a partner for him.

Longing for compassion and connection, the creature's unfulfilled desires and societal rejection illustrate the destructive effects of denying one's emotional and social needs. This study draws on primary text passages and scholarly analyses addressing issues of sexual suppression, unnatural creation, and isolation. This project aims to contribute to the broader discourse on human connection in *Frankenstein*, illustrating Shelley's warning about the psychological toll of rejecting intimacy.

**53. Sir Andrew Aguecheek: The Failure of Masculinity**

**Presenter(s):** Ava Evaro

**Advisor(s):** Dr. Kent Lehnhof

In Shakespeare's comedy "*Twelfth Night*," gender roles and identity are central themes, explored through complex love triangles and dynamics. Among the characters, Sir Andrew Aguecheek stands out for his portrayal of less traditional masculinity. When comparing him to characters such as Viola, who spends most of the play disguised as a man named Cesario, Sir Andrew tends to come short in terms of his masculinity even though he is biologically a male. Sir Andrew's efforts and ultimate failure to woo a wealthy countess in the play, who loves Cesario, are a large

component of what makes this play a comedy. This project will analyze two portrayals of Sir Andrew on stage and screen: *Twelfth Night* (2017) directed by Christopher Luscombe and *Twelfth Night* (1996) directed by Trevor Nunn. I will demonstrate how Sir Andrew's masculinity is characterized through his interactions and comparisons with other characters and the choices made by the actors portraying him. Using this information, I will touch on how his unreaching portrayal of masculinity contributes to the comedic aspect of the play. By examining these performances, we gain insights into how masculinity was perceived during the Shakespearean era and connect these views to modern perceptions of masculinity, showcasing the evolving nature of gender roles and expectations.

**54. Unpacking Gender Bias: The Impact on Women in Gaming and Gaming Communities****Presenter(s):** Ewan Cortes**Advisor(s):** Micol Hebron

This research query investigates how gender bias influence the experiences and representation of women in the gaming industry and gaming communities.

Research has demonstrated that gender bias significantly impacts the experiences and representation of women in the gaming industry and communities. My research will examine the ways that gender bias manifests in both game design and community dynamics. As the gaming industry continues to evolve, so does the influence of these biases on the engagement and treatment of female gamers. I will investigate the representations of women in video games and the experiences of women in gaming communities, focusing on how these factors contribute to broader patterns of exclusion and inequality within the gaming landscape.

Using the methods outlined in the Information Literacy portion of the FFC program, I will be researching this topic through a variety of approaches. My research will involve online searches, utilization of the Leatherby library database, and an examination of diverse sources. I will focus on peer-reviewed materials, including academic articles and books, as well as case studies and articles related to gender representation and bias in gaming. Additionally, I will analyze qualitative data from interviews and surveys conducted with female gamers to gain insights into their experiences within gaming communities.

I anticipate that the research will illustrate that gender bias in the gaming industry and communities has adversely affected the experiences of women gamers. Evidence of this will likely be reflected in heightened instances of harassment, lower levels of representation in game narratives, and a lack of support within gaming communities. This research aims to reveal how these biases contribute to a culture that discourages female participation and engagement in gaming.

**55. What Should A Woman's Body Look Like? Here's What Digital Media and Pop Culture**

**Says...**

**Presenter(s):** Amelia Sidney

**Advisor(s):** Micol Hebron

My research will explore how the visual representation of women's bodies in media and pop culture over the past 30 years have influenced modern society's unrealistic body standards for women, as well as how these stereotypes have harmed our current generation.

Research has shown that the body stereotypes of women shown in digital media have severely worsened body dysmorphia for generations of young girls. That dysmorphia lowers self-esteem, which often leads to symptoms of depression and anxiety. This has ultimately led to increased levels of self-harm, suicidal ideation, and other mental illnesses in adolescents. In addition to those findings, I will be looking at the correlation between women's bodies in video games and animated movies/TV shows, and how the combination of those digital medias has resulted in reaching a wider audience. Over the years, the online misrepresentation of women's bodies has only continued to grow exponentially, through body-altering filters on social media apps such as tik tok and instagram, as well as celebrities who post pictures of themselves that are edited to make their bodies look closer to the ones the media keeps showing on screen.

My methodology involves looking for existing studies that show the impacts of gender biases in digital media. I will also be using the other research strategies outlined in the Information Literacy portion of my FFC canvas program, which includes using the Leatherby Library database to find peer-reviewed articles and published studies.

I envision that my research will clearly demonstrate that the popularity/exposure of animated women has direct linkage between changing the body standards society holds for real women. Evidence is also expected to show the detrimentality of these unfair stereotypes upon young girls in particular, but also the general population.

**56. Sexism in the Media- Monica Lewinsky and the Targeting of Women Online**

**Presenter(s):** Ella Padrnos

**Advisor(s):** Micol Hebron

This research query focuses on and analyzes how Monica Lewinsky's case reflects systemic sexism and a bias against women online.

Research demonstrates how women all across the media are targeted and receive more hate consistently than male counterparts. When social media came around, it opened up the gate for people to anonymously cyberbully and spread hate. In Monica Lewinsky's 1998 scandal, while Clinton was just as much at fault, Lewinsky got majority of the backlash from the public. The case reveals how there is a systemic and normalized bias against women. My presentation will demonstrate and explain the harm this harassment has on women in the media, while revealing how it is still prevalent and a large issue to this day.

Utilizing methods and tactics from the FFC program's Information Literacy Module, I have many different channels I will conduct my research through. I will use the Leatherby Libraries database provided by Chapman, articles focused on Monica Lewinsky and the discrimination she faced,

academic articles discussing systemic sexism, and online databases and credible sources to pull information from.

I am expecting my research to reveal how systemic sexism and targeting of women can negatively affect women's mental health and standing in society. The research will demonstrate how influential and prevailing misogyny is and how it directly harms women in the media. Monica Lewinsky's case demonstrates these issues very well and supports my anticipated result. It will overall prove the point that social media enhances hate and persecution of women.

**57. Examining The Roles of Women In Video Games: An Investigation of Gender Representation**

**Presenter(s):** Maia Werner

**Advisor(s):** Micol Hebron

This research examines the roles of women in video games (both in characters and the gaming industry), the stereotypes which influence their portrayal, as well as the authorship of their narratives. In my research I will be investigating three aspects of gender representation in video games, particularly regarding the role of women: 1. the disproportionate ratios of male/female programmers in relation to the ratios of male/female players, and the effect this lack of diversity has on a woman's role under the male gaze leading to the use of stereotypes in games, 2. the gendered aesthetics of video games and their characters, and 3. game development in relation to target audience. Using the methods outlined in the Information Literacy portion of the FFC program, I will be researching this topic using a variety of methods including use of the Leatherby Library database. Through this database I have found a variety of sources including journals and a master's thesis, leading me to other online sources such as THE GAMER. Other sources include those addressed in my FFC class, Gender Bias in Social Media. I will also use ChatGPT as an experiment, asking the chatbot to "describe a female video game character." I expect to find that women's stories and perspectives in games are and will largely continue to be produced by male developers as they hold the majority of the gaming industry; no significant change can be made until diversity in the gaming industry is properly addressed and acted on, allowing women the space to create and share their stories and perspectives how they choose to. Evidence of this will be seen in the development of new games and the transition to supporting women in gaming.

**58. The Role Influencers Play in Reinforcing Traditional Gender Roles and Stereotypes**

**Presenter(s):** Erica Ramos

**Advisor(s):** Micol Hebron

This research query investigates the role influencers play in reinforcing traditional gender roles and stereotypes on social media.

Research has shown that many influencers on social media platforms contribute in some way to the gender stereotypes present in current day society. My research will further investigate exactly how these influencers perpetuate these stereotypes and gender roles. These online personalities can greatly affect their audience's views through the content that they produce. I will look into

the specific content and trends put out by these influencers that have the greatest impact on those consuming their content.

Using the methods outlined in the Information Literacy portion of the FFC program, I will be researching this topic using a variety of methods such as online searches through reputable databases, collecting information from multiple different types of sources, and gathering examples of the type of media I am covering. I will be using peer reviewed sources, academic articles, books, and studies revolving around this topic.

I anticipate that my research will show that influencers generally spread negative gender roles and stereotypes through creating unrealistic and idealistic lifestyles that others would want to copy and creating spaces where others feel as though they need to align with these roles instead of diverge from them in order to be accepted.

### **59. On the Commercialization of Sexploitation**

**Presenter(s):** Phoenix Grella

**Advisor(s):** Micol Hebron

This research query investigates the weaponization of sexuality, primarily women's sexuality, in an online sphere. In an increasing digital lifestyle, the monetization and exploitation of sexuality have increased significantly with the creation of digital phenomena such as revenge porn and "leaking" alongside the commercialization of the adult film industry through sites that promote independent sex work through OnlyFans and similar sites. My research will note social media trends from the last decade to analyze how they have been influencing users. Through this contextualization I will be able to find patterns of behavior that may continue to negatively impact the online world without interference. Much of my research will come from the internet through peer-reviewed articles from Leatherby Libraries, alongside opinion pieces and independent research I have found online. Many of the problems being faced now are unique to the metamodern digital era because sexuality is becoming more accessible to increasingly younger audiences. With the normalization and widespread availability to content that is usually not heavily protected, I believe I will be able to find trends that point to increased risky sexual behavior and pornography addictions in adolescents and teenagers, alongside a drop in average age of adult content creators on certain sites.

### **60. Social Media's Perpetuation of the "Beauty Myth".**

**Presenter(s):** Gabby Saitta

**Advisor(s):** Micol Hebron

My research question, which is "how does systemic sexism throughout social media platforms affect women's mental health, specifically in reference to "The Beauty Myth", and what role does it play in continuing the idea that women's worth are found in their beauty?" was created in order to understand and examine the impact of systemic sexism ingrained in social media on women's mental health, with a specific focus on "The Beauty Myth." Naomi Wolf defines "The Beauty Myth" as a "Shut The Fuck Up Tool." It is the unattainable societal standard of beauty that is set in order to oppress and control women. It is created in order to keep women down, and keep

them restricted by equating their physical appearance with their worth. In a time where social media is undoubtedly a huge part of where images and ideals are created and shared, this myth has been amplified. It further perpetuates a culture that teaches comparison, self-objectification, and diminished self-esteem among women. My research question will explore how algorithms and social media platforms reinforce unrealistic beauty standards, affecting women's mental health, including anxiety, depression, and body dysmorphia. By using research to examine personal accounts from women's experiences, as well as looking at the comparisons between data recorded by the social media platforms themselves, and outside sources. The research aims to uncover the relationship between social media's perpetuation of systemic sexism and "The Beauty Myth", and women's health, specifically in regard to rising stats of women receiving facial plastic surgery. I hope to prove with my findings how these platforms not only reflect but contribute to creating societal values regarding beauty and perpetuate this idea by creating face filters that drive women to receive plastic surgery to achieve the unreal beauty standards social media promotes.

## Food Science

### **61. Optimization of DNA Testing Methods for Mixed Species Identification in Canned Tuna**

**Presenter(s):** Akshay Khetrapal, Chloe Castanon

**Advisor(s):** Dr. Rosalee Hellberg

The increasing demand for tuna has made canned tuna a target for food fraud, particularly species mislabeling, which poses economic and health risks. Species mislabeling can mislead consumers, undermine regulatory compliance, and pose health risks, especially when high-mercury species are mislabeled as low-mercury ones. This study aimed to optimize DNA testing methods for identifying mixed tuna species in fresh and heat-treated (canned) samples. Real-time quantitative PCR (qPCR) was used to establish detection thresholds for albacore, skipjack, and yellowfin tuna at target species concentrations as low as 0.1% in binary mixtures. Consistent detection was achieved for albacore and yellowfin at 0.1%, while skipjack was detected in one-third of replicates at this concentration. Heat treatment simulating the canning process did not significantly affect detection rates, confirming the robustness of qPCR for processed tuna products. These findings align with and extend upon previous research, such as Lopez and Pardo (2005), who reported reliable detection of albacore and yellowfin at 10% in binary mixtures, while demonstrating qPCR's ability to achieve greater sensitivity at lower concentrations in this study. The detection threshold for skipjack in binary mixtures was also partially reliable at 0.1%, corresponding to 0.005 ng/ $\mu$ L of skipjack DNA in the PCR reaction, compared to Krcmar et al. (2019), who reported a detection limit of 0.0032 ng/ $\mu$ L in single-species samples. This demonstrates the versatility of qPCR for identifying species in more complex food matrices. This research enhances species identification accuracy for processed tuna, addressing a critical gap in food safety and fraud prevention. It provides a robust method for regulatory agencies to enforce accurate labeling,

protecting consumers and ensuring the integrity of the seafood industry. These findings support broader efforts to refine DNA testing protocols for processed and mixed seafood products.

## **Health Sciences and Kinesiology**

### **62. Predictors of longitudinal symptom trajectory in young adults with low back pain.**

**Presenter(s):** Abby Borlovan, Julia Leigh

**Advisor(s):** Dr. Jo Armour Smith

Severity and frequency of painful episodes change over time in individuals with chronic low back pain (LBP). Recalling previous episodes' severity/frequency is often considered inaccurate. This study's purpose was to determine if recall of LBP history or psychological characteristics are predictors of future symptom trajectories in young adults with LBP.

The 57 young adult participants had a year or more history of LBP and were not currently in pain. At baseline, LBP history was characterized by recall of pain severity and frequency during symptomatic episodes. Participants completed measures of anxiety, depression, and fear avoidance beliefs. Pain trajectories were tracked via survey every 2 months for 18 months, where participants identified average and worst pain symptoms. Participants were placed into groups based on pain trajectories over the follow-up period using latent class analysis (LCA). Logistic regression was used to identify if LBP history or psychological traits were predictors of average and worst pain trajectories.

Survey completion rate was 95%. LCA found two sub-groups for both average and worst pain trajectories, where individuals in the adverse trajectory group had greater severity and frequency of episodes than the less adverse group ( $p < 0.01$  for both comparisons). Predictors of more adverse average pain were typical pain ( $p = 0.01$ ) and frequency of symptoms ( $p = 0.02$ ) at baseline, and depression score ( $p = 0.04$ ) (percentage accuracy in classification (PAC) 84.9%, omnibus  $p = 0.0004$ ). Predictors of more adverse worst pain were typical pain ( $p = 0.05$ ) and depression at baseline ( $p = 0.02$ ) (PAC 69.8%,  $p = 0.02$ ).

Even during no pain, self-report of past pain history is predictive of future LBP episodes. To enhance LBP management, it is essential to determine factors that predict symptom fluctuation across the lifespan. As depression is linked with more adverse history of LBP over time, clinicians should assess psychological traits in young adults with chronic pain.

### **63. Effects of Incline Walking on Toe Clearance in Healthy Young Adults**

**Presenter(s):** Shelby Hext

**Advisor(s):** Dr. Rahul Soangra

This study explores the effects of incline walking and auditory stimulation with pink noise on gait parameters, specifically focusing on toe clearance. Toe clearance is critical in preventing tripping and falling, particularly in populations with impaired gait. Infra-red reflective markers are used to measure toe clearance by determining the distance between the ground and the lowest point of the foot. Researchers can better understand the biomechanical adjustments in toe clearance

under different conditions by analyzing gait on inclines. Additionally, pink noise, which contains equal energy per octave, has been shown to improve motor performance and concentration, suggesting a potential influence on gait stability. In this study, participants walked on a treadmill with a constant incline setting while listening to pink noise. Motion capture camera systems recorded toe marker position data to assess variations in the different walking conditions performed. The participants were put under conditions such as no incline with pink noise or incline but with no pink noise to better understand the effects that walking on an incline and pink noise have on toe clearance.

## **Integrated Educational Studies**

### **64. The Impact of External Experience on Urban Youth Education**

**Presenter(s):** Erin Simmons

**Advisor(s):** Dr. Quaylan Allen

This study examines how community, family, and educational dynamics impact behavioral and academic outcomes for students in urban communities, focusing on Black and Latinx youth. Through qualitative research involving interviews and observations, the study explores how factors like family instability, economic challenges, and community violence influence students' behaviors and motivations in school. Findings reveal that unresolved trauma and external stresses manifest in the behavior and emotions of students within the classroom, affecting both student engagement and achievement. The research offers insights for educators, counselors/ therapists, social workers, families and policymakers to develop supportive interventions that address students' unique experiences.

## **Mathematics**

### **65. How Many Hours Does a College Student Really Spend on Their Phone?: A Study on a Student's Daily Habits**

**Presenter(s):** Jayda Amaya

**Advisor(s):** Dr. Oliver Lopez

This study will examine the habits of a female, first- year college student using quantitative and qualitative data collected over the course of the semester. I have been collecting data on myself on 10 daily actions, the following topics are included: hours of sleep, miles walked, exercise, money spent, hours spent with others, water consumed, screen time, restroom usage, mood, and number of meals. The purpose of this study is to recognize trends within my routine that are unhealthy and make an effort to alter these practices. Using Excel, I will be analyzing this data to identify trends within my life in hopes of encouraging college students to seek out their unhealthy routines and make a change.

## Music

### **66. "The Chip Off the Block": The 21st-Century Legacy of Schoolhouse Rock!**

**Presenter(s):** Megan Lewandowski

**Advisor(s):** Dr. Carolyn Dike, Dr. Jessica Sternfeld

Schoolhouse Rock!, a series of short, animated educational segments featuring original songs about subjects like math, grammar, and history, first aired in 1973 with the goal of teaching young children between Saturday morning cartoons. Since then, research from the 1990s has established its role in shaping a generation, but little further study has emerged since the turn of the century. This thesis combines historical scholarship, firsthand accounts, educational research, and modern examples of works inspired by and derivative of Schoolhouse Rock! to create a comprehensive image of its lasting impact into the early 21st century and up to the present day. This synthesis of sources illuminates Schoolhouse Rock!'s wide variety of roles in the culture of today. Schoolhouse Rock! serves as a nostalgic touchstone and a marker of shared generational experience, to be both honored and transformed as a vehicle for comedy, commentary, and calls to action. In the educational sphere, it has inspired scientific research as well as both individual and larger-scale efforts to replicate its ability to engage students in learning through music. Thanks to the enduring influence of Schoolhouse Rock!, children of younger generations who have never seen or heard its original segments learn from copycat educational songs, some written by their teachers and others of their own creation. While its influence has continued to ripple through our society, Schoolhouse Rock! itself remains an active part of our cultural consciousness; its recent 50th anniversary sparked both celebration and scholarly scrutiny. This thesis unites all of these scattered facets of Schoolhouse Rock!'s legacy, illustrating its ongoing significance to our society. It suggests that Schoolhouse Rock!'s longevity is in large part attributable to its earnest beginnings, which in turn has implications for the development of new efforts to engage with and educate children.

## Political Science

### **67. Falling for the "Big Lie" of Rampant Election Fraud in 2020:**

#### **A Study on the Factors That Led to the Belief of Widespread Election Fraud**

**Presenter(s):** Aliyah Ramirez

**Advisor(s):** Dr. Ann Gordon

With less than four months left in his campaign for a second term, President Joseph R. Biden dropped out of the 2024 presidential race and shortly endorsed Vice President Kamala Harris to assume his nomination. Harris has since been expected to amass a campaign with the arduous task of persuading voters who were told that Democrats "rigged" the 2020 election by the then-sitting President, Donald J. Trump. Despite seemingly not trusting the election process, in 2024 Trump and his supporters are hoping to win back what was "stolen" from them four years ago, despite many investigations proving his claims to be false. The 2020 election resoundingly

diminished trust in the election process and the United States' democratic institution, leaving many Americans questioning what will happen when the race is called for either Kamala Harris or Donald Trump. This paper will assess the factors that influenced the popular belief that because of widespread election fraud, we will never know who won the 2020 presidential election. Using the 2022 wave of the Survey on American Fears conducted by Chapman University, which collected responses from 1,020 participants ages 18 and older, this paper finds that the factors of frequent Fox News consumption, lower level of education achievement, people who identify as male, strong conservatives and republicans, and people who voted for Donald Trump in the 2020 election were most likely to believe that widespread voter fraud rendered the results of the election inconclusive. It is essential to understand these factors so that in future elections, those susceptible to believing misinformation are not targeted once more and subsequently called to the frontlines to take back an election that was never stolen in the first place.

**68. Examining the Correlation Between Sexual Assault and Disabilities****Presenter(s):** Annika Lindberg**Advisor(s):** Dr. Ann Gordon

In the US alone there are over 433,000 recorded cases of sexual assault or rape yearly among people ages 12 and older, according to The Rape, Abuse & Incest National Network (RAINN). In this paper, I examine the fear of being sexually assaulted by someone you know or by a stranger, based on the fact of if you have a disability. My study relies on data from the Chapman Survey of American Fears X, a representative national sample of U.S. adults. From background articles, I have read about a lot of personal caretakers who take advantage of those who have a disability and cannot speak up for themselves. Most of the time these people are strangers who create a bond with the patient and are hired by the family. I think it is essential to raise awareness for this topic as I have studied disabilities for over five years now and have found that this is extremely understudied. I predict that the rate of people with a disability being raped or sexually assaulted by a stranger or by someone they know will be higher than what people expect. I also predict there to be multiple variations that will emerge based on secondary dependent variables such as age, and gender.

**69. Feed to Fear: The Transition of Social Media from Entertainment to Information****Presenter(s):** Carson Rudy**Advisor(s):** Dr. Ann Gordon

The new wave of social media has changed how we receive, understand, and utilize political information and messaging. This has not only changed how Americans perceive policies but how they interpret the United States Government itself. In this study, I examine the correlation between social media consumption and the fear of government corruption among government officials. Using data from the 2020 Chapman Survey of America Fears, a nationally representative sample, I find a strong correlation between the increased use of social media and increased distrust in the government. Previous research shows that increased media exposure, especially fear-drive content, directly leads to increased distrust. I plan to find if social media emphasizes

emotionally charged content or dramatic stories to see how they tie into our political atmosphere. One large discrepancy to note is the idea of perceived corruption and actual corruption, which could reflect a fear that varies significantly. This environment created by social media must be identified and explained in order to understand how it affects us. By analyzing the new ways in which our generation receives news and information, this study seeks to provide insight into how our political opinions are shaped. I plan to limit the divide that our country faces by trying to understand the key issue of our information is understood.

**70. AquÃ- y Ahora: The Role of Spanish-Language TV News in Perceived Financial Vulnerability in the US**

**Presenter(s):** Cintya Felix

**Advisor(s):** Dr. Ann Gordon

In today's world, the news we watch often does more than inform us; it can shape how secure or insecure we feel about our future. In this paper, I examine the extent to which an individual's consumption of particular Spanish-speaking TV news channels contribute to their sense of financial vulnerability. Using an original data set of responses to the questions in the American National Election Studies (ANES), I find a moderately strong relationship between the television news channel AquÃ- y Ahora and Noticiero Univision, and the degree to which they are worried about their financial situation. While it is true that various factors such as employment status, household size, and marital status contribute to this financial worry, a person's choice of television station can be an indicator of an increased sense of financial insecurity. This suggests that watching AquÃ- y Ahora and Noticiero Univision, especially for immigrants and first generation Americans, may influence financial distress, leading to a tense relationship with personal finances, economic uncertainty, and low financial confidence. Therefore, it is highly important to recognize media biases within the Spanish-speaking television networks to address the urgent need for informing the immigrant and first-generation Hispanic population on how news may influence their opinions. Ultimately, this highlights how critical it is to be cognizant of communication rhetoric in Spanish-speaking television networks to accurately inform the Hispanic population while setting them up for upward financial mobility.

**71. The Not-So-Silent Fourth Branch: Media's Impact on Voter's Trust in the Government**

**Presenter(s):** Emily Kinney

**Advisor(s):** Dr. Ann Gordon

In a democracy, trust is essential to the function of government; voters must trust that their vote holds value, that those they elect are working in their best interests, and that the government cares about their well-being. This trust in government, however, is at an all-time low, risking the very foundation of American democracy. Using the 2020 American National Election Survey and the Chapman Survey of American Fears, representative national samples of U.S. adults, this paper aims to determine how different types of media, such as various outlets and social sites, impact American's fear of the government, measured using a variety of scales like fear of corrupt government officials, fear of fraudulent election results, and overall distrust of the government

itself. Current literature highlights the relationship between echo chambers and the beliefs about government held by those in said chambers, and this paper uses regression analysis and crosstabs to determine if specific factors such as CNN vs. FOX news consumption, time on X/Twitter, or contact with print newspapers increase or decrease a respondent's fear of the government. I expect to find that the more time a respondent spends on non-mainstream news channels and on "fringe" social media, engaging with those who hold viewpoints similar to their own, the more likely they are to distrust the government, no matter their party affiliation. As media moves further away from serving the public and towards serving their bottom lines, it is essential to understand media's ever-growing impact on our faith in democratic systems.

### **72. The Factors Influencing Demand for Queer Politicians**

**Presenter(s):** Ian Pase

**Advisor(s):** Dr. Ann Gordon

Queer people and the LGBTQ+ Rights movement have been an ever-present part of American political discourse since the early twentieth century. For decades the movement has worked to improve the lives of the members of the queer community and foster a more equitable society regardless of sexual orientation and identity. Greater representation in government is a key method of how the movement aims to accomplish these goals. In this essay, I seek to examine what factors make individuals more likely to support the inclusion of more queer people serving as elected officials. Using the 2020 edition of the American National Election Studies Time Series survey I test multiple hypotheses for this question and find that party identification as well as moral beliefs such as traditionalism and egalitarianism are strongly connected to why individuals believe, or disbelieve, that it is important for more LGBT politicians to be elected to office. I also find compelling connections between the hypotheses that call into question the true values of American voters and the political parties they believe represent their values. This information is essential for understanding the modern discourse surrounding queer representation as well as what kinds of people need to be targeted by the messaging of campaigns for LGBTQ+ politicians.

### **73. Why Do Americans Fear Terror Attacks More Than the Death of a Loved One? A Data-Driven Explanation.**

**Presenter(s):** Jack Bunzel-Hardie

**Advisor(s):** Dr. Ann Gordon

The 21st century has brought with it several instances of domestic and foreign terrorism on the United States. In the post-9/11 world, the general fear of terrorism and the various sources of terror that fall beneath this umbrella term have ballooned to the point of being one of the most prevalent fears in American society during the completion of the 2016 Chapman Survey of American Fears. While it is important to note that significant events such as the rise of ISIS, the Paris and Brussels Attacks, the Pulse Nightclub shooting, and the 2016 Presidential campaign have left individuals among the general population with an increased measure of fear, this article intends to, among other things, show that certain demographics have been left with an outstanding fear that does not warrant a proper reaction to the data on these attacks. This

outstanding fear has led to a less cohesive American society, less civic engagement, more political divisiveness, and more ineffective policy-making from the federal government.

In this paper, I examine the root identifying factors and causes of this fear among Americans, in an effort to provide updated research-backed conclusions that can give readers options to more effectively combat this problematic amount of fear, that carries with it only negative consequences. Using data from the 2016 Chapman Survey of American Fears, which concluded that terror-related fears were 2 of the top 5 in America, this article will identify, through a series of hypotheses, several explanations for determining who is most subject to this fear and why. More specifically, the article examines not only the general fear of terrorism in America, but also the fear of international terror groups, domestic terror incidents, and cyber-terrorism. This data will help me to conclude that factors such as political orientation, media consumption habits, geographic location, and trust in government effectiveness all contribute to the degree to which this fear is relevant to the respondents in this survey, representing the larger population in America.

#### **74. Mobilization vs Influence: How Campaign Exposure Affects Voter Turnout**

**Presenter(s):** Julia Gaspari

**Advisor(s):** Dr. Ann Gordon

In every election cycle, trillions of dollars are spent on presidential campaigns. While elections cannot operate without these campaigns, evaluating the extent to which they influence voter turnout remains a critical question. In addition to following presidential campaigns, media and news outlets can also affect how voters participate in their democracy. Using a nationally representative survey containing 8,280 pre-election interviews and 7,449 post-election re-interviews from the American National Election Studies 2020 Time Series, I found a relationship between campaign exposure in the 2020 Presidential election and a higher voter turnout. Because campaign exposure can be measured through many different forms of media, I evaluated these different methods of campaign exposure and their effectiveness. These methods ranged from TV programs, newspapers, internet sites, radio news, and being contacted directly. I interestingly found that those who interacted with one or more of these methods had a higher voter turnout. In addition to these variables, I evaluated campaign exposure along with other sub-variables such as age, education, and party identification. Although a perfect election cycle would be policy-central, it is crucial to recognize and understand the importance and effect that campaigns and media exposure have on voter turnout. The results of this study could aid in clarifying how factors such as exposure to presidential campaigns and media outlets shape democratic engagement on a national level.

**75. Behind the Trigger: Investigating the Drivers Behind Public Opinion on Gun Control Regulations****Presenter(s):** Lucia Isa Alarcon**Advisor(s):** Dr. Ann Gordon

Gun violence in America has sparked demands for stricter gun policy measures in hopes of alleviating the fear of being caught in the crossfire. In this paper, I investigate how various political, sociodemographic, and media factors influence America's public opinion on federal gun control policies and proposed legislation while controlling for the role of gun ownership. These measures consist of background checks for private gun purchases, banning the sale of semi-automatic assault-style rifles, and mandatory government buy-back programs for semi-automatic assault-style rifles. Using the 2020 data collected by the American National Election Studies survey, a representative national sample of U.S. adults, results show that respondents are significantly divided on the three different firearm measures. I expect to find statistically significant correlations between support for lesser gun control measures and those who are more right-leaning, believe political violence is justified, and have less trust in the media. Taking into consideration that many young adults have grown up on the narrative of gun violence, I expect to find those who are younger or have higher educational attainment are more likely to support stricter gun control policies. In the last couple of decades, America has seen an increase in gun-related crimes. Therefore, it's critical to understand the priorities of the American public and what is influencing them in hopes of settling the debate and forming effective legislation for the needs of the people.

**76. The Intersection Between Spiritual Leaders, Religiosity, and Political Sway****Presenter(s):** Luke Patterson**Advisor(s):** Dr. Ann Gordon

In light of rising political polarization throughout the country, this research seeks to understand the relationship between religiosity and reliance on their leaders' opinion. As these tensions continue to rise, this relationship between a voter and who may inform their vote, provides an insight into the influence spiritual leaders around the country have on elections and party dominance. In order to better understand the political environment within the country, it is crucial to analyze how voters come to form the opinions they espouse. I believe that by focusing on how religiosity may affect the outspoken nature of a person's political opinions to the level of shared party identification within different congregations, will show a reliance on spiritual leaders' politics. Through this research spiritual leaders as influential members of the larger political system and the importance of appealing to people of stronger faith will be established. Overall, the research following will provide crucial insight into what affects voting behavior, and how religiosity plays a factor into the influence of said voting behaviors.

**77. The Educational Divide and It's Effect on Voter Turnout**

**Presenter(s):** Melissa Rosario

**Advisor(s):** Dr. Ann Gordon

In the 2020 U.S. presidential election, the interactions between education, income, and political affiliation influenced one of the most recently diverse voter turnouts. This study will explore the relationship between educational attainment, income level, and party identification on voter turnout, specifically in the 2020 U.S. presidential election. Using data from ANES 2020 pilot data, I employ SPSS for statistical analysis to identify significant correlations and patterns between my independent variables, educational attainment, and income level, and my dependent variables, voter turnout, and party identification. The central research question investigates how varying levels of educational attainment influenced voter turnout in the U.S. during the 2020 election. My hypothesis posits that higher educational attainment and income levels correlate with increased voter turnout. While my findings indicate a general trend supporting my hypothesis, the strength of the correlation as statistical significance is below expected. This research emphasizes the complex nature of voter engagement and underscores the importance of addressing educational and economic disparities that affect participation. Understanding how these factors impact voter turnout can inform strategies to enhance electoral participation, particularly among unrepresented populations. Addressing these inequalities is crucial for enhancing voter turnout and fostering a more equitable and participatory democratic system. Overall, this analysis offers valuable insight for future electoral strategies and policies that promote equitable participation in the democratic process across diverse demographic groups.

**78. The Influence of Partisan Media and the Public Perception of Violent Crimes in the United States**

**Presenter(s):** Rory Matos

**Advisor(s):** Dr. Ann Gordon

This study analyzes how political bias in media outlets shapes society perspectives and attitudes, as well as how partisan media affects public perceptions and contributes to fears of violent crime in the US. Partisan media sources, especially those with extreme political viewpoints are increasing in audience views in recent years, influencing stories about crime rates, demographics of both offenders and victims, etc. This study examines the relationship between the influence of media consumption and public perceptions of violent crime using both content analysis and data on the public perception in fears of crime. It evaluates how people's anxieties, sense of safety, and support for political agendas' such as policing and criminal justice reform are impacted by partisan framing. According to the research, those who view partisan news sources that confirm pre existing prejudices are associated with a higher fear of crime. This study incorporates reporting across well-known media outlets with a left- and right-leaning stance with data on media preferences and fears of crime. Also, the study finds that people who are more afraid of crime are more likely to watch political media that confirms their worries, which leads to divisive and polarized opinions on political standards and laws. This study shows that people who are more fearful of crime seek partisan media outlets that confirm and reinforce their fears, which

creates an endless cycle in which media consumption contributes to anxiety and distorts views. Establishing more well-informed, balanced public discourse on crime in the US calls for addressing the issue of media polarization and its effects on perceived fears of crime.

**79. Fear Factor: Tracing Ten Years of Anti-Immigration Sentiment in the United States**

**Presenter(s):** Serena Park

**Advisor(s):** Dr. Ann Gordon

Anti-immigration sentiment and rhetoric have been pervasive issues in the United States since the nation's early years. In 2024, polling found that Americans view immigration as the most important problem facing the country today, and looking at past contributing factors like the Trump administration's "zero tolerance" policy at the United States's Southern border and COVID's spike in anti-Asian hate, as well as more current economic conditions, campaign and political rhetoric, and xenophobia as a whole, immigration and immigrants are a particularly contentious topic in the country. Relying on the Chapman Survey of American Fears, a representative national sample of adults and their fears in the United States, this paper will draw on ten years of data, taking results from the first, fifth, and tenth editions of the survey, to study the factors that drive anti-immigration convictions and how they have shifted and evolved over the decade. I expect to find that factors such as fear of illegal immigration, fear of widespread civil unrest, fear of a terrorist attack, fear of being a victim of terrorism, fear of Muslims, belief that immigrants cause more crime, party identity, level of education, or a combination of these and other reasons are driving elements responsible for anti-immigration attitudes. This research can help provide a comprehensive view of recent anti-immigration sentiments and how these notions have impacted the country over the last ten years. Considering the anti-immigration feelings on both sides of the heavily polarized political spectrum in the United States, these findings regarding anti-immigration may bring to light the specific factors behind the problem. In a country whose foundation was constructed by immigrants and is considered a "melting pot" of cultures, we are left wondering how it can harbor such enmity to those who come to the United States for new beginnings.

**80. Nuclear Nightmares: The American Fear of Iranian Nuclear Attacks and Foreign Policy**

**Presenter(s):** Tyler Coker

**Advisor(s):** Dr. Ann Gordon

In an age of escalating tensions in the Middle East, the American public has to watch with a wary eye for a conflict in which the United States has to get involved overseas. In this paper, I examine the extent to which religiosity influences Americans' fear of Iranian nuclear attacks. Using Chapman University's Survey of American Fears, a nationally representative survey asking Americans about what scares them the most, I find an increase in the fear of Iranian nuclear strikes as a respondent's religiosity increases. In religious circles, fears can be greatly manipulated by the words of a single authority, which could increase the fear of nuclear strikes. Following the influence of religiosity, I also will connect religious concerns over Iranian nuclear strikes with who

respondents voted for in the 2020 presidential election. Looking into other variables, I also consider the influence of a respondent's consumption of nightly national news sources, finding a relationship between frequent viewership and fear. Finally, I also found a link between lower levels of education and greater fears of Iran's capabilities. Public opinion has the power to define American foreign policy, and with so much fear surrounding Iranian nuclear capabilities, the future of relations in the Middle East will be influenced by the striking fear of Iran.

**81. Partisan Perspectives on Trust and Corruption in America****Presenter(s):** Victoria Ascencio**Advisor(s):** Dr. Ann Gordon

Facing accusations of bribery, abuse of power, and the unethical exchange of political favors for financial gain, Robert Menendez has been urged to resign as a senator. This case has been highlighted through many outlets, yet his case is only one of many instances of political corruption in recent years. This recurring pattern is leaving Americans to have less and less faith in political actors to uphold moral behavior in their position of power.

In this paper, I examine the contrasting perceptions of political influence held by Republicans and Democrats regarding various agents of the political system, including state and federal politicians, labor unions, social justice organizations, national news media, and even the influence of celebrities. I will do so by referencing the Chapman Survey of American Fears, a representative national sample of U.S. adults, to find a strong stance that Republicans predominantly perceive these groups as self-serving, asserting that they utilize their political influence primarily for personal gain rather than for the benefit of America as a whole.

Meanwhile, data shows Democrats exhibit a more idealistic perspective, believing that these influencing powers balance their self-interest with the benefit of all Americans. The results indicate a significant statistical difference in perceptions across partisanship, highlighting an ideological divide that highlights the relationship between political affiliation and belief in corruption. This study contributes to the ongoing discourse on political polarization and the increasing distrust of the American government and actors that influence public policy.

**82. Divided by Fear: Party Perceptions on Firearm Regulation****Presenter(s):** George Louis**Advisor(s):** Dr. Ann Gordon

Advocating for or against government restrictions on firearms and ammunition has become a contemporary political debate that is divided between protecting individual liberty and addressing a national crisis concerning public safety. This research paper examines how party affiliation influences how afraid Americans are of government restrictions when it comes to firearms and ammunition. Using data from the Chapman Survey of American Fears, a national survey, I find that Americans are afraid of government restriction. My findings will consist of how party affiliation is directly contributing to how Americans fear and view governmental restrictions. Specifically, how a member of the Republican party would be more concerned about the government infringing on their constitutional right to purchase certain firearms/ammunition.

While a member of the Democratic party would prioritize security over their individual liberty of purchasing certain firearms/ammunition. This polarizing topic reflects the broader ideological difference between both parties, where Republicans fear a government with overarching power, while Democrats are more open to government intervention. Restricting firearms and ammunition unfortunately would not entirely eliminate gun violence in the U.S., but if it has the chance to save one life, then it is a question of whether the value of liberty outweighs the value of security.

## **Psychology**

### **83. Media and Immigration Fears**

**Presenter(s):** Charlie Sisk

**Advisor(s):** Dr. Ann Gordon

I will be researching the relationship between the media, and one's fear of immigration. I believe that this is a very prominent issue in American politics at the moment, and it is one of the major nationwide issues going into the next election. I believe that individuals who consume more media will generally have a much larger fear of immigrants. I can also look at their fears of violent crime (specifically kidnapping/abduction) and find similar results. The main independent variable in this research will be the amount of media one consumes, and it can be cross referenced with the various ages and demographics by each age group to potentially find interactions. I will mainly be using questions regarding fears of immigrants as well as violent crime for the dependent variable, and using as many of the questions regarding media as possible to create an independent variable. Additionally, marital status, number of children, and housing ownership can play a role. This topic will be very interesting to explore, especially given its significance in the election this year.

### **84. Does Insecure Attachment Mediate the Association Between Minority Stress and Body Image Among Gay Men and Lesbian Women?**

**Presenter(s):** Halle Morse

**Advisor(s):** Dr. David Frederick

As the number of individuals who identify as LGBTQ continues to increase, so do the challenges they face due to their sexual orientation and/or gender identity. Some of the more predominant issues that this community experiences are issues related to body image, minority stress, and insecure attachment. Individually or combined, these issues can lead to long-lasting trauma that can have a negative impact on multiple aspects of their lives. This study tested whether minority stresses and subsequent trauma experienced by gay men and lesbian women are associated with insecure attachment styles, which are associated with poorer body image. Efforts to educate people on the associations between these variables can provide members of the community with insight that could lead to healthier relationships, body positivity and/or less experiences with minority stress.

**85. Investigating the Relationship Between Personal Growth and Cognitive Functioning:**  
**A Longitudinal Study of Adults in Midlife**

**Presenter(s):** Bijou Allard

**Advisor(s):** Dr. Julia Boehm

Aging is commonly associated with cognitive decline, but emerging research suggests that psychological well-being and related constructs may offer protection against deterioration. This study examined the longitudinal association between personal growth— the ongoing process of developing self-awareness, improving one's abilities, and achieving a deeper understanding of oneself and one's potential — and cognitive function in a middle-aged American sample. We hypothesized that higher levels of personal growth would be associated with better cognitive outcomes over 10 and 20 years. Data were sourced from three assessment periods in the Midlife in the United States (MIDUS) Study (Mage = 46.91; 54% women; 93% White). Personal growth was assessed with three items from the Psychological Well-Being Scale in 1995-1997 (MIDUS I). In 2004-2006 (MIDUS II) and again in 2013-2015 (MIDUS III), cognitive function was evaluated via the Brief Test of Adult Cognition by Telephone (BTACT). The BTACT yielded measures of an overall BTACT Composite, an Episodic Verbal Memory Composite, and an Executive Function Composite derived from standardized z-scores of relevant subtests. Preregistered linear regression models evaluated the association between personal growth at MIDUS I with each of the three cognitive outcomes at MIDUS II (N=3,720) and MIDUS III (N=2,592), adjusting for relevant covariates. Age and gender-adjusted analyses revealed a significant longitudinal association between personal growth and cognitive function, with higher levels of personal growth predicting better cognitive functioning across all BTACT composites at both 10 and 20 years ( $p < .001$ ). Associations persisted when controlling for additional covariates, including marital status, income, race, and education level ( $p < .05$ ). Our findings highlight the potential of personal growth to act as a protective factor against age-related cognitive decline, offering valuable insights into how fostering psychological well-being can support cognitive health throughout adulthood.

**86. Project Fresh Air**

**Presenter(s):** Rylen Sakamoto, Eusabeia Silfanus

**Advisor(s):** Dr. Vincent Berardi

Secondhand smoke (SHS) exposure is defined as the breathing of smoke exhaled from burning combustible products, which can increase the risk of heart and lung diseases, especially in children. Research has primarily focused on tobacco SHS, with much less work examining cannabis SHS. Project Fresh Air, conducted in San Diego County, investigated the effect of real-time visual audio feedback plus coaching interventions on SHS, by gathering air particulate matter (PM2.5) data over the course of three months in the homes of 298 smokers in low-income households with children under 14 years of age. The sample consisted of participants who only smoked tobacco (n=163), as well as dual smokers of tobacco and cannabis (n=29), who were randomized into two groups: an intervention group that received real-time feedback, and a control group that did not. The goal of this study was to determine whether the intervention had differential effects on indoor air quality, measured by PM2.5, on participants who smoked only

tobacco or were dual smokers. A three-way interaction multiple regression model looked at the change in PM2.5 before and after intervention, between tobacco smokers and dual smokers, and between intervention and control groups. We found that the main effect of the intervention decreased PM2.5 from baseline to post-intervention ( $B = -233.37$ ,  $p = 0.01$ ). Dual users had a higher PM2.5 concentration during the baseline compared to tobacco smokers ( $B = 1837.25$ ,  $p < 0.001$ ). Compared to baseline, the intervention group of dual smokers had a decrease in their PM2.5 by 1320.63, while tobacco smokers decreased theirs by 337.27 ( $p < 0.01$ ). These results reveal that because marijuana users generated more SHS at baseline, which gives them more room to improve, resulting in more significant air pollution reduction after intervention.

## **Software Engineering**

### **87. Software Implementations and Analyses of the Emotional Impact of Various Binaural Beat Classifications Layered into Music.**

**Presenter(s):** Neil Azimi

**Advisor(s):** Adam Borecki

This study explores the psychoacoustic effects of binaural beats, which are produced when sinusoidal waves of slightly differing frequencies are played into each ear, leading to brainwave entrainment. Binaural beats are categorized by frequency bands (e.g., Beta: 14–30 Hz for energy, Theta: 4–8 Hz for relaxation), each associated with different psychological effects. This research contributes to the field by empirically analyzing whether binaural beats alter the emotional impact of music. Past studies have investigated the potential benefits of binaural beats in relaxation and energy stimulation. However, their effects, when combined with music, especially regarding a song's perceived emotional quality or valence, remain underexplored. The methodology involved developing a Binaural Synthesizer VST plugin using the JUCE C++ software framework for binaural beat synthesis with proper audio signal processing and buffering infrastructure; this encourages the use of binaural beats in music production workflows. Songs were categorized based on valence using Spotify's API and mixed with either Beta or Theta binaural beats. Participants listened to both control and modified versions of these songs and provided valence ratings, noting changes on a scale ranging from significant decrease to significant increase. The randomized order of presentation and matched musical elements helped isolate binaural beat effects and minimize bias and fatigue. Results indicated that Beta beats consistently decreased valence in high-valence songs, contrary to expectations, while Theta beats also decreased valence in low-valence songs, aligning with the hypothesis. These findings suggest that binaural beats decrease perceived positiveness in music rather than enhancing energy or relaxation. Limitations include the short duration of exposure and the subjective nature of emotional assessment, warranting further research.

## **Biochemistry and Molecular Biology**

### **1. Atomic Force Microscopy Imaging of Ultra-Low Crosslinked Microgel Paste Arrangement and Dynamics**

**Presenter(s):** Daniel Mattar

**Advisor(s):** Dr. Andrew Lyon

Ultra-Low Crosslinked (ULC) microgels are small deformable particles that are used in a variety of applications in the biomedical field including tissue engineering, drug delivery, and as biosensors. They have been used for these applications due to their unique deformability and tunability. The initial goal was to observe their behavior under different environmental conditions in order to understand the properties of these microgel pastes. In this study, Atomic Force Microscopy (AFM) was used in order to observe these interactions at different concentrations (mg/mL). The microgels were applied to silanized glass coverslips before imaging. The silanized glass slides were used to allow the bottom layer of the paste to adhere to the glass slide more effectively. This process provided more accurate results due to the minimization of the microgel-to-air interaction as well as allowing for the precise visualization of a single layer of these particles which would reflect the true dimensions of the microgel particles. At the bottom layer, the AFM was able to image the swelling and packing of the microgel particles at concentrations of 1mg/mL, 10mg/mL, 15mg/mL, 80mg/mL, and 150mg/mL. The lower range of concentrations, 1mg/mL, 10mg/mL, and 15mg/mL, have the consistency of a solution while the higher range of concentrations, 80mg/mL and 150mg/mL, have the consistency of a paste. It was observed that microgels in low-concentration solutions displayed larger particle sizes than those in high-concentration pastes, due to the higher packing density in higher concentration of pastes, where microgels are tightly packed, leading to smaller apparent particle sizes. The findings of this study provide valuable insights into the structure and mechanics of ULC microgels under different conditions, enhancing our understanding of their potential applications in biomedicine and materials science.

### **2. Analysis of the Combined Use of Antibiotics and Aminoacyl tRNA Synthetase inhibitors in Escherichia coli**

**Presenter(s):** Jin Nathan Swun, Emi Iwasaki, Aubrey Yokota

**Advisor(s):** Dr. Michael Ibba, Dr. Lorenzo Leiva Araya

The efficacy of antibiotics in public health is decreasing every year due to the increase in bacterial resistance to antibiotics around the globe. The most studied mechanism driving the rise of multi-resistant bacteria is the acquisition of resistance genes through the horizontal transfer of genetic material. However, bacteria also possess intrinsic stress response mechanisms that reduce the damage caused by antibiotics by regulating cellular metabolism and physiology. In this work, we focused on the aminoacyl tRNA synthetases (aaRS), a family of 20 essential enzymes required for protein synthesis that have been implicated in some mechanisms of antibiotic resistance. We specifically explored the roles of different aaRSs on the intrinsic tolerance of Escherichia coli to antibiotics found in clinical settings (erythromycin, nalidixic acid, and ampicillin). Using a CRISPRi

system to inhibit production of each aaRS, we observed that they are involved in the level of sensitivity to different antibiotics and the magnitude of the effects is specific to each aaRS. Furthermore, we analyzed the combined effect of commercially available aaRS inhibitors during antibiotic treatments in bacterial cultures, observing a synergistic effect in their action. These results suggest that regulating aaRS production and/or activity during antibiotic treatments is one of the intrinsic resistance mechanisms and that using aaRS inhibitors in combination therapies may open the door to the design of new antibacterial treatments.

### **3. Exploring the Effects of Student Mindset on Study Strategies**

**Presenter(s):** Molly Niswender

**Advisor(s):** Dr. Jeremy Hsu

Research Question Effective study strategies are essential for success in STEM courses (Sebesta et al., 2023). However, factors influencing students' choice of study strategies are not well understood. Recent research suggests that students' beliefs about their abilities, such as a growth or fixed mindset, may shape their study habits. For example, students with a growth mindset—the belief that intellectual abilities are improvable—may employ more effective study strategies compared to those with a fixed mindset, who see abilities as unchangeable (Chouvalova et al., 2024). It remains unclear, however, to what extent mindset influences study strategy choice, and how factors like class size and type of institution may affect this relationship. This study investigates: Do students' mindsets influence their study strategies, and if so, how? Research Design We conducted our study at a private, comprehensive institution in southern California and an open-enrollment institution in central Utah. First, we developed interview questions aligned with our research question, drawing on relevant literature (Chouvalova et al., 2024). After piloting the questions through cognitive process interviews, we conducted 32 one-hour, semi-structured interviews with introductory biology students from both institutions. These interviews were transcribed, and we are currently conducting thematic analysis. Analysis Preliminary results suggest that mindset and beliefs impact students' study strategies in STEM courses. Students with a growth mindset showed greater openness to trying new study methods, and we found that errors in coursework influenced students' motivation and study habits, aligning with previous research (Chouvalova et al., 2024). Further analysis will explore differences between students at smaller, private institutions and larger, open-enrollment institutions. Contribution Our research provides insights into factors shaping study strategies in STEM, particularly across different institution types. This work may inform interventions to promote effective study strategies in

## Chemistry

### **4. Microgel Paste Thin Films as Sacrificial Supports in 3D Printing**

**Presenter(s):** Marion Harper, Hatte Hamilton

**Advisor(s):** Dr. Andrew Lyon, Elif Narbay

The tunable properties of microgels permit a wide range of potential applications in engineering and medicine, particularly in the fields of 3D and 4D printing, where they supply the role of active or smart matter. Microgels are ideal for this purpose as their properties are tunable by environmental conditions such as temperature, light, pH, or the presence of chemical or biological stimuli. In this study, ultra-low crosslinked (ULC) poly(N-isopropylacrylamide) (pNiPAM) microgels were used to explore their potential as a sacrificial layer in 3D printing and an active material in dynamic 3D printed structures (4D printing). Sacrificial layers are desirable in 3D printing as they allow 3D-printed structures to be released from the printing surface and printed in more complex shapes while minimizing potential damage done to the structure in detaching in from the print surface and supports. Thin films of pNiPAM paste have already shown potential as a sacrificial layer in 3D printing. pNiPAM dissolves when exposed to water, allowing printed structures to be released (from the substrate) without imposing mechanical stresses and freely float in the liquid. This is particularly useful in printing soft constructs, which may be very sensitive to deformation caused by a mechanical removal process. pNiPAM also has possible 4D printing applications as an active material. 4D printing is the design and synthesis of a 3D printed structure which is able to change shape over time, based on certain stimuli. Microgels such as pNiPAM offer not only avenues of testing the models of 4D printed materials, but also ready biological and medical applicability due to their biocompatibility and tunable activation stimuli.

### **5. Assessing Arsenic Bioaccessibility and Spatial Distribution in Mine Wastes: An Integrated Microscopic and Macroscopic Approach**

**Presenter(s):** Lea-Sophie Vetter

**Advisor(s):** Dr. Christopher Kim

Arsenic (As) is a toxic trace metalloid that harms both humans and the environment due to its carcinogenic nature. Anthropogenic activities, especially mining, can mobilize arsenic when enriched in fine-grained mine wastes. Prolonged exposure to low-level arsenic occurs in populations near abandoned mine sites, primarily through inhalation or ingestion. Therefore, accurately quantifying arsenic bioaccessibility is critical for long-term risk assessment and remediation efforts. Arsenic bioaccessibility is influenced by various factors including initial concentration, surface area, and particle size. Additional variables such as spatial distribution within particles remain under-studied due in part to the challenges in quantification and resolution, despite its potential influence in arsenic release and bioaccessibility. This project seeks to assess the effectiveness of arsenic spatial distribution as an indicator of changes in bioaccessibility over time, with the overall objective of identifying a more effective method for prioritizing mine sites for remediation efforts.

Simulated gastric fluid extractions of ground and unground samples were performed to simulate the pathway of ingestion and analyzed using ICP-OES to determine the percent arsenic bioaccessibility. SEM-EDS analysis on prepared thin sections of the samples provided data for visualization, morphology, texture, and elemental characterization. Additionally, micro-XRF maps, collected at the Stanford Synchrotron Radiation Lightsource, were utilized in a quantitative analysis to determine spatial distribution of arsenic. Comparative analyses were then conducted to compare the spatial distribution of samples with bioaccessibility data and identify correlations. By identifying such correlations, the value of using spatial distribution as a predictor of arsenic bioaccessibility was assessed. These findings have the potential to streamline the process of assessing long-term risks of arsenic exposure from abandoned mine sites.

#### **6. Hot Electron Chemistry on Bimetallic Titanium Nitride Core-shell Nanoparticles**

**Presenter(s):** Stephanie Hoang, D'Angelo Alvarez

**Advisor(s):** Dr. Jerry LaRue

The increase in CO<sub>2</sub> pollution has become a prevalent global climate issue. CO<sub>2</sub> pollution can be mitigated by converting CO<sub>2</sub> into CH<sub>3</sub>OH (methanol) or other hydrocarbons to create renewable fuel through a hydrogenation reaction using catalysts. Photocatalysts are a class of catalysis that changes reaction rates when excited and can be used to assist in creating green fuels. Our plasmonic photocatalysts are bimetallic transition metal core-shell nanoparticles composed of a plasmonic core and a chemically active transition metal shell. The core metal displays a phenomenon called localized surface plasmon resonance that generates excited or "hot" electrons when absorbing light. The addition of a transition metal shell enhances the plasmonic core, and the resulting core-shell nanoparticles exhibit unique optical and catalytic properties that contribute to their photocatalytic abilities to efficiently generate hot electrons for use in excited state chemistry. This project focuses on titanium nitride (TiN) as the core metal used for the synthesis of bimetallic core-shell nanoparticles. As of now, ruthenium (Ru), rhodium (Rh), and nickel (Ni) have been used as the shell metal. The TiN/Ru and TiN/Rh nanoparticles (NPs) are synthesized using reflux reactions, washed using a centrifuge, and characterized using Scanning Electron Microscopy (SEM), Energy-Dispersive X-ray Spectroscopy (EDX), Transmission Electron Microscope (TEM), and Ultraviolet Absorption Spectroscopy (UV-Vis). Characterization of the synthesized bimetallic core-shell nanoparticles depicted favorable size, shape, and elemental distribution for photocatalysis. The photocatalytic efficiency of the bimetallic core-shell nanoparticles were assessed through the hydrogenation of CO<sub>2</sub> using a photoreactor chamber equipped with mass spectrometry and Raman spectroscopy. Through the use of bimetallic core-shell nanoparticles, we aim to understand their photocatalytic properties and use these promising catalysts to assist in creating renewable fuel in order to reduce CO<sub>2</sub> pollution.

**7. Theoretical and Experimental Synthesis of  $\beta$ -Fluorinated Morphine Derivative for Selective Binding in Inflamed Tissue**

**Presenter(s):** Amelia Bayha, Thu Doan, Adel Martinez

**Advisor(s):** Dr. Matthew Gartner, Nayiri Alexander

The growing abuse and fatalities related to drug overdoses in the United States have sharply risen in the past two decades. The necessity for a non-addictive alternative for prescription opioids, such as the most commonly prescribed morphine, is greater than ever. Previous studies have identified several morphine derivatives that promote selective binding in lower pH environments, such as inflamed tissue, while avoiding dangerous activation in the brain. This was determined by a decreased  $pK_a$  of the biochemically active amine group to promote the selective binding in peripheral opioid receptors within inflamed tissue (pH=6-6.5). This activation provides analgesia while central receptors within the brain remain inactive, thus preventing undesired side effects associated with opioids. The structural modifications made to morphine resulted in one ideal drug candidate—Fluoromorphine  $\beta$ -C2—that can provide pain relief by binding selectively only in inflamed tissue. The aim of the study is to experimentally synthesize the novel opioid derivative Fluoromorphine  $\beta$ -C2 from a theoretical synthesis plan assisted by computational resources. A new approach to the theoretical synthesis includes an insight from AI computational websites such as IBM RXN for Chemistry. The theoretical synthesis plan starts with 2-chloro-3-fluoromethoxypyridine to create the final product of Fluoromorphine  $\beta$ -C2. A SmilesCode generator was used to create a single-line string of symbols to illustrate a 3-dimensional molecular compound, which can be inputted into several AI synthesis programs. The resulting information is subsequently cross-referenced with peer-reviewed articles and experts in the field to assess the feasibility of each step. Therefore, addressing the opioid crisis allows for new opportunities for pain-relieving medication without dangerous side effects associated with opioid use.

## **Computational Science**

**8. Impact of Environmental Context on Motor Task Performance in Stroke Rehabilitation: A Comparison of Lab and Home Settings**

**Presenter(s):** Priya Gadhe

**Advisor(s):** Dr. Rahul Soangra

Recovering motor function after a stroke is a journey that extends beyond the clinic, where the familiar walls of a lab can't fully mimic the dynamic, unpredictable environments of daily life. This study bridges that gap by comparing biomechanical data from healthy adults as they perform movement tasks in controlled lab settings versus their own homes, aiming to uncover how real-world surroundings influence rehabilitation outcomes. The objective was to assess how environmental context influences the quality and execution of motor tasks, providing insights into the feasibility of remote monitoring for rehabilitation. Data was collected from healthy participants performing 360-degree turning and sit-to-stand tasks under varied conditions—eyes

open, eyes closed, on foam, and on foam with eyes closed. For the turning tasks, completion time, peak acceleration, and peak angular acceleration were measured. For sit-to-stand tasks, movement time was divided into segments: initiation to peak flexion, peak flexion to peak extension, and peak extension to termination. Additional metrics, including peak flexion, peak extension, seat-off, acceleration initiation, and termination, were analyzed. Data from both environments were compared for each metric. We expect to see a difference between the lab and home environments. Differences in movement dynamics were observed, particularly in acceleration and timing metrics. These results suggest that participants perform movement tasks differently outside a controlled setting, emphasizing the impact of environmental factors on rehabilitation monitoring and outcomes. Because we expect to see a difference between the home and lab environments from healthy participants, we anticipate an even greater difference when examining the performance of stroke patients. This study highlights significant variations in motor task performance between lab and home settings, underlining the need to consider the environmental context in remote patient monitoring. These findings support further investigation into the design and application of home-based mo

## **Computer Science**

### **9. HarmonicThreads: A Computer Musical Interface that Supports Accessibility**

**Presenter(s):** Ellie Nguyen

**Advisor(s):** Dr. Franceli Cibrian

Our research involves the development of HarmonicThreads, a computer musical interface that provides users with an easy and engaging way to produce music. The goal of this project is to support those who struggle to play traditional musical instruments due to cost, training, and mobility requirements. To foster a natural user experience, we develop an interface where users can create and control sounds easily by touching a responsive, flexible fabric. In particular, we design a system by embedding conductive threads into the fabric and attaching them to a sensor that detects the user's touch. Proximity sensors are also placed behind the fabric to measure the amount of force applied by the user. Then, a box will support the structure and portability of this system. All of the sensor data will be sent to a Pure Data computer music program, which uses this information to influence musical parameters, including pitch, volume, and duration. As we analyze ways to influence music with sensor data, we find many possible approaches to respond to the user's interactions. Currently, the program associates each thread on the fabric with a unique frequency to play when it detects touch. Thus, users may control what notes to play, create chords by touching threads simultaneously, and control the duration of these chords. They may also control the sound by applying force on the fabric, and use a slide switch to select the musical scale to play. Through this exploration, we discovered that musical composition is achievable with a rule-based system. In future work, we will conduct a user study to evaluate the experience and potential of HarmonicThreads in a real scenario. This opens doors to further

developments in the fields of creative, accessible musical practice and human-computer interaction.

### **10. Design Implications for Montessori Education Applications**

**Presenter(s):** Olivia Chilvers

**Advisor(s):** Dr. Franceli Cibrian

This project aims to identify the design implications for children’s educational apps that seek to align with the principles of the Montessori Philosophy and contribute to the development of educational technology. By analyzing critical features of apps that engage children and promote their natural desire to learn, this project aligns with the Montessori philosophy of fostering independent, self-directed learning. To uncover the design implication, we conducted a qualitative analysis of reviews of popular educational apps, defined by having at least 3,000 reviews and a rating of 3 stars or higher, that appeared from search results using the keyword “Montessori” in the Apple App Store. A preliminary analysis was conducted on 200 randomly selected reviews, which were then used to define and create a codebook containing 20 different themes with definitions and examples. This codebook was applied to analyze 100 reviews for each app, categorizing the feedback and determining common design elements. The coding revealed recurring themes such as open-ended experience, independent learning, and encouraged curiosity, which are commonly found across the varying apps. These themes highlight key design elements such as fostering child autonomy, promoting interactive learning that expands the child’s creativity, and creating sensory-rich yet calming environments that all align with the Montessori principles. The findings suggest that these recurring themes are crucial in designing Montessori educational apps that promote self-directed learning. Understanding these design implications offers valuable insights for developers aiming to create engaging, effective educational tools for children. Future research will involve a heuristic evaluation and a user experience study with children to provide further insights and refine design implications for educational apps that support independent learning.

### **11. Coherent Backscattering in Finite Disordered Structures**

**Presenter(s):** Connor Caruthers

**Advisor(s):** Dr. Nooshin Estakhri

There is a phenomenon in studies of light interaction called Coherent Backscattering (CBS), which is a coherent effect that results from scattering of optical waves in disordered structures, where light intensity is enhanced in the backscattering direction. This effect can be observed in many different media in nature, and is studied in many fields including optics. Typically, CBS research focuses on observing the effect in large media with high opacity, but in this work we investigate the emergence of this phenomenon in finite-sized sparse random media, through a full-wave numerical analysis. Computational techniques are crucial to assist such studies in the field of optics, and for analyzing how light interacts with these random structures we use the CELES software package. We use this to run simulations and capture the data we need, mainly observing the polarization effects based on key parameters such as sample size, density factor, and an

absolute number of particles in a finite-sized sparse geometry. Another critical parameter we investigate is the behavior of enhancement convergence. This is observable through direct ensemble averaging which can show the overall patterns that emerge over hundreds of simulations. Our work on observing the coherent backscattering phenomenon helps explore the possibilities of using the CBS effect as a new powerful diagnostic tool, for a range of scientific and industrial applications.

**12. Tensor-Based Multi-modal Data Fusion****Presenter(s):** Mason Li, Tiffany Le**Advisor(s):** Dr. Yuxin Wen

Machine learning is widely adopted but often requires substantial computational resources. This research addresses the need for more efficient and accurate models by exploring tensor decomposition and tensor fusion as methods to increase predictive accuracy and reduce computational loads. We aim to perform tensor decomposition on convolutional layer weights and input feature data, reducing dimensionality and enhancing computational efficiency. We aim to achieve this efficiency without sacrificing accuracy. Additionally, the proposed model integrates multi-modal inputs, combining visual imagery, patient demographics, and time-series data to perform regression and classification. We aim to improve the accuracy of the model by mapping each data modality to create a third-order tensor, and performing tucker decomposition on the resultant tensor to extract the most crucial features. Using a third-order tensor rather than concatenation allows the model to learn joint relationships between the different modalities, increasing accuracy. The model also employs a novel regularization method to reduce the impact of missing or corrupted data, allowing a more compact tensor decomposition, increasing model accuracy and computational load. Experimental results indicate a significant reduction in model parameters and inference time, demonstrating the potential of tensor decomposition in real-time clinical applications.

**Dance****13. "From Head to Toe: What Do We Think About Heels Dance?"****Presenter(s):** Peyton Winsett**Advisor(s):** Dr. Arushi Singh, Robin Kish

Through both observation as a dance consumer and personal experience as a dance student, heels dance has noticeably risen in prominence within the commercial dance industry in recent years. This style has primarily been showcased through professional dance classes and in commercial and concept video projects. This study seeks to understand the reasons behind this sudden growth in appeal, the potential social implications of this increasing popularity, and the varying perspectives on this style across generations. It synthesizes past research and analyzes a survey conducted with current students in Chapman University's dance department. This presentation will investigate the motivations driving the uptick of this popular dance style while

uncovering relevant historical connections through both research and interviews with dance faculty and students. Understanding the historical origins of this style is essential for comprehensively studying its rise in popularity. This investigation questions whether dancers are training in heels dance out of passion or pressure, exploring the rationality behind this heightened interest. With that in mind, this study aims to inform dancers and dance educators about how they consume and produce dance through a historical lens to support their training choices. Additionally, this research seeks to address gaps in the existing literature on heels dance and explore how this style may socially impact both consumers and artists. By addressing these questions and bridging research gaps, this study will empower dancers, choreographers, and dance consumers to make more informed choices in their training, while illuminating the broader social and historical impacts on the dance community.

**14. Is Dance Universal?****Presenter(s):** Mandy Fang**Advisor(s):** Julianne Pedersen

From its origins, a core value of contemporary dance is rebellion. The definition of contemporary dance has evolved throughout the decades as dancers continue to discover innovative movements that almost contradict their predecessors, inspiring its ever-evolving aesthetic. Unlike other technical styles like ballet, there is no strict codified right or wrong, nor is there a set vocabulary, meaning contemporary dance can look like a lot of things. A common conception when it comes to dance in general is how it transcends nationalities as a universal language of sorts. However, given the individualistic nature of contemporary dance and global varieties of culture I sought to prove how dance may not be as universal as it is commonly deemed.

**Digital Arts****15. Unpacking Bias, Accountability, and Ethical Practices in AI****Presenter(s):** Manya Chandra**Advisor(s):** Micol Hebron

This study is based on understanding how text-to-image generative AI platforms perpetuate biases such as racism and sexism and decoding how this bias is programmed within large language models and datasets. In this study, the results of generative AI are analyzed through the lens of affect and affect theory, as they are applied to investigate the machine learning and computer theory behind generative AI algorithms. The purpose of the study is to explain why generative AI is biased and whether this bias is generated due to current trends or to deficits and biases within the database that it draws information from. By understanding how generative AI is coded, we seek to understand whether and how generative AI is able to predict trends, even outpacing human prediction. These conversations are all correlated to the ethical implications of generative AI, and whether as we move forward with the expansion of text-to-image AI platforms, there should be mechanisms of accountability imposed for ensuring that these platforms operate in ethical and responsible ways. This research also examines whether use of AI can also further

perpetuate stigmas against race and gender by either further encouraging it by its use or rather that AI is being fed such stigmas by analyzing the current trends of the social and political climate of the world. The goal of this study, however, is to understand the origins and mechanisms of bias within generative AI, particularly with regard to tropes of sexism and racism, and to create a proposal for best practices which would help encourage and implement guidelines to create more ethical and conscientious use and application of generative AI platforms.

## **Electrical Engineering**

### **16. Using Archytas Robot for Controlled Movement of Antenna Probes**

**Presenter(s):** Lupe Torres

**Advisor(s):** Dr. Nasim Estakhri

This project investigates the capabilities of an Archytas robotic arm to consistently move and position an antenna probe for measurement of electric field, ensuring high-fidelity measurements across different planes of an antenna or near-field of an RF structure. These types of measurements are typically made within an anechoic chamber. For the chamber we have high-performance polyurethane EMC absorbers to minimize unwanted reflections, creating a suitable environment for data collection. In these types of measurements, the antenna is typically on a stationary stand and employing the robotic arm we study how to capture wave information from multiple angles using a mobile probe. These measurements are recorded by a Network Analyzer. We study different settings and programming of the Archytas robot which can contribute to a robust, controlled setup that advances our understanding of antenna propagations. We will present our findings in controlling the robot in different modes and pros and cons of using such setup for pattern measurement.

## **English**

### **17. Bridging the Gap: A Rhetorical Analysis of the Hydra and its Relation to the Modern**

**Day**

**Presenter(s):** Luca Mathias

**Advisor(s):** Lauren Sieberg

Why are Greek mythological stories so relevant throughout history? Although Greek mythology doesn't seem to provide a relevant purpose beyond entertainment from a surface-level perspective, the stories contain deeply meaningful themes and lessons that resonate with the Ancient Greeks and beyond. The mythological story of the Hydra provides a perfect bridge between ancient and modern time periods in terms of how the story and rhetorical strategies influenced lives in a positive manner. To provide a brief context, the Hydra is a 9-headed water serpent with poisonous blood and venom with regenerative capabilities. The protagonist, Heracles, is ultimately unable to defeat the Hydra until an intelligent strategy is executed. This mythological story provides a multitude of purposeful messages, such as persistence during hard times, complex thinking in the face of turmoil, the constant presence of chaos, and how evil multiplies exponentially when faced without intellectual finesse. The authors and oral storytellers of this aimed to inspire the audience to defeat their own monsters with resilience and smart thinking. The significance of the Hydra myth was how the story is conveyed to the audience, teaching them how to be a good hero through examples and actions, which is why it has such a strong appeal to pathos. These lessons were relevant to the ancient Greeks during the Archaic and Classical periods, as there was a rise in both cultural flourishing and political turmoil.

This mythological classic was timely in its execution, but also bears relevance to the modern day as we fight societal and personal obstacles, oppression, and general adversity. The ultimate goal of this research is to encourage audiences to examine how Ancient Greek stories about the mythological Hydra still offer meaningful resonance within our own modern lives.

## **Environmental Science and Policy**

### **18. Understanding the Population Dynamics of *Lottia gigantea* in Southern California Marine Protected Areas**

**Presenter(s):** Alyssa Boutelle

**Advisor(s):** Dr. Richelle Tanner

Intertidal zones are often frequented by the public because of their wide array of easily accessible marine organisms. While some visitation is purely recreational, many individuals remove organisms for consumption or collection. As a result, many high-traffic tide pool areas have fallen victim to overharvesting of marine organisms and destruction of their natural habitats. One species located in the lower intertidal zone that has been of particular interest to the Orange County Marine Protected Area Council, Crystal Cove Conservancy, and California State Parks is the owl limpet, or *Lottia gigantea*, a species of limpet native to California. The population dynamics of owl limpets, including their sex ratios, are vital to the structure of intertidal communities because of their contributions to species richness in the region. They promote recruitment and settlement by other organisms that would otherwise be competitively excluded from the area. Due to increased visitation and removal of the owl limpets by visitors of the tide pools, other studies have found their sex ratios to be skewed towards smaller male individuals. This is problematic because an imbalance in the proportion of male and female individuals may affect reproductive abilities of the species, and in turn the species' relative abundance. Our study sought to understand the fluctuations in the size distribution and relative abundance of the owl limpets through data collected at several Southern California locations, with each location having "high use" and "low use" sites. Data collection began in 2011 and continues presently. We analyzed the data in RStudio with various summarization, visualization, and analytical methods, which led to identification of several trends within the data. A trend of particular interest revealed that over time there was often a shift from a normal distribution to a right skew, indicating a larger abundance of smaller individuals at nearly all locations.

## **FFC**

### **19. Biblical Surrogacy: Ancient Narratives and Their Ethical Implications**

**Presenter(s):** Cole Krakovsky, Graham Livingston, Louise Smith, Thomas Feles

**Advisor(s):** Dr. Julye Bidmead

Biblical surrogate motherhood differs significantly from contemporary practices, highlighting the evolution of societal norms and values regarding surrogate mothers. By examining Biblical passages, particularly Genesis 16-22 and Genesis 29-31, alongside journals and academic articles, this research seeks to uncover the historical context that shaped early views on surrogate

motherhood. These Biblical narratives, outlining the lives of women who served as surrogates, reveal the often-limited roles and challenges faced by women in ancient society. Careful source analysis and critical reflection are expected to illustrate how surrogate mothers, though more respected today, were historically undervalued and lacked the rights and protections that contemporary society strives to provide. The methodology involves a textual analysis of the cited passages in Genesis, emphasizing the social and theological implications of surrogate arrangements in ancient times. By comparing these accounts with modern surrogate practices, this study highlights the progress made in recognizing the dignity and rights of surrogate mothers. This research aims to contribute to broader discussions around reproductive rights and societal recognition, offering a perspective that respects the profound commitment and sacrifice involved in surrogate motherhood today. Although progress has been made, ongoing societal challenges remain, emphasizing the need for greater appreciation and support for surrogates as they continue to play a critical role in helping families grow.

### **20. Rape in the Hebrew Bible**

**Presenter(s):** Madelyn Kuhnlein, Mehkai Parmer, Desmond Collins

**Advisor(s):** Dr. Julye Bidmead

Ancient rape concepts in the bible are still relevant in today's world. We can see the biggest change in cultural response to rape when comparing and contrasting the modern world and biblical times. Response to rape is one of the most controversial topics in today's world. When comparing the modern day response, there are three main cultural aspects to focus on. One cultural response is the way a society responds to sexual violence. We can see examples of this by how the family reacts, how a city may react, etc., in comparison with today and in the past. Another cultural aspect is the reason behind the violence, why did they decide to rape someone, why the specific person. We can also look at the power dynamics between the people involved and how that plays a role in non-consensual sex. The last reason is the reaction of the victim of the violence. We will look at how the victims express their trauma or if they express it at all. The story of Lot and his daughters in Genesis 19:30-38 shows complex cultural views on survival, power, and family bonds in biblical times. After the destruction of Sodom and Gomorrah, Lot's daughters, fearing the end of their family line, decided to intoxicate their father and conceive him. Genesis 19:31-32 states: "There is no man to come into us; let us make our father drink wine, and we will lie with him." This shows the extreme measures taken for survival in a patriarchal context, where women's choices were often constrained by social and familial expectations. The narrative holds significance for its lack of moral judgment, encouraging reflection on survival-driven actions in oppressive circumstances. Lot's daughters' motivations reveal to us the vulnerabilities and desperation that shaped personal agency in such settings, drawing attention to power imbalances that still resonate in today's world. In the modern world, the story reflects ongoing issues around power dynamics, trauma, and the influence of societal expectations. It underscores the importance of support systems and ethical dialogue in preventing and addressing sexual violence, emphasizing that desperation should not override moral considerations and the need for societal protection remains as relevant as ever.

**21. The Other Woman**

**Presenter(s):** Mayleen Villamil, Natalie Paradiso, Kelechi Igbokwe

**Advisor(s):** Dr. Julye Bidmead

The purpose of second wives is often questioned in a biblical context, finding the contributions they provided these ancient societies was parallel to none and irreplaceable. Discovering the aid they provided for the men of biblical times and the hidden aspects of their lives that led to distinguishing accomplishments is vital to research of the past, present, and future. The problem of gender equality and discrimination plagues our society, sparking rivalry and jealousy between the sexes but also between women alike. The tension established by these women changes the dynamic of their families and divides brother from brother. We will examine the stories of Sarah and Hagar (Genesis 16) that help demonstrate the strained surrogate relationship and social consequences of a second wife. By inspecting other stories like Rachael and Leah (Genesis 29), the themes of divine intervention and jealousy among the sisters can be analyzed. Assessing the details of stories of second wives highlights the features of this lifestyle and the benefits society can reap from this group of people. Through a comparison of various biblical passages depicting second wives aiding society and further scholarly articles, our research will prove the importance of secondary wives in a multitude of contexts from surrogacy to spirituality.

**22. Lady Macbeth: Gender in Text and Film**

**Presenter(s):** Arden Schmidt

**Advisor(s):** Dr. Kent Lehnhof

Lady Macbeth in "Macbeth" is a character whose gender is on a spectrum, upholding and contradicting traditional gender expectations. Throughout the text she is depicted as a character who guides her husband to greatness, but also as a fragile woman who cannot cope with her guilt. I will be displaying scenes that overtly depict the masculine and feminine sides of Lady Macbeth. I will then be exploring Lady Macbeth's portrayal in the 1948 adaptation directed by Orson Welles and the 2010 version directed by Rupert Goold. I am going to be analyzing how each version either emphasizes a more masculine portrayal or a feminine one, and the effect it has on her as a character. Also, I will be examining how her portrayal changes how she is perceived and the role she plays. Lastly, I will be explaining how I would portray Lady Macbeth in a film and the effects intended by each choice. The goal of this project is to highlight how surface-level changes such as costuming and delivery can alter an audience's perception of Lady Macbeth's gender while all the dialogue and plot lines stay the same. By examining different aspects of Macbeth, I intend to emphasize the difference between Lady Macbeth in the text and in the films and the effect these changes have on her gender presentation.

**23. Shadows of Ambition: A Cross-Cultural Analysis of Lady Macbeth****Presenter(s):** Gillian Bui, Lily Devlin**Advisor(s):** Dr. Kent Lehnhof

How is Lady Macbeth portrayed in two vastly different cultural contexts and mediums?

In William Shakespeare's *Macbeth*, the character Lady Macbeth is portrayed as a complex figure whose ambition and influence challenge traditional gender. During the Shakespearean era, societal expectations strictly confined women to roles of obedience and domesticity, making Lady Macbeth's ambition and dominance strikingly subversive. Her character not only reflects the anxieties of the time regarding female power but also challenges conventional notions of gender and sexuality by embodying traits traditionally associated with masculinity. In traditional performances, Lady Macbeth embodies ambition, usually perceived as the motivation for Macbeth's switch into ruthlessness. However, in modern adaptations, her character has evolved to reflect deeper psychological dimensions, including moral conflict and vulnerability. By analyzing two *Macbeth* productions: Akira Kurosawa's *Throne of Blood* (1957) and Rupert Goold's *Macbeth* (2010), we will discuss the similarities and differences in their portrayals of Lady Macbeth through their usage of her costume, makeup, physicality, and acting choices. All of these categories tie into her gender and sexuality and the difference between a director from 50s Japan and a modern director from the 2010s UK. An analysis of these adaptations reveals how Lady Macbeth's ambition can be read both as a critique of patriarchal structures and as a reflection of broader societal ideas of struggles with identity and morality.

**24. Macbeth: Stage Representations of Gender Through the Weird Sisters****Presenter(s):** Guinevere Marston**Advisor(s):** Dr. Kent Lehnhof

Over the last 400 years, filmmakers and stage directors have reinterpreted Shakespeare's renowned play *Macbeth* in countless ways, with significant changes in the presentation of the Weird Sisters. I plan to investigate how the portrayal of the Weird Sisters alters the production's gender biases and message. The European witch trials between approximately 1450-1750 killed tens of thousands of innocent women under the guise of witchcraft and heresy. These ongoing witch trials heavily influenced Shakespeare's creation and characterization of the Weird Sisters. Whether his representation was a defense of the witch trials or a protest against them is a common debate. Modern productions reinterpret and alter Shakespeare's intentions and his overall message by differentiating the portrayal of the Weird Sisters' gender and supernatural abilities, either creating a robust feminist argument or adhering to the misogynistic rhetoric of the times. I will research the Weird Sisters' stage portrayals, specifically in productions from the Royal Shakespeare Company in the twentieth and twenty-first centuries, and examine how the specific choices in their physical characterization and the representation of their gender intend to alter the meaning of the production, such as their costuming, staging, actors, and more. I plan to find contrasting gendered characterizations, from which I expect to conclude that the portrayal of the Weird Sisters can depict women as fickle and malevolent by supernaturally manipulating Macbeth's fate or as innocent clairvoyant overseers of the play's events.

**25. The Gender-Bending of Disney Villains in Disney Princess Films****Presenter(s):** Jeremy Tsao**Advisor(s):** Dr. Kent Lehnhof

Disney films have played a role in shaping the lives of many individuals around the world. In particular, the Disney Princess films have shaped the way people act. While on the surface these films focus on a princess searching for their happily ever after and an evil villain attempting to thwart every chance the princess has towards their happily ever after, there is more than just the journey towards the happily ever after. The purpose of the project will be to focus on how Disney villains in the Disney Princess films are gender-bended and are portrayed as characters who go against traditional gender roles in contrast to their princess counterparts who are portrayed in a hyper-heterosexual manner. Specifically, I will be exploring how female Disney villains like Ursula from *The Little Mermaid* (1989) and the Maleficent from *Sleeping Beauty* (1959) are portrayed as masculine characters with how male Disney villains like Governor Radcliffe from *Pocahontas* (1995) are portrayed in a feminine manner. The project will also focus on how the portrayal of these villains reinforces negative stereotypes about people who defy gender-roles. This project contributes to the area of inquiry of gender and sexuality in that it will explore how the Disney villains are gender-bended in the sense that they have characteristics associated with the LGBTQ+ community like going against traditional gender norms in contrast to the heroines who are portrayed in a hyper-heterosexual manner that follows traditional gender roles. This project will incorporate visuals such as images of each of the characters showing how the characters are portrayed along with explanations on the side.

**26. Lady Macbeth's Portrayal of Gender Roles****Presenter(s):** Maddycin Dayna Mamasig, Caitlin Wong**Advisor(s):** Dr. Kent Lehnhof

In William Shakespeare's *Macbeth*, Lady Macbeth defies traditional gender roles and is presented as assertive, aggressive, and ambitious. Hungry for power, Lady Macbeth encourages her husband, Macbeth, to embark on a series of morally unjust actions without feeling initial remorse, but then accumulating into guiltiness. Lady Macbeth challenges feminism in pushing Macbeth to murder King Duncan, mocking Macbeth's masculinity, and her desire to be void of her femininity in favor of her ambition. These attributes/characteristics are not usually associated with traditional femininity, especially within the 1600's. Women of the 1600's were expected to devote their lives to domestic duties, tend to their families, and be subservient to their husbands and other male figures of authority. Exploring these notions, this paper will explore how Lady Macbeth's portrayal of gender roles in Shakespeare's original play challenges traditional notions of gender and sexuality, specifically within the Shakespearean era. In doing so, we will collect various scenes and dialogue, analyze her portrayal of either femininity or state of masculinity, and compare and contrast the sentiments of each category. Further, we will compare Lady Macbeth's behavior to that of women's gender roles within the Shakespearean era. The exploration of Lady Macbeth's subversion of gender roles could open the conversation to how certain forms of gender

representation can encourage free gender expression as opposed to harmful stereotypes that confine people to traditional gender roles.

**27. How Viola in Shakespeare's Twelfth Night Represents Fluid Gender Identity and Sexuality**

**Presenter(s):** Shealyn Higgins

**Advisor(s):** Dr. Kent Lehnhof

In the play *Twelfth Night*, written by William Shakespeare and published in 1602, the protagonist Viola's gender is obfuscated and manipulated throughout the play. She is a woman who poses as a man, becoming romantically involved with both a man and a woman. As a result, in the tangle of romantic intrigues in the play, Viola's gender and sexuality becomes fluid. An analysis of a modernized adaptation of *Twelfth Night*, *She's the Man*, released in 2006 and directed by Andy Flickerman, offers a unique understanding of this fluidity. In studying how this adaptation presents Viola's shifting gender identity in different ways, in some cases attempting to either exacerbate or downplay this shift, Viola's fluctuating displays of both masculinity and femininity can be dissected, revealing a deeper insight into the fluidity of gender in the process, thus challenging the often staunchly-held belief that gender is rigid, defined, and immutable. To further explore these concepts, a proposed adaptation of Viola is presented. By focusing on accentuating Viola's agency to switch genders at will, as well as emphasizing how Viola wields others' expectations of gender in order to further manipulate her own gender, it is demonstrated how Viola's character contradicts and disputes the antiquated notions of gender.

**28. Sexism in the Animation Industry**

**Presenter(s):** Talia Folch

**Advisor(s):** Dr. Kent Lehnhof

This project will explore how sexism in the animation industry has evolved throughout its history and how it persists today. By analyzing what has caused, prevented, and may lead to change, the progress in gender equality in the animation industry can be examined to find how to move further forward, as well as applied toward solving the static inequality in the film industry as a whole. While the percentage of female animated film producers varies greatly from year to year, with an overall of 37%, the percentage of female live-action film producers makes very slow progress and sits at an overall of 15%. Prior to the 1940s, women at Disney were barred from holding positions outside of the Ink and Paint department—the grunt work, with little creative influence. Only a select few women could be found in other departments in the studio. One of these women was Mary Blair, a pioneer whose concept art incredibly impacted the Disney style of the 1940s through the early 1950s. Pioneers like Mary Blair strove forward with ambition and opened up opportunities for other women in the future just by their presence—they were a sign that it was possible to get there. However, women are still underrepresented in the animation industry at all levels today. Around two-thirds of students studying animation at top colleges are female, but according to a 2019 USC Annenberg study, only 3% of animation directors are women. Only 1% are women of color. On the other hand, the industry is improving. The percentage of

female directors at animation film festivals has steadily increased, as has the percentage of female writers. This is in part thanks to the effort of organizations working to combat gender inequality, such as Women in Animation (WIA)—a global non-profit that supports underrepresented gender identities in the industry. Today, resources and communities like WIA help women connect with each other and provide them with opportunities to uplift them, fighting sexism while striving toward a more equitable environment.

**29. Crediting The Miscredited****Presenter(s):** Evelyn Gaona**Advisor(s):** Michol Hebron

This research query investigates the contributions of women in early computing programming and recent attempts to recognize their achievements. Research has proven that historically, women have been miscredited for their contributions to computer programming development. In my research, I will investigate the works of trailblazing women such as Ada Lovelace, Grace Hopper, and Hedy Lamarr. My research will examine Lovelace's development in computing work, Hopper's advancements in coding, and Lamarr's radio frequency discovery. Using the methods provided by the Information Literacy portion of my FFC program, I will research my topic using the Leatherby Library research materials. I will use peer-reviewed sources and academic articles to structure my research. My research will demonstrate that Lovelace, Hopper, and Lamarr set the groundwork for computing methods and highlighted the need to recognize pioneering women in all male-dominated fields. The evidence of the impact will be seen in the foundations of programming, the evolution of software engineering, and the development of critical communication technologies.

**30. How Ada Lovelace Helps Today's Feminist Movement****Presenter(s):** Aiden Fujikawa**Advisor(s):** Micol Hebron

This research query investigates Ada Lovelace's impact on the computing department and how her methods of overcoming sexist boundaries can be utilized today.

Ada Lovelace is most notably famous for being considered the first-ever programmer. Not just the first female programmer but the first-ever programmer to be credited. Her most notable accomplishment in this field is her contributions to Charles Babbage's Analytical Engine, a proposed digital computing model. She figured out how to use it in order to compute Bernoulli numbers. Just how impressive this is cannot be understated, as she fully understood how computers worked before computers were even invented. I will look at ways that Ada Lovelace overcame the sexist societal boundaries that came with the time period in order to try and utilize her intelligence to its full potential. Using methods that are taught from the Information Literacy portion of Chapman's FFC program, I will be conducting research on this topic using various methods, but primarily online searches and academic articles of Lovelace's life. I anticipate that despite Ada Lovelace not typically being viewed by history as a feminist role model, she still had to utilize feminist ideals in order to be given her rightful place among her fellow scholars. I expect

that her methods and actions will help to shine a light on how feminists can continue to contribute to the feminist movement, particularly in academic settings.

**31. Social Media vs. Our Brains****Presenter(s):** Angela Liu**Advisor(s):** Micol Hebron

The central research question I will be investigating is how social media affects our brains. We have witnessed a significant impact of social media on our youth. The rise of social media in this generation has also created one of the biggest generational gaps yet. Additionally, social media has an even bigger effect on kids who are exposed to it at very young ages. I will be studying how social media affects one's moods, thoughts, and behaviors, as well as what social media physically does to one's brain. For example, studies have shown that social media triggers brain activities that parallel the ones involved in addiction. Using the methods outlined in the Information Literacy portion of the FFC program, I plan on conducting my research using reputable videos and documentaries, online searches, and peer-reviewed articles found through the Leatherby Library database about social media. The expected conclusion to my research will be that social media platforms use systems, such as the infinite scroll, to intentionally trigger certain areas of our brain in an addictive manner. This is because they want to hook their users to their platforms. This addictive tendency of social media in turn negatively impacts people's mental health and has a correlation with an increase in mental illnesses. Furthermore, young children have especially susceptible brains and exposure to social media molds their brains in a way that hinders their development.

**32. The Pandemic, Social Media, and Our Mental Health****Presenter(s):** Calvin Le**Advisor(s):** Micol Hebron

This research query delves into the extensive influence of social media on the mental health of its users, examining both the positive and negative effects that have emerged since the beginning of the pandemic. Research has shown both positive and negative impacts stemming from the use of social media platforms since the pandemic, which has emerged over the past few years. The negative effects are the ones mainly focused on, like increased anxiety, depressive symptoms, and loneliness. However, there have also been a number of positive ones that get overlooked, like improved happiness, connecting with the real world, and gaining a sense of belonging and connection. My research will explore the main contributors that are causing these impacts on society and how they've affected them. I will be looking at the ways social media has evolved in the past few years during and after the pandemic, exploring the effects it has had on its users. Utilizing the methods that have been outlined in the Information Literacy portion of the FFC program, I'll be researching this particular topic through several methods. My research will involve findings from the National Library of Medicine, an article from Penn Medicine, and an article about the pandemic and social media from Vox. Researching the positive and negative effects of smartphones on users following the COVID-19 quarantine will reveal the significant

impacts they've made on the mental health of its users. This influence is evident in people's behaviors, their interactions on social media, and how they connect with those around them. Thus, the role of smartphones in shaping social dynamics and individual well-being has become increasingly apparent.

### **33. Play and Prejudice: The Impact of Gamergate in Digital Communities**

**Presenter(s):** Frances Parker

**Advisor(s):** Micol Hebron

This research query analyzes how Gamergate revealed systemic sexism, misogyny, and violence against marginalized groups within virtual gaming communities.

Research shows that there has been an immense increase in online harassment and its normalization in our society since the eruption of Gamergate. My investigation will analyze the deeper roots and issues that have emerged from cyberbullying, especially targeted towards women. As the impact of gaming communities grows especially in the lives of younger generations, the protection of women and minorities against online violence and cyberbullying is an important topic. My project will explore the ways these issues have grown with the establishment of larger digital platforms, and what has been done to create safer online spaces.

Using the methods provided in the FFC programs' Information Literacy Module, I will be researching this topic using a variety of methods. My research involves taking advantage of the Leatherby Library database, online interviews with women in gaming, and a variety of digital resources. I will use academic articles, books, and studies on how digital media affects women and marginalized groups since the establishment of Gamergate.

I anticipate that the research will demonstrate that cyber-bullying, especially in the virtual gaming communities, is harmful particularly towards women. Evidence of this is the increase in systemic sexism in digital media and the continuing visibility of misogynistic structures that amplify and facilitate harassment towards women.

### **34. Celebrity Sex Tapes and their Effect on Western Culture**

**Presenter(s):** Gray Brackett

**Advisor(s):** Micol Hebron

This research explores how rumors of celebrity sex tapes influence public perceptions of gender and sexuality in media culture, specifically investigating the double standards that shape responses to male and female celebrities embroiled in such scandals. Studies in media and gender have shown that public reactions to celebrity scandals are deeply influenced by gendered biases, with female sexuality often subject to greater judgment than male sexuality. This research builds on work in media studies and sociology, focusing on the commodification of celebrity culture and its role in perpetuating patriarchal expectations. By examining how these rumors impact celebrities differently based on gender, this study contributes to discussions about the intersections of fame, sexuality, and gender in digital culture. The study utilizes qualitative content analysis, drawing on peer-reviewed articles, books on gender and media studies, and case studies of high-profile celebrity scandals involving sex tape rumors. Case studies will include both male

and female celebrities to analyze media portrayals, public responses, and the career impacts experienced by each. This approach highlights the role of mediated scandals in shaping public narratives on gender, sexuality, and agency. The research anticipates revealing pronounced gender biases, with women facing greater social scrutiny and professional repercussions. These findings will underscore how celebrity scandals perpetuate traditional gender norms and contribute to societal policing of female sexuality, deepening the understanding of media's role in sustaining and challenging gendered perceptions of sexuality within contemporary celebrity culture.

**35. The Association of Social Media Engagement With the Rise in Mental Health Problems - Particularly Anxiety and Depression Among Adolescents During the COVID-19 Pandemic**

**Presenter(s):** Josiah Gray

**Advisor(s):** Micol Hebron

This study investigates the role that engagement with social media has played in increasing rates of two of the most prevalent mental health problems, anxiety and depression, among adolescents during the COVID-19 pandemic. Since public health measures denied many young people access to face-to-face social support, social media became crucial for interacting with people and expressing themselves. However, recent studies indicate that greater utilization of social media, especially over such a continuous period of stress and uncertainty, is linked to poor mental health in adolescents. This discusses how certain aspects of social media use passive scrolling, exposure to carefully curated or idealized images, and algorithmically amplified sensational or negative content-have the potential to increase feelings of loneliness, inadequacy, and fear. Many studies have sought to isolate specific patterns of social media use that are associated with symptoms of anxiety and depression through a mixed-methods approach that included a review of current literature in both psychology and sociology, and an analysis of survey data for adolescents aged 13-18 years.

It's hypothesize that more frequent use, in particular passive scrolling without interaction, more time spent on disturbing news, and more comparisons to idealized images of peers, will be associated with higher levels of anxiety and depressive symptoms among adolescents. In the present project, we will add to the work on digital well-being by focusing on those social media behaviors most likely to contribute to poor mental health outcomes among adolescents. It also highlights the raising of awareness on and necessity for tailored interventions about responsible use of social media by adolescents. The findings are to aid parents, educators, and mental health professionals in their work of supporting adolescents' wellbeing in a digital environment increasingly interlinked with social and emotional health.

**36. Social Media Moderation: Global Perspectives, the Free Speech vs. Censorship Debate, and Challenges in America**

**Presenter(s):** Matthew Barnes

**Advisor(s):** Micol Hebron

This research project explores the global perspectives and challenges of social media moderation, focusing on the tension between free speech and censorship in America. With social media deeply integrated into daily life, content moderation has become a critical issue, shaping how information spreads and influencing public behavior. The key question is: how do we balance the right to free speech with the need to protect users from harm?

To address this, I examine global variations in content moderation. Authoritarian countries like China and Russia enforce strict, state-controlled policies, severely limiting freedom of expression. In democratic nations, moderation is often left to private companies, raising concerns about corporate power and accountability. These differing approaches illustrate the difficulty in finding the “goldilocks” balance—minimizing harm while preserving essential freedoms.

This project highlights the complexities of content moderation, including its impact on mental health, social trust, and the spread of misinformation. Using research, data analysis, and global case studies, I will evaluate the effectiveness of current moderation practices and explore possible solutions. Ultimately, this project seeks to better understand the fine line between censorship and free expression and its implications for society.

**37. Gender Bias, Women, and Technology: How Female Chatbots, Assistance Algorithms, and AI can Reinforce Gender Bias and Further it to Reach Reality**

**Presenter(s):** Natalia Llort

**Advisor(s):** Micol Hebron

This research query investigates the impact of the increasing implementation of female chatbots, assistance algorithms, and AI on the perpetuation and reinforcement of existing gender bias in reality. Research has shown that there has been an increasing trend in the use of female-gendered chatbots, assistance algorithms, and AI in recent years, along with concerns about the reinforcement of outdated gender stereotypes due to the relation between previous gender stereotypes and the services these technologies provide. My research will examine stereotypical traits associated with women and their presence in these technologies. As these stereotypes and traits are central to the functions and purposes of these technologies and are built to be perceived as women by users, these outdated stereotypes can be perpetuated beyond technology and into reality. I will observe the ways in which chatbots, assistance algorithms, and AI have historically been female and how the purposes of these technologies as assistance, caretakers, or service providers can further extend biases and stereotypes against women through their gendering. Using the methods outlined in the Information Literacy portion of the FFC program, I will research this topic using various methods. These methods include the use of the Leatherby Library database and online searches. I will use peer-reviewed sources, academic journals, books, and articles about user’s perceptions of female-centered technologies and their impact on reinforcing gender stereotypes. I anticipate that this research will showcase a perpetuation of

gender bias and stereotypes against women through the common choice of constructing chatbots, assistance algorithms, and AI to be perceived as women. Evidence of this will be observed in the previous history of these technologies being perceived as female, the traits within them mirroring stereotypically feminine traits and biases, and the continuation of these biases from technology to reality.

**38. Misrepresentation of Women of Color in the Gaming Industry and its Effects****Presenter(s):** Niccarri Allen**Advisor(s):** Micol Hebron

This research query explores the gaming industry and how its misogynistic issues affect the BIPOC communities in its forums. Research has shown that there has been a suppressed issue of prejudice against women of color in many gaming spaces in the last 20 years. Video games, created for healing and interactive spaces for communities seemingly have normalized its harming nature to minority groups. My research will look into aspects of how gender bias and racism mix into the gaming industry and cause distress among its players. I will research how misrepresentation in the character personas in video games lead to stereotypical forms of perception for women of color. Using the methods outlined in the Information Literacy portion of the FFC program, I will be researching this topic using a variety of methods. My research will involve using real life accounts of women players who have dealt with the consequences of false perception in gaming, and scholarly peer reviewed sources of experts in gender and racial bias. I also plan to include portions from books, articles, and studies about harm in gaming communities. I anticipate that the research will prove that there is an underlying issue for women of color in the gaming industry, that is being normalized to avoid conflict. Evidence of this can be shown in low demographic rates of players, hostile gaming forums, and stereotyped characters in video games.

**39. Why Are Female Teen Users of Social Media Cyberbullied More Compared to Different Age and Gender Groups?****Presenter(s):** Sally Park**Advisor(s):** Micol Hebron

My research will focus on the question, why female teen users of social media, such as Instagram, are cyberbullied more compared to other users from different age and or gender groups. I am conducting this research in order to spread awareness of the negative effects of cyberbullying and to encourage in having more empathy towards others when online. Hopefully by approaching and utilizing social media in a way that is more compassionate towards others, there will be less victims and lives lost due to cyberbullying. This research will provide a brief summary of the origins of cyberbullying and how it became so prevalent today. It will also explore the different forms/types of cyberbullying, such as doxing, harassing comments, and sexting, as well as which types of cyberbullying female teens experience the most frequently. I will also include a case study of an actual female teen victim of cyberbullying to strengthen my argument. Using methods outlined in the Information Literacy portion of the FFC program, I will be researching this topic

using a variety of strategies. My research will involve the use of academic articles, books, as well as personal experiences to support my argument. I expect to find that the reason female teens are more likely to be harassed on social media to be linked to the sexist origins and structures of social media, as well as the influence of traditional gender roles in society. I expect that this research will show the extent and severity cyberbullying can have on teen women. I hope that through my research and by bringing awareness to this issue, I might also be able to propose some ways to counteract the negative effects of cyberbullying.

**40. How Does Social Media Provoke Unhealthy Habits and Poor Mental Health, Such as Anxiety, in Teenagers?**

**Presenter(s):** Samantha Hopkins

**Advisor(s):** Micol Hebron

This research query investigates the detrimental effects social media has on teenagers' well-being and how it engenders unhealthy habits.

Research has found that social media has become an addiction to teenagers and can affect their well-being negatively. Instead of doing something more productive with their days, teenagers find themselves distracted by social media and caught in a loop of doomscrolling. As a result, they are prevented from doing healthy and productive activities such as exercising and actually meeting up with people face to face. My research examines how social media leads to increasing mental health problems, especially anxiety, and how it has started to have control over people. A big aspect to this is how social media can lower self-esteem due to the promotion of unattainable body standards and increase feelings of isolation, especially for victims of cyberbullying. I will look at the tactics social media companies use to have a hold over us and how that hold affects us in many aspects.

Using the methods outlined in the Information Literacy portion of the FFC program, I will be researching this topic using a variety of methods. My research will involve utilizing the Leatherby library database and online searches. I will use peer reviewed sources such as academic articles and books on social media's effects.

I anticipate that the research will demonstrate that we should be more aware of the effect and hold that social media can have over people, especially those more vulnerable, such as teenagers. Evidence of this will be seen in increased mental health problems. The research will show a calling for enhanced media literacy and balanced approaches to social media use in order to prevent these effects and create a healthier environment for future generations.

**41. The Impact of Modern Day Social Media on Mental Health**

**Presenter(s):** Samuel Soto-Romero

**Advisor(s):** Micol Hebron

This project will investigate the impact of the algorithm-driven social media platform's affect on adolescent mental health. The central research question examines how platforms like Instagram and TikTok contribute to anxiety, depression, and loneliness in teens, and focuses on patterns of usage, mainly associated with these mental health outcomes. Research has highlighted a major

decline in mental health and an increase in loneliness among adolescents over the past decade, a trend that ties in with the rapid growth of social media. This study aims to understand how specific technologies and methods employed by social media companies influence behavior and mental health. By examining the evolution of social media platforms and the methods to maximize user engagement, this project will focus on the ways that may produce negative mental health outcomes. The research project will include information literacy techniques outlined in the FFC program, involving extensive online searches, the use of the Leatherby Library database, and a diverse array of sources. Peer-reviewed academic articles, books, and studies on social media platforms will serve as the base of this research. By using insights from psychological and technological research, this project aims to provide an understanding of the relationship between social media and adolescent mental health. The expected results are that the data will highlight a correlation between social media and the increased instances of anxiety, depression, and loneliness among teens, particularly girls. Indicators such as higher rates of self-harm, suicidal actions, and the inclusion of negative content on social media are anticipated to emphasize these findings. This research will contribute to the evidence on the societal impact of digital media and inform future discussions on regulatory approaches to mitigate these effects.

**42. Gender Bias in the Gaming Industry****Presenter(s):** Sophia Young**Advisor(s):** Micol Hebron

This research query aims to investigate how bias, specifically gender bias, in not only player interaction but also character design affects the gaming experience for female users and the community of the gaming industry. Following my area of inquiry, this research question suits the theme of gender and sexuality in the current FFC engaging the world topic. Gender bias has always been established in the gaming industry; with events such as Gamergate and threats against female workers in the industry and the continued belief that video games are for males, I want to delve into the stereotypes caused by this bias in video games and how it has affected users overall, both female and male. I plan to do mostly case study research using methods from the Literacy portion of the FFC program, looking at past and current events that have shaped gender bias in the gaming industry and how we can address the issue of stereotypes through articles and readings in Leatherby libraries and peer-reviewed works. I also plan on doing experimental research by looking at current video games and gathering intel on how audiences are considered when creating a game. Some expected conclusions I have are seeing the clear difference between female character design and male character design and how it is catered to the male audience. I expect to see the roots of stereotypes formed by gender bias based on gaming industry workers' intended audience.

**43. Artificial Intelligence, Voice Assistance, and Chatbots affecting Women in Society****Presenter(s):** Sophia Lopez**Advisor(s):** Micol Hebron

This research investigates the correlation of artificial intelligence chatbots, voice assistance, and virtual personas and effect on gender roles for women. Research has shown an increase of female voices used for virtual assistance that are used through big companies. The more people interact with these bots the more users will start correlating the idea of women as a domestic object. My research will examine the psychological understanding of why users find a more positive correlation towards female voice bots. As companies continue to grow and incorporate artificial intelligence into their businesses the more they will use chatbots and other forms of interaction to engage their users. I will look at specific cases that have occurred such as Microsoft's Tay chatbot and understand the treatment of these female personas online. Using the methods in the information literacy portion of the FFC program, I will be researching by using a variety of methods. My research will involve online searches using the help of online sources of news articles and searches found in the Leatherby Library database along with other physical sources. I anticipate that the research will demonstrate how users prefer that AI chat bots, voice chat, and personal assistance have some kind of female persona that acts as a servant to the users.

**44. Blurring Boundaries: The Impact of Simulacra and AI-generated Content on the Perception of Reality****Presenter(s):** Sulay Sierra-Leon**Advisor(s):** Micol Hebron

This research examines the presence and impact of simulacra and the hyperreal in AI-generated advertisements that target women, including how this contributes to the consumers' difficulty in differentiating reality from artificial intelligence. With the increased use and accessibility of social media, new representations of individuals and environments have been created and manufactured to the point that society is now questioning its perceptions of reality. My research will examine the technologies and tactics that are contributing to this, specifically with regard to AI-generated content. As well as how these manipulative tactics result in long-term impacts such as lack of human trust, diminishing self-esteem, and exploitation of users and consumers. I will examine how social media platforms have created AI-generated female models, avatars, and chatbots over the past 5 years and are actively continuing this phenomenon of perpetuating simulacra in social media and online content. Using the methods outlined in the Information Literacy portion of the FFC program, I will research this topic in various ways. My research will involve online searches and excerpts from books such as Plato's The Republic and Jean Baudrillard's Simulacra and Simulations and AI-generated social media accounts, active and inactive. Additionally, I will use peer-reviewed sources, including academic articles and studies regarding the impact of AI and digital media on the perception of reality. I anticipate that the research will reveal the intentionally deceptive and misogynistic tactics of social media companies in creating these simulations. I also predict a higher number of negative consequences than positive ones for consumers due to this persuasive technology. Evidence of this will be seen in

general increased rates of low self-esteem, lack of human connection and trust, and unrealistic expectations and standards for society.

**45. Social Media's Impact on Teen Girls****Presenter(s):** Temisha Palmer**Advisor(s):** Micol Hebron

My research will explore how constant exposure to idealized and filtered representations on social media distorts the self-perception of teenage girls, contributing to a damaging cycle of comparison, self-doubt, and declining mental health. Research indicates a significant decline in the mental health of emerging adults due to constant exposure to idealized lives on social media. This exposure often leads to increased self-harm, a rise in the use of anti-aging products, and, in severe cases, suicidal thoughts. My research will analyze how social media heightens female users' insecurities, focusing on the ways influencers affect viewers' mental health and the tactics they employ to shape perceptions. Using research methods from the Information Literacy portion of the FFC program, I will gather data from various sources, including online searches, Leatherby Library databases, and peer-reviewed articles. My research will include academic journals, books, podcasts, and studies focused on social media's influence on users' self-image and mental health. This approach will allow a comprehensive analysis of how social media contributes to self-perception issues among teenage girls. I anticipate that my research will demonstrate the detrimental effects of social media and persuasive technology on the mental health of teen users, particularly teenage girls. The findings will substantiate that prolonged exposure to social media contributes to increased rates of suicidal ideation, self-harm, and harmful comparisons to unrealistic beauty standards.

**Health Sciences and Kinesiology****46. Religious and Spiritual Coping as Predictors of Cardiovascular Health: Associations with HDL and LDL Cholesterol Levels****Presenter(s):** Mark Meltzer**Advisor(s):** Dr. Julia Boehm**Background:**

Religion and spirituality have been central to many individuals' lives throughout history, yet today limited research has looked into their associations with objectively measured health outcomes. This study investigates the relationship between religious/spiritual coping, defined as the use of religious and spiritual beliefs and practices to cope with life stressors, and cardiovascular health, specifically cholesterol levels. We hypothesized that higher religious/spiritual coping would be associated with more favorable cholesterol levels, including higher HDL (high-density lipoprotein) and lower LDL (low-density lipoprotein) concentrations.

**Methods:**

Using data from 927 participants in the second wave of the Midlife in the United States (MIDUS II) study (56.4% women; 52.3% had some college or less; 93.1% white), we examined associations between religious/spiritual coping and cholesterol outcomes. Religious/spiritual coping was measured on a multi-item scale (lower scores indicated greater coping). Fasting blood samples were used to assess HDL and LDL cholesterol levels. Multivariate linear regression models controlled for age, gender, race, marital status, education, income, and lipid-lowering medication use.

Results:

Religious/spiritual coping was positively associated with HDL cholesterol ( $\hat{r}^2 = 0.086$ ,  $p = 0.009$ ), suggesting that greater engagement in religious or spiritual practices is linked to higher HDL cholesterol levels, which benefit cardiovascular health. The adjusted  $R^2$  for the HDL model was 0.176, indicating that 17.6% of the variance in HDL levels was explained by the model. Similarly, religious/spiritual coping was inversely related to LDL cholesterol ( $\hat{r}^2 = -0.137$ ,  $p < 0.001$ ), with higher coping associated with lower LDL levels, reducing cardiovascular risk. The adjusted  $R^2$  for the LDL model was 0.169, explaining 16.9% of the variance in LDL levels.

Conclusions:

These findings suggest that religious and spiritual coping may offer protective cardiovascular benefits by influencing cholesterol levels. This study adds to the growing body of liter

#### **47. Effects of Flat-soled Sneakers and Socks on the Gait of Healthy Young Adults**

**Presenter(s):** Alohi Sheung, Belle Salazar

**Advisor(s):** Dr. Rahul Soangra, Michael Shirashi

The purpose of this research study is to examine the effects of flat-soled footwear on gait parameters, comparing when participants are barefoot versus when they are wearing flat-soled shoes. Footwear, or lack of footwear, has been shown to influence gait mechanics, with potential variations in the transduction of force along with changes in stability. This study gathers data from participants in both conditions, barefoot and shoe-wearing, to assess the changes in plantarflexion, dorsiflexion, as well as the impact force of the feet. In order to standardize the conditions, all participants were told to wear Vans, a flat-soled shoe, as the chosen footwear. The materials for this study included a treadmill to measure force during walking, motion capture camera systems to track gait parameters, and infra-red markers that were placed on the bony landmarks of the participants. Walking trials under both conditions were performed in order to measure step length, step width, cadence, joint angles, as well as joint moments. It is hypothesized that barefoot conditions will increase stability due to a larger surface area contact with the ground (direct transmission of proprioceptive information), whereas wearing shoes may reduce foot motion and prolong the support phase of the gait cycle ( due to reduced proprioception). We also hypothesize that shoes will absorb impact forces. Observing these parameters across both conditions allows for a comprehensive assessment of gait. In data processing, variations in joint angles along with force parameters between the conditions will be analyzed to identify differences in stability and force transduction. In this study, we hope to

provide a greater insight into the biomechanical implications of footwear on gait characteristics in enhancing our understanding of fall risk with and without shoes.

## **Music**

### **48. Manifest Destiny, A Repeat of History: Scoring Stanley Kubrick's The Shining**

**Presenter(s):** Emilie Montoure

**Advisor(s):** Dr. Carolyn Dike Dr. Jessica Sternfeld

In this paper I will examine Stanley Kubrick's 1980 film *The Shining* through the lens of manifest destiny. Using this angle, I discuss how protagonist Jack Torrance takes on the role of a settler as he cares for the Overlook Hotel and becomes verbally abusive and controlling to his wife and son. I use the disconcerting, avant-garde scores of twentieth century modernist composers Béla Bartók, György Ligeti, and Krzysztof Penderecki to analyze how this story of westward expansion is conveyed. This chilling soundscape involving extreme dissonance, complex rhythms, layering of sounds, and unconventional techniques scores Jack's psychological descent into murderous insanity and lures him into his doomed fate of death, the karma one receives when settling over Native American land. Additionally, I touch on how Kubrick conveys this tragedy all while showing no violence on the moving image, proving that without this haunting soundscape, the film's unnerving plot and tension would lose its potency, thus demonstrating that the auditory experience is an essential part in amplifying the horror of a psychological narrative. This analysis will provide the history needed to depict *The Shining* as more than just a haunted hotel story; an exploration of the music will also enable listeners to make more sense of the disjointed sounds and understand why musical editor, Gordon Stainforth, made his strategic choices.

### **49. Musical Intimacy: The Art of Recording as a Music Journalist**

**Presenter(s):** Nathaniel Yang

**Advisor(s):** Dr. Carolyn Dike

In this paper I will explore the art of recording as a musical journalist while focusing on National Public Radio's concert series, Tiny Desk Concerts. These concerts started in 2008 by Bob Boilen and Stephen Thompson not knowing the outcome they wanted to just have a more enjoyable listening experience by stripping down all technological sound setups and doing everything acoustics. While having the concerts in small office spaces, the technicians created an intimate yet authentic musical experience for audiences in person and online. These experiences are only possible due to the simplicity of the setup and through post-production work using minimal effects. Josh Rogosin, the Tiny Desk audio engineer, will be the main focus of this paper because his approach to blending in the space in Tiny Desk and outside projects is superb due to his journalistic intuition and passion. As an audio recording engineer, I will dive into how Rogosin's use of specific microphone techniques, post-production work, balancing signals, and selectively muting certain audio channels to preserve the recordings' raw, intimate feel. I will also compare and contrast smaller spaces and how the audience plays a pivotal role in the recording. By

exploring these aspects of recording and musical journalism? I will provide a better outlook on how modern audio engineers can capture the soul and humanity of live musical performances.

**50. Echoes of Contrasting Culture:**

**A Comparative Analysis of the Japanese Koto and the Western Piano**

**Presenter(s):** Nicholas Lippold

**Advisor(s):** Dr. Carolyn Dike

This paper dissects the similarities between two distinct instruments: the Japanese koto and the Western piano. Both are deeply rooted in their respective cultures and had a deep history within the upper classes and noble courts. Additionally, both sought significant construction, technological developments, and cultural function evolution. The koto, tracing back to the Chinese guzheng, became a symbol of Japanese refinement and exonerates the aesthetic of simplistic yet emotional. On the latter side, the piano emerged from European keyboard instruments and became a staple of aristocratic life, art, and culture. Over time, both instruments adapted to changing musical landscapes and shifted from a safeguarded art to becoming widespread throughout society.

Through the comparative analysis of their histories, materials, and craftsmanship, this paper highlights how the koto and piano showcase technological and stylistic changes within Japan and Europe. The koto, made originally from wood and silk, furthered its understanding of foreign technologies to evolve with Western influences. Meanwhile, the piano advanced through heavy interest in improving dynamic control, expression, and size. Additionally, this paper will discuss modern examples of each instrument, including Shokunin Fujii's craftsmanship in koto and the Kawai RX-2 baby grand piano, exhibiting contemporary innovations of both instruments.

Ultimately, the koto and the piano mirror society's cultural history and aesthetic values and provide insight into the global musical exchange. By examining the historical, technological, and practical parallels between the koto and the piano, this paper will uncover a deeper insight into these instruments and reflect the cultural environments of these instruments in the context of global musical exchange and evolution. Both instruments' shared scientific principles of sound production and resonance contribute to their similar functions despite their cultural differences.

**51. From Vinyl to Viral: Rock 'n' Roll's Timeless Comeback in Today's Digital Age**

**Presenter(s):** Victoria Lucas

**Advisor(s):** Dr. Carolyn Dike

Rock 'n' roll from the 1950s-1980s—a category of music often referred to as “oldies”—is experiencing a remarkable comeback among younger audiences, even being favored over today's music trends. While nostalgia may play a role, it is clear that this genre offers something unique that modern music often lacks. As a Gen Z rock 'n' roll lover myself, I explore the reawakening of rock 'n' roll among Millennials and Generation Z and examine the reasons why this genre resonates so deeply with my peers, even half a century later. In this paper, I discuss how the music of that era shaped identities and captured cultural movements when it first emerged in the latter half of the 20th century, as well as how it remains a meaningful timepiece for that same audience today.

I then delve into the ways in which the raw emotions and rebellious spirit of rock music connect with today's youth, providing listeners with a powerful outlet for navigating issues like mental health and social pressures. Additionally, I discuss the intriguing nature of nostalgia and consider whether younger generations can genuinely experience longing for an era they never lived through. Finally, I explore the perceived shortcomings of modern music: particularly its overproduction, formulaic songwriting, and the industry's shifting priorities. Ultimately, I shed light on how rock 'n' roll is still such a compelling, unifying force and how its spirit endures, continuing to inspire listeners across generations.

## **Physical Therapy**

### **52. Reliability of Metabolic Cost Measurements During Treadmill Walking Across Specific Time Intervals**

**Presenter(s):** Hailey Hashiguchi

**Advisor(s):** Dr. Natalia Sanchez Aldana Rachel Berns

Metabolic cost is an indication of efficient walking. Inter-day measurements of metabolic cost must be reliable to determine if an intervention has a real effect on reducing metabolic cost. This project will determine the reliability of metabolic cost measured over specific time intervals using preliminary findings in three healthy young adults. Participants performed four identical data collection sessions on separate days on specific intervals: one day, week, and month apart. In each session, participants performed a standing trial and three 6 minute trials of treadmill walking at 0.5, 1.0 and 1.5 m/s. A TrueOne<sup>®</sup> 2400 Metabolic Measurement System measured VO<sub>2</sub> and VCO<sub>2</sub> breath by breath. A polar chest monitor collected heart rate (HR). Respiratory Exchange Ratio (RER) was calculated using VCO<sub>2</sub>/VO<sub>2</sub>. RER and HR averages were calculated using the last 2 minutes of steady state metabolic cost. Future work will calculate Pearson's correlation coefficient (r) and test-retest intraclass correlation coefficient (ICC) using a 2,1 model. The range of RER and HR values at standing, 0.5, 1.0, and 1.5 m/s are listed. Participant 1: 0.08, 9 bpm; 0.04, 8 bpm; 0.04, 8 bpm; 0.07, 10 bpm. Participant 2: 0.04, 13 bpm; 0.12, 11 bpm; 0.03, 7 bpm; 0.05, 11 bpm. Participant 3 performed trials of standing and 1.0 m/s, one day and week apart. Participant 3: 0.03, 8 bpm; 0.05, 10 bpm. There is higher variability in RER and HR at higher speeds for participants 1 and 3, and at lower speeds for participant 2. RER changes show consistent metabolism of fat. HR differences are within ranges associated with measurement error. Preliminary analysis indicates metabolic cost measurements may be reliable and interventions might reflect true differences in metabolic cost.

### **53. Effects of Cognitive-motor Dual Tasking on Gait among Healthy Young Adults**

**Presenter(s):** Alex Mayorga

**Advisor(s):** Dr. Rahul Soangra, Michael Shiraishi

It is widely known that engaging in physical activities involving dual tasking such as holding or balancing an item while walking can drastically change gait performance. Since walking involves

cognitive attention, a cognitive task, such as responding to environmental cues, draws attention away from walking. The purpose of this study is to determine how gait parameters change in response to participants performing motor tasks, cognitive tasks, or both at the same time, which were monitored using infrared markers and cameras. Specifically, changes in stride length, single support time, double support time, and other temporal, spatial, and kinematic parameters were examined to understand how gait can be affected by various tasks. Twenty-six reflective markers were positioned on each participant's body to monitor gait parameters in four experimental conditions: walking with no external motor task, walking holding a tray balancing a cup of water, walking while completing a Stroop test, and walking while both holding the tray with the cup of water and completing the Stroop test simultaneously. The Stroop test is used as the cognitive loading, in which participants identify color words displayed in conflicting ink colors. Balancing a cup of water on a tray is used as the motor task. We expect that dual-tasking significantly impairs gait performance compared to walking without additional tasks, underlining the importance of cognitive-motor interactions in activities of daily living. These findings could have implications for understanding fall risks in older adults or individuals with neurological conditions, where multitasking can disproportionately affect gait and mobility.

**54. Effects of Green Noise and Smartphone Texting on Gait****Presenter(s):** Sebastian Herrera Vargas**Advisor(s):** Dr. Rahul Soangra

More often than not, pedestrians around busy college campuses, business parks, and shopping malls are seen walking while using their phones, listening to music, or having earphones in. Activities on pedestrians' phones that captivate them more and require higher cognitive processing demonstrated a higher detriment to their gait kinematics than less cognitively complicated activities (Brennan and Preloff, 2021). This study aims to establish whether or not gait parameters are affected by walking while engaging in cognitively demanding activities such as texting and listening to green noise. Green noise is a deviation from white noise, which amplifies the mid-range frequencies of white noise, resulting in a more soothing acoustic environment. Ten participants walked in five walking conditions each increasing the degree of cognitive complexity. The order in which the participants underwent the different conditions were randomized. Data was collected using the Vicon Nexus Motion Camera system and processed using Motek's Gait Offline Analysis Tool (GOAT). Based on prior studies and seeing how the participants' gait altered due to the more challenging conditions, once the data is processed we expect mixed responses for changes in gait kinematics as the participants looked at their phones and listened to green noise. If this assertion is proved true by the processed data, this study could serve as further evidence supporting why distracted walking imposes fall risk.

## Physics

### **55. Modeling a Continuously Monitored Quantum Bit**

**Presenter(s):** Cory Panttaja

**Advisor(s):** Dr. Justin Dressel

We model a quantum circuit involving a readout resonator and a quantum bit (qubit) in a superconducting medium with control and readout drives. Modern superconducting devices for quantum computation use driven microwave resonators to indirectly read out the states of neighboring quantum bits by examining the induced dispersive frequency shift through dispersive coupling with a transmission line. Continuously monitoring the leaked resonator field induces stochastic time evolution of the entangled qubit-resonator quantum state. Our numerical simulations show that this joint state progressively collapses due to the ongoing measurement and examine important transient effects that can affect the readout process, such as the ring-up and ring-down of the resonator population.

### **56. Genetic Algorithm Guided Design of Low Power Plasmonic Nanotweezers**

**Presenter(s):** Luke Valerio

**Advisor(s):** Dr. Nasim Estakhri, Dr. Nooshin Estakhri

The ability to precisely control nanoscale objects is a valuable tool in many disciplines ranging from microbiology to various physics fields. One specific method of this control is using nanostructures to create a nanoscale trapping potential. Typical techniques for creating forces involve lenses concentrating light. However, the scalability of this technique is often limited by the fundamental diffraction limit of light. Recent innovation in this field has led to the development of precisely designed metallic nanostructures frequently referred to as nanotweezers. These structures are capable of concentrating light into subwavelength areas creating a high electric field resulting in a nanoscale optical trap. Our work aims to optimize the design of nanotweezers using optimization algorithms on a unique three-center nanohole design. Our objective is to enhance the capabilities of modern low power nanotweezers.

## Political Science

### **57. The Effect of Media Consumption on Political Violence**

**Presenter(s):** Declan McDaniels

**Advisor(s):** Dr. Ann Gordan

In recent years, politics in the United States has become increasingly divisive, and rhetoric from many political candidates is paving the way for extremist views to be validated. Events like the January 6, 2021, Capitol Riots have shown that a subset of American citizens believe that violence is necessary or even justified to restore their candidate to the presidency. A 2023 survey by the Public Religion Research Institute (PRRI) found that 23% of Americans agree with the phrase “American patriots may have to resort to violence in order to save the country.” This number is

up from 15% in 2021, an increase of around 8% in just two years. This paper will examine how the consumption of specific media has affected one's perception of political violence. More specifically, I will be using the Chapman Survey on American Fears (CSAF) to describe the relationship between the frequency at which an individual consumes a specific type of media and their level with agreement to the statement "force is justified to restore Donald Trump to the presidency." The specific types of media that will be examined are the frequency at which the respondent watches Fox News, CNN, or MSNBC, listens to a talk radio show that discusses politics, and gets news from social media. Studies have been conducted on the connection between media and political violence, but little research has been done pertaining to Donald Trump and this new rise of justifying political violence. I expect that viewers of Fox News will be more likely to agree with the statement "force is justified to restore Donald Trump to presidency" due to the network's conservative leaning views, and I expect that CNN and MSNBC will be less likely to agree with this statement due to their left-leaning views. I also expect there to be a high percentage of Republicans who get their news from talk radio shows or social media that agree with the statement "force is justified to restore Donald Trump to the presidency" due to the potential lack of regulation around misinformation and extreme views on these platforms.

**58. Artificial Intelligence: A New Platform to Influence Elections****Presenter(s):** Robert Arellano**Advisor(s):** Dr. Andrea Molle

Since its inception in 2022, artificial intelligence has impacted education, social relationships, job markets, and politics all while using a system of machine learning through algorithms. The creation of artificial intelligence comes at a pressing time for the United States as this November will be the first presidential election in American history with the presence of artificial intelligence. Some political and business leaders have expressed concerns over artificial intelligence and its lack of regulation and potential to spread misinformation. My research aimed to study the relationship between text-based artificial intelligence programs and voter behavior while monitoring the 2024 United States presidential campaigns. Based on literature and other research conducted, I expected the responses to reveal certain political biases when informing users. To test this relationship, I gathered a random sample of twenty participants in a controlled setting to measure their political views on salient issues of the campaign before and after using ChatGPT through two Likert scale surveys. In between both surveys, participants were each given a booklet with both presidential candidate's stances on each issue according to ChatGPT. A reading comprehension quiz followed the second survey to incentivize participants to read the booklet. The experiment yielded three results: respondents who follow politics loosely were swayed by ChatGPT, ChatGPT polarized respondents with strong political beliefs, and the language used by ChatGPT tended to favor Joe Biden more than Donald Trump. This research strives to illuminate the biases of artificial intelligence to prevent the spread of misinformation and political polarization.

**59. The Conflict with the United States Financially Supporting Israel****Presenter(s):** Asiya Umar**Advisor(s):** Dr. Ann Gordan

The Israeli-Palestinian conflict has long been shaped by external actors, with the U.S. playing a particularly influential role through its financial and military aid to Israel. In this research, I explore how U.S. funding impacts policy decisions within the conflict and examine whether this financial support aligns with American public opinion or caters to specific political and economic interests. I also investigate how U.S. aid contributes to the balance of power between Israelis and Palestinians, and whether it facilitates or hinders peace negotiations. By analyzing data on U.S. foreign aid, historical policy statements, and political discourse from both American and Middle Eastern sources, I aim to provide a comprehensive understanding of the ways in which American financial involvement affects the dynamics of the conflict. Existing literature often emphasizes military and diplomatic involvement, but I argue that the economic dimensions of U.S. support play an equally critical role in sustaining or resolving the conflict, which has not been sufficiently explored. Additionally, I consider the extent to which U.S. policies are reflective of the preferences of the American public, particularly in light of growing public debate on U.S. involvement in foreign conflicts. My findings suggest a potential disconnect between public preferences and policy decisions, with U.S. foreign aid disproportionately influenced by political elites and interest groups. This raises critical questions about the democratic nature of U.S. foreign policy making and its implications for international conflicts. Ultimately, I argue that U.S. financial involvement has profound consequences for the future of the Israeli-Palestinian conflict, warranting a re-evaluation of its role in the region.

**60. United in Fear, Divided by Cause: Bipartisan Perceptions of Government Corruption****Presenter(s):** Christian Douglass**Advisor(s):** Dr. Ann Gordon

Following a democratic principle, the United States government prides itself on justice and equality for all, yet the inclusivity of this process does not diminish the perceptions of corruption in the government. In this study I examine the underlying factors of government corruption perceptions in the United States through the role of partisanship, levels of government, and special interest groups in dictating the democratic process in America. Using the 10th edition of the Chapman Survey of American Fears, a representative national sample of U.S. adults and their fears, I find a striking relationship between party association and one's perception of where the corruption may be occurring. The fluid definition of corruption enhances the struggles to address such a prominent issue in the world of politics. Yet, generalized studies show a somewhat bipartisan belief that the American government is indeed corrupt. Therefore by identifying a variety within party beliefs, the fight against corruption can become stronger by understanding the public opinion of American citizens and their underlying beliefs. Thus, as the role and perception of corruption continues to question the vitality of our democracy, identifying its potential root causes through either partisanship, level of government, and special interest groups can we then fully encapsulate these bipartisan beliefs.

**61. Fear of Violent Crime: Should You Be More Afraid of A Stranger or Your Neighbor**

**Presenter(s):** Daliah Amarshi

**Advisor(s):** Dr. Ann Gordon

Whether you're watching the news or scrolling through social media, you are bound to hear about violent crimes. The constant reminder strikes fear within individuals. What many do not realize is that specific individuals are more susceptible to the fear of violent crime than others. Within this paper, I determine how social media usage, level of education, and gender impact an individual's fear of being murdered by either a stranger or someone they know. To do this, I used the Chapman Survey of American Fears. This survey was conducted on a national sample of adults in the U.S. through a series of questions regarding their fears. I expect to find that individuals who tend to have higher levels of social media usage will have a higher fear of being murdered. Additionally, I believe that people with higher levels of education will have less fear of being murdered than people with less education. Finally, I predict that women will have higher rates of fear of being murdered than men will. Our society is filled with information regarding getting murdered, but there is a lack of research in the field regarding the fear of being murdered. By understanding which groups of individuals have higher levels of fear regarding being murdered, we are able to use this information to break the stigma and aid individuals in feeling more secure.

**62. Politicizing Attitudes Towards Illegal Immigration at the Southern Border.**

**Presenter(s):** Gabriel Ramos

**Advisor(s):** Dr. Ann Gordon

In consideration of the politicization of immigration issues in our nation's history, policies surrounding immigration and border security have become a contentious topic in the upcoming election. American politics have always been polarized on immigration issues, specifically illegal immigration. These issues entail a variety of social implications that call for public attention and action. This paper is meant to analyze public opinion towards illegal immigration in accordance with voting patterns, partisanship, and political rhetoric regarding illegal immigration, especially at the southern border. This paper is divided into several sections meant to analyze relevant theoretical frameworks about immigration and the correlation between partisanship and xenophobia. It will explore attitudes that influence xenophobia as well as scrutinizing rhetoric towards immigrants. Policies examined will range from border security to economic concerns. Topics covered aim to address several leading rhetoric that influence attitudes towards illegal immigration at the US-Mexico border. These range from security threats to humanitarian concerns at the border. By examining public perception of immigration policy, a wider understanding of how policy addresses or fails to address the concerns of the population in the upcoming election is enhanced. Ultimately, this paper has found trends and correlations between public perception of illegal immigration as it relates to past and present political agendas of immigration reform.

**63. Triggering Fear: The Relationship Between Party Affiliation, News Sources, and Gun****Control****Presenter(s):** Gabriella Bartsch**Advisor(s):** Dr. Ann Gordon

Freedom and democratic principles are our government's core and essential for upholding a democratic society. This paper considers the relationship between political identity, media consumption, and the fear of government restrictions on firearms within the United States. This study analyzes correlations between these variables using data from the Chapman Survey of American Fears, Wave 10. Among the interesting findings are that Republicans and conservatives are more likely to fear government restrictions on firearms than Democrats, Independents, and liberals. Another finding is that one's preferred news sources can influence beliefs toward policies, including those on firearm restrictions, and shape people's perceptions of government intervention. Additionally, there is a moderate correlation between believing that violence is justified to change unjust US laws and institutions and the fear of potential government restrictions on firearms and ammunition. Many factors that contribute to the fear of government restrictions on firearms, such as education, age, and media, will be explored in this paper. This paper thus identifies key patterns where political beliefs, media habits, and views on the justification of violence influence perceptions of Second Amendment rights.

**64. The Power of the Choice: Voter Mobilization and Why Americans Choose to Vote****Presenter(s):** Isabella Mahar**Advisor(s):** Dr. Ann Gordon

Acting as a hallmark of democracy, voting is one of the greatest aspects of the American promise. Voting is what changes lives, from national law to fixing potholes on the road. But what causes people to vote? For many, voting is a duty, for others it's a choice on whether or not to show up. Are those who view it as a choice less likely to vote and pay attention to campaigns without this? Get Out The Vote (GOTV) efforts target voters and encourage them to turn in their ballot, but does this reach the circles that view voting as a choice? At its core, this study is asking if GOTV efforts are reaching voters who do not normally vote? My hypothesis is that those who view voting as a choice are less likely to vote, and that there is a gap between those people and GOTV efforts reaching them, as GOTV efforts often rely on a baseline voter attention span in which people choose to pay attention. To study this I will be using the American National Election Survey from 2020 which is a nationally representative election survey. This project ties together key literature on the effectiveness of GOTV efforts, such as canvassing, phone calls, and text messages, as well as data within the ANES that provides insight into the mind and actions of Americans. Findings include the correlation of those who view it as a duty or choice or those who do or do not pay attention to national politics, and if they are contacted by political campaigns. This is a key divider between those who show up on election day, and more importantly those who don't. Voting is all democracy asks of its citizens, so how can campaigns encourage voters to answer that call to action?

**65. Women's Fear of Violent Crime: Examining Media Consumption and Misconceptions of Violent Crime and Gender**

**Presenter(s):** Kate Lindfors

**Advisor(s):** Dr. Ann Gordon

Within the United States, women are disproportionately victimized by crimes of domestic violence (DV) and intimate partner violence (IPV). However, media narratives do not accurately represent the threats that women face within society, and women are often unaware of and lack protection from the forms of violence that they are most commonly subjected to. Therefore, this paper examines how the media frames violent crime and the victimization of women, as well as how underrepresentation and misconceptions contribute to the levels of fear that women feel toward violent crime. Through using data from the Chapman University Survey on American Fears from 2023, this paper examines women's fear of violent crimes committed by strangers versus a person they know and how accurately it reflects reality. This paper also examines the misconceptions caused by media consumption and its inaccurate framing of violent crime in relation to the level of fear that respondents possess. Media consumption plays a vital role in creating this disconnect, and the forms of media that women consume can increase or decrease the accuracy of their understanding of violent crime. The widespread misunderstanding of violent crime, and particularly DV and IPV, creates larger vulnerabilities by leaving women with inadequate knowledge about the threats they face and creating public misconceptions that can lead to decreased security and resources for victims. Therefore, the intention behind this research is to highlight the danger of falsely representing these crimes within the media, as well as to improve awareness of how DV and IPV manifest within society.

**66. Are Americans Losing Trust in the Government? An Examination into the Inner Workings of the American Public.**

**Presenter(s):** Maverick Shuck

**Advisor(s):** Dr. Ann Gordon

American Democracy, a fundamental idea that was thought to have been impossible to achieve, with the work of many, became a reality. However, in the ever-expanding partisan government we see today, in the 21st Century, people are once again feeling that American Democracy may be a fleeting and an unobtainable fantasy. In this research, I will examine how effective the American public believes that it is in shaping the policy of its own politicians, and in turn how that belief shapes the public's perception about the degree to which politicians make decisions that are in the best interest for all Americans. Using the Fear 5 through X Data Sets, I will find that those who believe that the American public have little to no impact on policy decisions are more likely to believe that politicians are not making decisions that serve all Americans. Likewise, I will find that those who believe that the American public can significantly impact policy decisions are more likely to believe that politicians are making decisions that serve all Americans. Furthermore, it will be found that those who watch extremely partisan media outlets are likely to believe politicians are not acting in their best interest. Additionally, it will be found that those who religiously identify as Christian are likely to believe that the government is not acting in their best

interest. Lastly, it will be found that those who believe that the majority of politicians are corrupt, the less likely they will believe the government is acting in their best interest.

Ultimately, this data will show the impact of one's lack of belief in influence as a factor contributing to their perception of a politician's motivations, which will ultimately show that without a belief in one's ability to shape policy, the foundation upon which American Democracy functions is on the brink of collapse and will leave a fractured society consumed with corruption & no direction in its wake.

### **67. The Ins and Outs of Voter Turnout in the United States**

**Presenter(s):** Max Gravell

**Advisor(s):** Dr. Ann Gordon

In democracies, voting is not merely a right but very much perceived as a civic duty. Why, then, do so many people stay at home on election days? Understanding the factors that drive higher voter turnout is crucial to increasing democratic participation. Oftentimes, it is common for Americans to cast their ballots based strictly on moral and ethical obligations; this perspective, however, is different from that of the heavily scrutinized rational choice theories that fuel self-interest. This paper will focus on how factors such as education, corrupt politicians, and political engagement influence the perception of civic duty and voting. Data shows that individuals with a strong sense of civic duty are more likely to vote, regardless of apathy. The data for this research were gathered from the 2020 wave of the American National Election Studies; the findings suggest that obtaining a sense of civic responsibility through education and community involvement could be the key to boosting voter turnout. Boosting voter turnout, in turn, has positive effects such as establishing accountable leadership and increasing legitimacy in public office.

### **68. The Irrational Nature of American Islamophobia**

**Presenter(s):** Maya Marcinko

**Advisor(s):** Dr. Ann Gordon

The events that occurred on 9/11 forever changed the American perspective regarding terrorism and terrorist attacks. Regardless, there has always been a gap of information in the American mind of what constitutes or occurs in the Middle East. Often, extreme situations are generalized and deemed as applicable to all Middle Eastern states. Upon further realization, learning more about the Middle East through higher levels of education discourages these assumptions and allows for the irrational fear of Muslims or of individuals associated with Islam. By using the Chapman Survey of American Fears from May of 2016, Wave 3, I investigate the relationship between an individual's level of education and their corresponding levels of Islamophobia. I expect to discover a correlation between lower levels of education and a higher fear level. There are a few other variables that may contribute to this fear such as media exposure and usage. Media often portrays unreliable and extreme appearances of Middle Eastern countries which can heighten said fears. Establishing this causal relationship can allow for the implementation of more

effective educational programs to provide a more accurate understanding of the Middle East in hopes to move away from the plagues of false stereotypes and generalizations.

**69. Why is There Division in Regards to the Abortion Ban?**

**Presenter(s):** Melissa Perez

**Advisor(s):** Dr. Ann Gordon

Abortion rights have been fought for by the people since the 1960s, and resulted in the division among those who do or do not support the status for abortion. Through this paper I am going aim towards the effects that the Supreme Court's rulings on abortion rights led to different reactions within political parties. I will be relying on the American National Elections Study (ANES), a seen national study to present an explanation in whether partisan views result to different reactions towards the abortion ban. Not only can the controversy on abortion be influenced by partisan views. However, in looking beyond just partisan influence I am also going to view gender influence towards the results of the abortion ban. Among my findings I did find moderate relations towards partisans in relation towards the perspectives to the abortion ban. In addition, I am also going to identify whether one's religious devotion can explain different reactions towards the abortion ban. After reviewing each variable, I would like to identify which variable plays a larger part in explaining the division in perspectives that are being formed in the results of the abortion ban. The reason why understanding the division being formed due to the abortion ban provides a larger perspective on how the public views reproductive justices, and the importance the idea of abortion has within our society.

**70. How Have Economic Fears Evolved, and How Do They Correlate with Specific Economic Indicators?**

**Presenter(s):** Robert Hutchens

**Advisor(s):** Dr. Ann Gordon

Americans can have many different economic fears, including fear of not having enough money in the future, fear of financial collapse, and fear of not having enough money for rent or a mortgage. The factors that influence these fears are paramount to understand for politicians, financial advisors, and others. In this paper, I analyze how specific economic fears have evolved in recent history and how specific economic indicators like employment rates and the financial markets correlate. I use data from Chapman's Survey of American Fears from the past decade to do so. I expect to find a strong correlation between economic fears during the COVID-19 pandemic and the years following. I also expect to find that fear of unemployment impacts economic fear more than other fears, such as fear of financial collapse or not having enough money in the future. Politicians and political parties can use this knowledge to better understand what concerns voters at different times. Furthermore, financial advisors can use this data to grasp better what might be concerning their clients and how to reassure them based on political outcomes. Understanding the economic fears of the American people and how they correlate with other variables can be very insightful for multiple disciplines.

**71. The Aftermath of January 6th: Examining the Link between Race, Party Affiliation, and Fear of a Violent Government Overthrow**

**Presenter(s):** Roshnee Moorthy

**Advisor(s):** Dr. Ann Gordon

2016-2020 marked the period of Donald Trump's first term in office, which spurred a change in the American political environment forever due to a shift in values and core platform on which the republican party ran. Trump's loss of the 2020 election against the Democratic party's candidate Joe Biden resulted in the insurrection on January 6th, where Trump supporters aided by far-right extremist groups fought against the peaceful transfer of power. In this study, I will examine the link between those who identify as non-white (AKA People of Color/POC participants) and a fear of violent overthrow of the US government in relation to party identification. This article uses nationally emblematic data from Chapman University's 2024 Survey of American Fears (N = 1,008). I find there is a considerably strong correlation between those who identify as non-white and democrat which links to their affinity to fear violent upheaval of the government in comparison to all other counterparts. Much of Trump's rhetoric targets the Black and Hispanic communities living in the United States, among other races, and with the events of January 6th in tow and a heated election, this relationship supports the notion that Trump's implicitly racist rhetoric leaves non-white, democrat voters to fear an overthrow of the government by means of force in America's current political environment. This brings to the forefront the concern of the volatile nature of bipartisan politics and tolerance in America today.

**72. Income, Economic Fears, and Fear of Illegal Immigration: A Study of American Attitudes**

**Presenter(s):** Ryan Vega

**Advisor(s):** Dr. Ann Gordon

Amid increased economic instability, many Americans are concerned about illegal immigration into the United States and its possible economic impact. In this research, I investigate the extent of fear of illegal immigration by income level, specifically whether people with lower salaries are more likely to express concern about illegal immigration than people with higher incomes. This study uses the Chapman Survey of American Fears (a survey with a representative national sample of American adults who were asked about more than ninety fears and related behavior) to examine how economic position affects perceptions of immigration and perceived risks to economic elements such as job security, wages, and access to public resources. Although an individual's perceived threat of illegal immigration on the economy can serve as a strong indicator of how fearful an individual may be of illegal immigration, other perceived threats, such as threats to culture and cultural affinity, can serve as more robust indicators as to how fearful an individual may be of illegal immigration into the United States. In addition, while individuals with lower incomes fear illegal immigration due to economic concerns, individuals with higher incomes are less likely to fear illegal immigration for those same economic fears than those of lower incomes.

**73. Distinguishing the Vocal Minority: Internet, Religion, and the Drivers of Political Violence****Presenter(s):** Samantha Daniels**Advisor(s):** Dr. Ann Gordon

The storming of the U.S. Capitol on January 6, 2021, placed the Republican Party at the center of national debates on political violence, often casting its supporters as extremists. This paper examines the complex relationships between religiosity, trust in religious leadership, perceptions of government officials, and internet and media usage as they relate to support for political violence. Using data from the 2024 Chapman Survey of American Fears—a representative national sample of U.S. adults—I hypothesize that, contrary to popular assumptions, religiosity alone is not a predictor of supporting political violence. Instead, willingness to rely on religious leadership emerges as a more significant predictor. Additionally, I expect internet usage and partisan media consumption to play a defining role. By exploring these relationships, this paper seeks to clarify the actual drivers of radicalization within the Republican base and identify the factors that foster support for political violence among a subset of its electorate. In a time of heightened political polarization, distinguishing between the vocal minority within the Republican Party who support violence and the majority who do not is essential to counter polarized perceptions. Findings from this study could be instrumental in understanding how non-partisan related beliefs influence dangerous behaviors and the broader political climate, particularly in an election year when responses to political change are critical. This research contributes to the limited body of work on domestic political violence beyond the January 6th insurrection, enhancing our understanding of predictors of political violence and addressing the divisive attitudes that threaten healthy democratic discourse.

**74. Media, Misinformation, and Mistrust: Understanding the Roots of Voter Fraud Fears in America****Presenter(s):** Will Basnight**Advisor(s):** Dr. Ann Gordon

Millions claim the 2020 presidential election was stolen; there was even an insurrection to try and stop the election from being certified. Despite the lack of evidence, too many people trust politicians who claim elections were rigged or stolen. In this paper, I will study the type of person who fears widespread voter fraud, what media sources are pushing voter fraud headlines, as well as the patterns in social media usage when related to fearing voter fraud. I will do this by using the Chapman survey of American fears, a representative national sample of U.S. adults in 2024. I found that there are strong correlations to an increased fear in widespread voter fraud by people who get their information from Fox News compared to any other news source. I also found an adequate connection between people fearing widespread voter fraud and fearing corrupt government officials. The biggest correlation I found was between people fearing widespread illegal immigration and widespread voter fraud. Interestingly, I found no evidence that people who get their news from social media (e.g., Facebook, Twitter) have increased fear of voter fraud. In a nation as divided as we see today, any person, organization, or platform pushing false, harmful

narratives about elections being stolen or cheated needs to be called out, and people have the right to know what is really going on.

**75. Fear of Illegal Immigration and the News Media**

**Presenter(s):** Yasmine Hourie

**Advisor(s):** Dr. Ann Gordon

In the 2016 Presidential Election, debates over illegal immigration caused the topic to surge to the forefront of national discourse, transforming it into a decisive issue with powerful effects on public opinion and voter decision-making. The news has also played a crucial role, as how it is communicated is extremely important as it can quickly reflect or obscure a reality. In this research project, I will explore how the news media (CNN, MSNBC, Fox News) impacts viewers' feelings towards illegal immigration, and how it can elevate a viewer to develop a xenophobic-based fear. To do so, I will be using the Chapman Survey of American Fears, a representative national survey of adults in the United States, to further examine the correlation between news media and the political biases that they may hold, which can then influence their viewers. I will be investigating the years following the election of former President Donald Trump in 2016, as that was when fear of illegal immigration ran most rampant in the news media. I expect my findings to reveal that those who watch CNN and MSNBC on a daily basis, are less likely to fear illegal immigrants, while their counterparts who watch Fox News, are more likely to fear illegal immigrants. Another variable I expect to influence my findings is that of partisanship. Through my findings, I will be able to analyze how the news media plays a role in the fear of illegal immigrants, which then impacts who voters choose to support in presidential elections. This can be potentially dangerous for immigrants and their families, given that their right to the "American Dream" is in the hands of viewers who are susceptible to misconceptions in the media.

**Psychology****76. Beyond the Data: Integrating Quantitative Outcomes with Lived Experiences**

**Presenter(s):** Sydney Evans

**Advisor(s):** Dr. Alexander Bay

This capstone project explores the intersection of psychology and health humanities through the re-evaluation of my psychology thesis on the impact of early intervention for children with autism spectrum disorder. My original research hypothesized that children with autism spectrum disorder who receive early intervention treatment will have improved social development when compared to those who did not receive early intervention treatment. In order to expand the scope of my original study, this project aims to combine existing quantitative data with an analysis of personal narratives from families and individuals who utilized early intervention methods for autism spectrum disorder. These personal stories offer an ethnographic approach based on the methods of health humanities. I hypothesize that through the combination of psychological data and qualitative accounts of lived experiences, we can understand how a health humanities

perspective provides a far more humanistic view of the social impacts of early intervention for autism spectrum disorder. This interdisciplinary approach exemplifies the value of integrating statistical data with personal experiences to create a holistic understanding of early intervention. This information can be further used as a way to shape interventions around clinical research and human experiences of autism spectrum disorder.Â

### **77. Mass Shootings**

**Presenter(s):** George Bovetas

**Advisor(s):** Dr. Ann Gordon

There is high fear of being the victim in a random mass shooting and it has become a huge concern that keeps on growing in contemporary society. It was seen that being in a public space used to feel safe but now people have been vulnerable about outbursts of violent attacks. This fear is not really looked at as a hypothetical but since there have been so many incidents in a lot of countries, particularly looking more at the United States. The high-profile mass shootings that take place in workplaces, big venues and especially schools have increased the perception of danger and this has been statistically likely to be very high. But, mass shootings do represent a very small fraction of the gun violence overall, there does tend to be a random type of nature and as well as the public visibility of these events that do contribute to a more broader, meaning more of a pervasive sense of an insecurity. Though surveys have often revealed that many citizens do feel a lot more apprehensive about how they can deal with the encounterment of gun violence in someone's daily life, it would be more likely in a setting like concerts, places to shop or even places where people go to worship. A lot of citizens get anxiety and it's mostly fueled because of how unpredictable and random these attacks happen. Also these things mostly happen in places that are associated with community as well as safety. As well, the media does extensive coverage of these mass shootings and does tend to amplify and create fear in the public. Though a lot of policies are now aimed at and trying to reduce gun violence they are now extensive background checks and even strict gun measures when trying to buy a firearm. The one thing that is very clear is that there is a big emotional toll of living with a fear of mass shootings and it can be very hard to maintain being in that normal lifestyle everyday.

### **78. Assessing Access to Art Therapy Programs Among Individuals in the Foster Care System**

**Presenter(s):** Diya Patel

**Advisor(s):** Dr. Crystle-Joie Agbayani

Research shows that youth in foster care who exit care struggle with education, employment, and overall health compared to the non-fostered general population. Despite being a useful therapy tool for children, there is minimal research on art therapy being used as a resource for youth in foster care. This research assesses access to art therapy programs among youth in foster care. If art therapy resources are offered, the study aims to determine if they generally improve children's attitudes and outlooks toward the future, and whether these resources ought to be implemented or referred to youth in foster care. Seven professionals working with youth in foster care

participated in interviews focused on common needs among youth in care, youth's general outlooks, art therapy availability, and whether art therapy improved youth's future outlooks. Interviews were recorded, transcribed, and coded for recurring themes. Six prevalent themes emerged across interviews: communication tools, receptiveness, regulation tools, arts integration, benefit of control, and barriers to access. Participants reported that art therapy helped to provide youth with non-verbal communication tools. Professionals noted that youth in foster care are more receptive to art therapy compared to traditional talk-therapy, giving them a means to express themselves more appropriately. Many participants revealed that art therapy provided youth with regulatory tools. Nearly all participants revealed that barriers to accessing art therapy included a lack of funding and service providers. Although some participants conveyed a lack of art therapy resources, many reported integrating art into traditional therapy practices to build rapport and trust with youth. Youth in foster care are at risk of instability as adults. Yet, access to art therapy programs appears to be limited. Art therapy could mitigate future instability by warming youth up to therapy and providing them with healthy coping skills at their comfort level.

**79. An Analysis of Factors in Pilot Aircraft-Assisted Suicides****Presenter(s):** Emma Kochenderfer**Advisor(s):** Dr. Mykel Kochenderfer

The Federal Aviation Administration (FAA) puts in place medical requirements with the aim of increasing air safety. Several of these medical requirements relate to factors impacting mental health, such as pilot usage of selective serotonin reuptake inhibitors (SSRIs). This paper studies factors that are present in pilot aircraft-assisted suicides. These factors are important in order to create policies that are effective in risk mitigation while still giving a space for pilots to come forward with honesty about their mental health issues and receive the help that they need. Existing literature indicates that pilots often feel compelled to misrepresent their mental health situation and avoid seeking treatment or communicating treatment to the FAA out of fear of losing their medical certificates, upon which their hobbies or career might depend. From the period of 1989-2021, the National Transportation Safety Board (NTSB) database contains 43 aircraft-assisted suicides initiated by the pilot. This study investigates a variety of factors, ranging from class of certificate, age, gender, medication, negative life events, and alcohol usage.

**80. Surveying Incentivized Variability In Physical Activity Among College Students****Presenter(s):** Payton Kim, Louie Vitan**Advisor(s):** Dr. Vincent Berardi

Physical inactivity among college students remains a prevalent issue, necessitating the introduction of physical activity (PA) interventions to promote sustainable exercise habits. Preliminary studies have indicated that when building an exercise habit, varying the time at which PA occurs could be beneficial, which lays the groundwork for behavioral interventions that incentivize variability in PA timing. However, little is known about the feasibility and acceptability of college students varying the timing of their physical activity in the context of unique

environments (campuses with a plethora of free gym facilities) and challenging responsibilities (balancing class schedules that change each semester, outside job commitments, fluctuating motivation, etc.) that likely implement regular exercise routines. To investigate this phenomenon, we designed a survey that was distributed to Chapman University students via the SONA participant pool management software. Data collected assesses the estimated physical activity of Chapman undergraduate students, examines their perceived benefits and barriers to exercise, gauges levels of resilience, and assesses willingness to modify one's exercise routines. Our analyses investigate relationships among perceived barriers, resilience levels, and receptiveness to incentivized variability in exercise routines. We anticipate that higher levels of resilience and perceived benefits will correlate with more significant physical activity engagement and openness to such incentive models. Findings from this study will inform future research on developing strategies for designing flexible incentive systems to support lasting physical activity behavior change.

### **81. The Impact of Extreme Heat Exposure on Physical Activity Interventions**

**Presenter(s):** Analisa Vavoso

**Advisor(s):** Dr. Vincent Berardi

A key consequence of climate change is the increased severity and frequency of extreme heat events, which harm physical health. While physiological factors like age and health conditions are known to elevate heat-related risks, there is limited evidence on how environmental changes due to climate affect the success of behavioral interventions. This study used data from the WalkIT Arizona project, where 512 healthy, inactive adults wore an accelerometer daily for a year while receiving daily goals for moderate-to-vigorous physical activity. Conducted in Maricopa County, AZ — where summer temperatures often exceed 110°F — the study context is notable: although only 1% of the U.S. population lives in Maricopa, it accounts for 13% of heat-related deaths nationwide from 1991 to 2017. Participants were randomly assigned to one of four intervention groups, varying in static vs. adaptive activity goals and delayed vs. immediate reward timing. A hurdle model assessed extreme heat's effect on activity levels and participant characteristics. Results showed a 5% reduction in physical activity on extreme heat days ( $p < 0.05$ ), with variation across intervention groups. Notably, those assigned to static goals with immediate reinforcement performed 8.6% less activity on extreme heat days and were less likely to engage in any physical activity ( $p < 0.001$ ). The other treatment groups experienced smaller reductions and maintained similar activity levels on extreme heat and non-heat days. Given the recommended 150 minutes of weekly physical activity, an 8.6% reduction could diminish health benefits, impacting intervention efficacy. This highlights the need to account for climate effects in behavioral interventions, as climate change will increasingly shape public health outcomes.

## Religious Studies

### **82. Acting Religion: Analyzing the AIDS Crisis Through Religious Response**

**Presenter(s):** Anya Nguyenkhoa

**Advisor(s):** Dr. Mateo Jarquin

In 1981, doctors in the United States diagnosed the first official case of HIV/AIDS. As the disease spread across the country, medical professionals began calling it GRID, or Gay-Related Immune Disorder, which people also referred to as "gay cancer." This association between HIV/AIDS and homosexuality led the country down a dangerous path; homophobia created systemic barriers that restricted research, treatment, and a potential cure. For people with AIDS, community support served as one of the best treatments alongside medication and therapy. Across the country, communities' whether from partners, peers, families, or religious institutions' came together to provide aid and care, from Los Angeles to New York.

In my research project, I analyzed how different religious groups understood AIDS and responded to the crisis. These religious perspectives varied widely, but responses fell into three main categories: blaming, embracing, and helping. When people with AIDS (PWAs) were blamed, groups interpreted AIDS as divine punishment for breaking traditional sexual norms, with death as the consequence. For example, Christian fundamentalist leaders like Jerry Falwell promoted this view. When groups embraced PWAs, they removed sexual morality from the conversation and disconnected it from AIDS. Buddhist views on illness and suffering, for instance, allowed followers to understand AIDS outside its medical definition. In the cases where people with AIDS received help, groups approached AIDS as a medical issue rather than a moral one, urging compassion. For example, liberal Jewish communities prioritized the religious duty to care for the ill, which overrode any prejudice toward those with AIDS.

## Software Engineering

### **83. Welcome to the Disco: Developing Celebratory Technology to Reduce Social Stigma in College Students**

**Presenter(s):** Paige Caskey, Spencer Au, Joshua Vaysman, Rhea John, Jack DeBruyn, Briana Craig, Gage Kizzar, Johny Dabbous

**Advisor(s):** Dr. LouAnne Boyd

Research indicates that the social stigma associated with autism is the most significant yet overlooked challenge faced by individuals on the spectrum. To address this gap, the DiscoBall icebreaker app aims to initiate the first wave of Celebratory Technology for Neurodiversity, fostering inclusivity and empowering neurodivergent individuals through innovative social interactions. The app generates personalized disco balls based on user responses, symbolizing individuality and creative expression.

The deployment of the DiscoBall app involved a structured event, referred to as a "Disco," where participants created their disco balls and engaged in team activities. Groups were formed using

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an evolving algorithm to explore diverse interactions and collaboration dynamics. Following the event, we conducted a comprehensive analysis of both qualitative and quantitative data to identify patterns in user responses and behaviors.

Insights from last year's deployment informed our design interaction and deployment strategy. Last year we learned that groups with more specific matching characteristics often experienced decreased collaboration, particularly those with higher levels of introversion, which led to significant drops in satisfaction. This current work explores a new algorithm aimed at increasing a sense of belonging in brief encounters, providing opportunities for high-quality contact with peers. Overall, our observations underscore the importance of fostering diverse group dynamics to enhance social interaction and satisfaction among individuals with disabilities. This project not only highlights the challenges posed by social stigma but also demonstrates the potential of innovative tools like the DiscoBall app to facilitate meaningful connections and promote inclusivity in various social contexts.

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