HONORS COLLOQUIUM

This program includes abstracts for Honors Thesis Projects submitted
by undergraduate students completing the USD Honors Program.

All projects will be presented to the public during short oral presentations at
the Honors Colloquium
in the Learning Commons on the University of San Diego campus.

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Schedule of Thesis Presentations

Learning Commons	Room 103	Room 104	Room 105	Room 202	Room 204
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Break **-** 10:00 AM					
Block B 10:30 AM	**Riley Lim** (FREN) **Jack Hartley** (HIST) **Navah Eshraghi** (BIOL)	**Maria Simpson** (ENGL) **Elle Kallsen** (BIOL) **Nadia Aljunaidi** (ISBN)	**Natalie Wright** (SOCI) **Miya Jacobs** (BIOL) **Abigail Stallard** (HIST)	**Calli Ortega** (IREL) **Vita Olson** (BIOL) **Evan Broer** (ARCH)	**Sarah Adrid** (POLS) **Nina Finocchiaro** (FINA) **David Vera** (PHYS)
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ABSTRACTS

(listed alphabetically by academic discipline)

ACCOUNTING

MARIA MOREARTY

Thesis Advisor: Dr. Kimberly Krieg, Accountancy

Taxing for Change: Incentivizing Sustainable Taxpayer Behavior to Create a Greener Future

Taxation is often viewed simply as a means to generate revenue to fund government projects. However, there is an alternate motive for the implementation of tax policy: influencing taxpayer behavior. This paper assesses the ways tax policy drives taxpayer behavior, exploring both the direct impact of purposeful incentivization as well as the unintentional behavioral consequences of tax policy. These behavioral impacts of taxation, intentional or inadvertent, cannot be overlooked when assessing the design and influence of tax policy. Specifically, this paper focuses on the ways United States tax policy has encouraged and discouraged environmentally sustainable behaviors. Through a literature review and analysis, the paper will examine current tax policies targeting sustainability, such as the clean vehicle and home energy tax credits, as well as historical instances of the impacts of tax policy on sustainability. Further, it will determine what forms of federal- and state-implemented tax policy are most effective in encouraging sustainable behaviors among taxpayers, both on an individual level and an organizational level. This paper will address the importance of movements toward environmental sustainability and make recommendations for which forms of tax policy can most effectively encourage sustainable behavior, considering which industries can benefit most from such tax incentives.

MARCOS VARGAS

Thesis Advisor: Dr. Sarah Lyon, Accountancy

Taxation and Inequality: How the U.S. Tax System Impacts Black Americans, Latinos, and Undocumented Immigrants

The United States has a history of structural inequality that has exacerbated the disparities between privileged and marginalized groups. Several factors have played a role in widening the wealth gap between individuals of different races and ethnicities, gender, and socio-economic status. One factor perpetuating the issue is found in a fundamental system that affects nearly all Americans: the U.S. tax system. Although lawmakers have designed it to be a fair and just system, the U.S. tax code often falls short of these goals. This research aims to summarize and analyze taxation in America and its impact on minority communities, specifically Black Americans, Latinos, and undocumented immigrants. It seeks to understand how the tax code impacts these populations versus others and determine how lawmakers can potentially address the issue. Research indicates that the U.S. tax system continues to follow an outdated image of the American population. As this picture has evolved, the tax system has failed to adapt. As a result, minority communities are negatively impacted and often hold a heavier tax burden. To avoid further perpetuating structural inequality, lawmakers must ask themselves if the tax laws they write consider the 21st-century picture of America.

ANTHROPOLOGY

EMERY BETZER

Thesis Advisor: Dr. Jerome Hall, Anthropology
An Exploration of the Role Anthropology Played in the Third Reich during World War II

ARCHITECTURE

EVAN BROER

Thesis Advisor: Dr. Juliana Maxim, Art, Architecture and Art History
Developing a River: Analyzing Urban Interventions Along the San Diego River in Mission Valley

San Diego's Mission Valley is a hub of urbanization that runs from the Mission Trails Regional Park all the way to the Pacific Ocean. The land around the San Diego River in Mission Valley has been in a constant state of urbanization since the 1950's. It is also a historic area, as the heartland of the Kumeyaay people and where Spanish Missionaries settled in the 18th century. In this project, I analyze how precedents of urban intervention along the river in Mission Valley can inform current and future development projects. Specifically, the First San Diego River Improvement Project, completed in 1988, will be a case study in successful strategies when developing an urban river. I will discuss how well-informed design through urban planning and landscape architecture can provide urban growth that is in harmony with the river. I argue that design focusing on the health, sustainability, and beauty of the river in mind can lead to many benefits for the city. Problems such as a lack of green spaces, crime, flooding, ecological destruction, homelessness, etc. can all be addressed. This analysis aims to better inform the fields of urban design and landscape architecture in successful techniques regarding urbanization along rivers.

BEHAVIORAL NEUROSCIENCE

PAULINA ANDREA CASTELLANOS

Thesis Advisors: Dr. Jennifer Wenzel and Dr. Jena Hales, Psychological Sciences

The Role of Cortical and Striatal Regions in Platform-Mediated Avoidance Behavior

Positive and negative reinforcement play pivotal roles in shaping human behavior. The striatum has a well-established involvement in positive reinforcement, while its role in negative reinforcement, particularly avoidance behavior, remains less explored. Similarly, the contribution of the infralimbic (IL) and prelimbic (PrL) prefrontal cortices on avoidance behavior also requires further investigation. Traditionally, rodent studies utilize operant shock avoidance procedures to investigate the neurobiological underpinnings of negative reinforcement. However, these models lack the complexity seen in human behaviors, where avoidance often yields mixed outcomes. To address this, a platform-mediated operant avoidance paradigm is used in this study, where rats must choose between avoiding a footshock or receiving a food reward. The goal of this study is to elucidate how the striatum and prefrontal cortex mediate avoidance behaviors with multifaceted consequences. The use of designer receptors exclusively activated by designer drugs (DREADDs) and intraperitoneal drug administration of clozapine-N-oxide (CNO) transiently inhibits brain areas, allowing for a causal understanding of neural activity and behavior. Different from existing literature, inhibiting all PrL neural output in this study increased avoidance behavior prevalence, indicating the paramount role of the prefrontal cortex in complex decision-making. Results such as these may offer novel insights for the pathophysiology and treatment of neuropsychiatric disorders, such as Substance Use Disorders (SUDs).

JULIENNE DESANTO

Thesis Advisor: Dr. Elisabeth Walcott, Psychological Sciences

Moving Forward with Ketamine Therapy: Ensuring Safety, Efficacy, and Accessibility in Depression Treatment

Ketamine, a medication long used in anesthesia, has emerged as a promising treatment for depression and other mental health disorders. Its rapid onset of action and mechanism, which differs from traditional antidepressants by targeting NMDA receptors, offers a novel approach to managing depressive symptoms. Despite its potential, ketamine's use outside anesthesia, particularly in off-label ketamine clinics, is fraught with regulatory, safety, and accessibility challenges. This paper delves into ketamine's historical medical use, its emerging role in mental health treatment, and the operational dynamics of ketamine clinics. It compares the efficacy and administration routes of ketamine, including IV and nasal spray forms, highlighting the distinctions between ketamine and its S-isomer, esketamine (Spravato), which was FDA-approved in 2019 for treatment-resistant depression. Given the substantial evidence supporting ketamine's promise as a treatment for depression and other mental health conditions, the paper concludes by emphasizing the importance of developing strategies that prioritize safety, efficacy, and widespread accessibility, ensuring ketamine can fulfill its potential as a transformative mental health therapy for many.

ALLISON MARQUIS

Thesis Advisor: Dr. Veronica Galvan, Psychological Sciences

Antidepressant Influence on Neurogenesis: A Comparative Review of Rodents and Humans

Recent studies have revealed that neurogenesis is not confined to embryonic stages but persists into adulthood in both rodents and humans. However, while extensive research has explained neurogenic processes in rodents, the understanding of adult human neurogenesis remains limited. Bridging this gap is crucial for exploiting the clinical potentials of neurogenesis, particularly in the context of antidepressant treatments. This literature review aims to synthesize current knowledge on neurogenesis across species, focusing on developmental stages, epigenetic influences, anatomical substrates, and identification methods. Emphasis is placed on modulating factors, specifically the role of chronic antidepressant use which is found to cause an increase in adult rodent neurogenesis. Methodological challenges inherent in studying human neurogenesis are additionally addressed alongside factors influencing neurogenic processes in humans, including aging and the effects of antidepressant medications. Findings of rodent research suggest that chronic antidepressant treatment promotes adult rat hippocampal neurogenesis through increasing cell proliferation, while human studies offer limited results. Such insights not only hold implications for the clinical use of antidepressants but also underscore their broader impact on brain function beyond depression treatment. This review suggests the need for further research in human neurogenesis with antidepressants.

BIOLOGY

NAVAH ESHRAGHI

Thesis Advisor: Dr. Cawa Tran, Biology

Beating the Heat: Can Coral-benefitting bacteria preserve a symbiosis in heat-stressed anemones?

The warming of ocean temperatures has caused mass coral-bleaching events characterized by the expulsion of vital algal symbionts from coral tissues. However, the possibility of algal reuptake and existence of bacteria that support coral-algal symbiosis are two avenues of potential restoration efforts. Using the sea anemone *Exaiptasia diaphana* as a model for corals, I tested whether the coral-benefitting bacterium *Endozoicomonas montiporae* could enhance algal uptake under ambient (27°C) and heat-stressed (32°C) conditions. I then turned acquired results into an article modeled after National Geographic Kids to introduce the experiment to younger ages. While temperature was a larger determinant of algal-uptake success, microscopic imaging showed heat-stressed anemones with the addition of *E. montiporae* to have visibly more algal density in their tissues than those without the bacterium. These results suggest that administration of *E. montiporae* to corals may assist their algal reuptake before they bleach completely. By making such work accessible to children and students of younger ages, an early interest in scientific inquiry and climate preservation can be inspired.

MIYA JACOBS

Thesis Advisor: Dr. Michael Mayer, Biology

Phytodiversity of Eastern Himalayas Along Elevational and Disturbance Gradients

My research team studied the variety of plant life in the eastern Himalayas, focusing on how factors like altitude and human activity affect biodiversity. We aimed to discern patterns in biodiversity, anticipating peak diversity at the middle of our elevation range and in areas where human activity was moderate. To do this, we surveyed a series of plots along the Wangchhu River in Western Bhutan, ranging from 742 to 2365 meters above sea level. The plots were divided into three categories based on how much human activity they experienced: undisturbed, intermediately disturbed, and disturbed. We then identified and counted the different plant species in each plot. Surprisingly, we didn't find a clear connection between altitude and the diversity of plant species. However, we did notice something interesting: in areas where humans had disturbed the land more, we found fewer different types of plants overall. But among those plants, there were more of each individual species, though they were spread out less evenly. This suggests that when humans change the environment, certain types of plants, like invasive species, may become more common, decreasing plant biodiversity. This finding underscores the potential impact of population growth and urbanization in the variety of plant life in western Bhutan.

KATARINA KAMINSKY

Thesis Advisor: Dr. Kate Boersma, Biology

Biodiversity Gradients of Zooplankton in the North Pacific Basin

Biodiversity is a crucial component of a healthy ecosystem because diverse ecosystems are more resilient to changes in the environment. As global temperatures continue to rise due to climate change, it is valuable to assess the relationship between biodiversity and temperature. Studying this relationship in marine ecosystems is important because over 80 percent of life exists within our oceans and these environments are particularly susceptible to warming. Zooplankton are a diverse collection of aquatic invertebrates that are highly sensitive to temperature. Since temperature varies spatially across latitude and ocean depth, I compared zooplankton diversity across latitude and depth. Samples of zooplankton were collected from the upper 1000 meters of the North Pacific Ocean from 28 locations between 0-57 ° N and 138 ° E - 118 ° W. I used metabarcoding analysis to taxonomically identify zooplankton and performed community similarity analyses. I observed higher species diversity within the 500–1000-meter depth zones than the surface levels and a negative correlation between diversity and latitude. The results are consistent with previous studies of zooplankton community composition using morphological and metabarcoding techniques. These patterns of zooplankton diversity help to predict the effects of global warming on marine ecosystems.

KATHERINE MORAN

Thesis Advisor: Dr. Michael Moran, Biology

Evolution of hexaploidy in California native flower, Silene hookeri

The Silene hookeri complex of flowers is a group of flowers native to northern California and Oregon. Previously, flowers within this group were thought to be subspecies of the species Silene hookeri, but now they are understood to be unique species. These species include *Silene salmonacea*, *Silene serpentinicola*, *Silene bolanderi*, and *Silene nelsonii*. It has previously been shown that the Silene hookeri flower became hexaploid through allopolyploidy. Researchers placed Silene hookeri into a phylogenetic tree falling under the species *S. menziesii* and the Physolychniss clade. This study aims to determine the method of polyploidization of the other hexaploid species in the *Silene hookeri complexi*. The nuclear RPA2 gene of each species in the complex was sequenced and sequences were arranged into a phylogenetic tree. Our results will demonstrate that the other flowers in the complex also became hexaploid through allopolyploidy and will be arranged in the same location on the phylogenetic tree. This study puts these newly discovered species into an evolutionary context for the first time so that their origins and speciation can be understood.

VITA OLSON

Thesis Advisor: Dr. Geoffery Morse, Biology

Does ecology or geography drive diversification of a seed feeding beetle in the southwestern U.S.?

Plant-eating insects make up a quarter of all described animal species on earth, with an extraordinary diversity of morphologies, feeding strategies, and life history traits. These insects and the plants they predate on have evolved intricate and intense associations, with significant consequences for ecosystems. Seed beetles are particularly notorious for their highly specialized feeding behavior. These tiny insects rely entirely on seeds for their nutrition, survival, and reproduction. In the Mojave and Sonoran deserts of the southwestern United States, seed beetles specializing on highly toxic legumes display a relatively recent radiation through which we may investigate the evolutionary mechanisms driving such diversity. We aim to examine whether geography or ecology is a stronger driver of the diversification of these seed beetles. Seed sampling of known host-plants was done to obtain beetles by rearing. Next generation sequencing of extracted DNA enables higher coverage of genomic variation between populations. More fine scale detection of adaptation and selection allows us to construct phylogenetic trees to examine relationships across seed beetle populations of the Southwest. Ultimately, this provides insight into the major factors driving evolutionary diversification of this group of unique plant-eating insects.

AIDAN JACOBS WALKER

Thesis Advisor: Dr. Cawa Tran, Biology

Food Poisoning in Anemones: The Effect of Feeding Activity on the Establishment of a Pathogen in Exaiptasia diaphana.

Coral reefs house 1/3 of all marine life, but corals are threatened by bleaching events in which they lose photosynthetic algae key to their survival. Marine pathogens cause coral diseases, which both trigger bleaching and destroy corals weakened by bleaching. For unbleached corals, it has been shown that exposure of the gut during feeding may present an entryway for pathogens. However, while the relationship between eating and disease is understood in unbleached corals, it is essential to understand if this relationship changes after bleaching. The anemone *Exaiptasia diaphana* is used for studying coral diseases due to its relatedness to corals. We used a fluorescent strain of the coral pathogen *Vibrio alginolyticus* to track pathogen establishment in aposymbiotic (i.e., bleached) and symbiotic (i.e., unbleached) anemones. Anemones were exposed to *V. alginolyticus* by (i) water exposure, (ii) water exposure with prey (brine shrimp larvae), or (iii) prey infected with the pathogen. Feeding activity did not significantly impact pathogen establishment in aposymbiotic nor symbiotic anemones. However, only anemones fed during exposure yielded fluorescent *V. alginolyticus* colonies. This suggests eating may present an entryway for pathogens, but that it is not the only possibility. Also, the proportion of fluorescent bacteria was far more diluted in symbiotic anemones than in aposymbiotic anemones. This suggests the eating-disease relationship may become more prominent after bleaching. This study points to the relationship between eating and disease as an exciting launching point for future coral conservation research, such as the use of probiotic treatments to help bleached corals.

KHAURI WILLIAMS

Thesis Advisor: Dr. Lisa Baird, Biology

Devouring Nutrients: Exploring the Role of Lipid Transport Proteins in the Feeding of Carnivorous Plants

Plant lipid transfer proteins (LTPs) play an integral role in a variety of biological processes including lipid transport, signaling pathways, and plant defense, but the exact role of these complex proteins remains an enigma. Plant carnivory captivates both the general public and researchers, as it offers insights into the evolutionary adaptations of plants. While plant carnivory is hypothesized to have originated from plant defense mechanisms, the specific function of LTPs in carnivorous plants have not been previously reported on. The goal of this project is to explore how these LTPs are involved in the feeding responses of the carnivorous sundew plant native to Japan, *Drosera tokaiensis*. Through a series of enzymatic reactions after the feeding of the plant, the expression of the specific LTP3 gene expression can be visualized. The results will contribute to the understanding of how the LTP3 gene is implicated in the feeding response of the *Drosera tokaiensis* plant. These findings will be compared to what is known about LTPs' involvement in biological processes in other kinds of non-carnivorous plants. Additionally, insight on the role of LTPs in *Drosera tokaiensis* not only sheds light on their functions across carnivorous plants but also contextualizes this research into knowledge of the essential role LTPs play in the survival of flowering plants as a whole.

BUSINESS ADMINISTRATION

ISABELLE ZAKHEIM

Thesis Advisor: Dr. Rebecca Nieman, Business Law and Ethics

Navigating the New Normal: Addressing Obstacles, and Evaluating Solutions within the Collegiate Athletics NIL Domain

The NCAA has been the ruling body for collegiate athletics since 1906, currently overseeing more than 350 universities. Prior to 2021, collegiate, non-professional athletes were barred from profiting whatsoever, however, since the release of their interim policy, student athletes are allowed to profit off their name, image and likeness. Spurred by the rulings of antitrust court cases, NCAA v. O'Bannon, and NCAA v. Alston, the change in policy has sparked a new conversation surrounding rules and regulations, with particular emphasis on the lack of clarity and impact on university athletic departments. Additionally, the emergence of collectives supporting student athlete NIL deals, has posed federal taxation issues, subsequently prompting the need for further guidance within this domain. In order to combat such problems, this report proposes the following: the Federal Government must provide a clear outline for the review of NIL Entities, such as Collectives, and participating universities, with an emphasis on transparency provisions, including compulsory annual disclosure mandates. Moreover, the NCAA needs to implement monitoring and compliance recommendations, across the board reporting requirements and student athlete education, in order to ensure the safety and equity of student athletes.

CHEMISTRY AND BIOCHEMISTRY

MICHAEL FAGAN

Thesis Advisor: Dr. Anthony Bell Jr., Chemistry and Biochemistry

Using Plant-Derived Small Molecules to Target HMGB1

High Mobility Group B1 (HMGB1) is a highly-abundant DNA-binding protein that was classified in the early 1970s as an intracellular chromatin-remodeler which aids in regulating the transcription, genetic recombination, and repair of DNA. Thirty years later, HMGB1's extracellular function was discovered. Outside of the cell, HMGB1 can act as a proinflammatory cytokine that amplifies local and systemic responses to ward off harmful stimuli. However, the protein also possesses negative extracellular capabilities – namely, serving as an alarmin that worsens the impact of inflammatory and autoimmune diseases. To offset this, therapeutics are being developed to target HMGB1. Oligonucleotides (i.e. single-stranded DNA) have been used as HMGB1 antagonists. This approach is built on HMGB1's aforementioned high affinity toward DNA and has proven to be effective in animal studies. However, we suspect that a combination-therapy approach will be required to successfully inhibit HMGB1. Hence, small molecule-based strategies are also being investigated. Despite small molecules representing the majority of drugs on the market, they are largely unexplored with HMGB1. Flavanones, a group of plant-derived small molecules, have been found to alleviate HMGB1-related inflammatory stress. Their renewability, coupled with the previous qualitative findings, demands further examination of their potential to serve as anti-HMGB1 drugs.

ASHLEY ZIOMEK

Thesis Advisor: Dr. Timothy Clark, Chemistry and Biochemistry

Synthesis of Biaryl Bisphosphonates by Oxidative Homocoupling

In recent years, the growing field of C-H borylation has provided access to valuable phosphines and phosphonates. These ligands are heavily used in metal-catalyzed reactions throughout the pharmaceutical industry and in medicinal chemistry. Creating pathways to unknown or hard to access ligands can in turn have positive impacts on human health by allowing access to new treatments. The goal of this project is to have borylated aryl phosphonates, from *ortho-directed* C-H borylation, undergo oxidative homocoupling to access valuable chiral and achiral bisphosphonates. It was found that the oxidative homocoupling of borylated aryl phosphonates provided moderate yields of achiral biaryl bisphosphonates but efforts to synthesize enantioenriched products have not yet been successful.

COMMUNICATION

PAIGE AUGUSTINE

Thesis Advisor: Dr. Jillian Tullis, Communication

Closing the Gaps: A Qualitative Analysis of Oral Health Education

Oral health is a crucial part of overall health and well being, but public knowledge is greatly lacking. Oral health education in the US is insufficient and is seen through high rates of tooth decay, other oral health problems, and lack of access to care. Societal inequalities and an emphasis on cosmetic dentistry over oral health further demonstrate a lack of concern. The goal of this project is to assess oral health education, explain improvements that can be made, and demonstrate how this will have positive implications for societal health. Through a qualitative content analysis, I have analyzed the public health websites of six states to describe their oral health literacy and education practices. This analysis focuses on accessibility, content, multimedia resources, and integration of oral health to overall health. This project highlights research in communication and concludes the effectiveness of the information. This project aims to provide understanding of the importance of stronger and more comprehensive oral health education. I argue that there should be increased attention to oral health as well as a greater integration into the field of communication, because currently there is a lack of research in this area. Shifts in the way oral health is presented will result in greater overall health as well as improved quality of life.

HENRY DORN

Thesis Advisor: Dr. Kristin Moran, Communication

Remote Working Preferences of American Workers

This presentation will be an analysis of the realities and perceptions surrounding the shift to remote work in America following the Covid-19 pandemic. It will call into question the benefits and drawbacks of both virtual and in person working environments. Since virtual working culture has taken a larger grasp on the population, it is crucial to understand what the outcomes of this recent shift are and how people feel about it. My presentation will briefly break down the facts and history surrounding virtual working environments and alternatively compare the findings to in person and hybrid work. I then intend on presenting my own findings from a survey I conducted of American workers in order to compare their own perceptions of different working environments to their overall job satisfaction in their current type of work environment. This will allow for the comparison between facts and perception, which will help me make a well informed conclusion on which work environment is the most beneficial for society.

COMPUTER SCIENCE

DANIELLA HUBBLE

Thesis Advisor: Dr. Jennifer Olsen, Computer Science

Unveiling Biases: An Analysis of Societal Inequities Embedded in Artificial Intelligence

As artificial intelligence (AI) becomes increasingly integrated into our daily lives, understanding its biases is crucial. This understanding is necessary to mitigate potential societal harm, while also ensuring that AI remains effective for all individuals to use, regardless of demographic factors. AI encompasses a wide range of applications, including chat bots, facial recognition, autonomous vehicles, medical diagnosis systems, and many others. In a meta-analysis, which is a technique for combining findings from independent studies, I explored prevalent biases—gender, racial, age, ethnic, and more—entrenched within AI systems and their underlying causes. I investigate both algorithmic biases, which are inherent in the design of AI algorithms, and data biases, which arise from biased datasets used for AI training. The analysis reveals a troubling reality: AI systems perpetuate societal biases, posing ethical and social ramifications. Gender disparities, racial prejudices, and age discrimination are mirrored within AI, influencing decision-making processes across various domains, from hiring practices to criminal justice. Shedding light on the biases ingrained within AI systems advocates for ethical AI development practices, inclusive dataset curation, and rigorous algorithmic scrutiny. Addressing these biases is crucial to ensure AI's equitable and fair integration into society.

ECONOMICS

KELLI WOOD

Thesis Advisor: Dr. Stephen Conroy, Economics

The Importance of Patents in Contributing to Regional Economic Growth

Innovation varies significantly across different geographic regions, thus affecting economic growth as a critical factor. Patents, an exclusive right to an invention, have long been a measure of innovation at both local and state-wide levels. Further, knowledge spillover and county-wide economic activity also affect how innovative a region may be. At the same time, patents can also increase levels of market-stealing and reduce regional performance. Both the knowledge spillover effect and market-stealing effect occur simultaneously when a firm chooses to patent its invention. A panel dataset of patent counts from the US Patent and Trademark Office, along with American Community Survey county-level data, will be used to conduct this analysis. This paper aims to understand patents' role in contributing to regional economic growth and what differences in knowledge production occur across various counties. The software program Tableau will also be used to provide accurate maps of the critical regions for patenting. Finally, this paper investigates how well patents can serve as a factor of innovation at both the intermediate and final stages of production within a specific geographic region.

ENGLISH

MICHAEL FARRELL

Thesis Advisor: Dr. Malachi Black, English

Biblical Literacy and the Creative Mind

Biblical Literacy and the Creative Mind will explore interpretation tracing the history of English literature back to biblical aspirations and its continued profound influence on Western human perspectives. It will examine the decline in adults reading literary texts and the diminishing number of English majors among prospective students. I am arguing for poetic interpretations over hermeneutic ones, which analyze what is structurally in a sentence to make a reader feel a certain way. I will use the theory of intertextuality, meaning a text comprises the consumption of past texts, to aid my argument. This theory underscores the importance of celebrated and historic texts that form the basis of the Western Canon and why they should be required for readers and writers. I will explore the notion of literary authority, the Bible, and elucidate its profound significance in literature and education. Drawing on specific literary examples, I will explore interpretative engagement with texts, like the concept of close reading, symbolism, and metaphors. Many contemporary undergraduate educations have sidelined these aspects of English literary history. Ultimately, this essay will argue for grounding English literature in a common-sense poetic approach and examine how some theories can rupture the major's prestige.

MARIA SIMPSON

Thesis Advisor: Dr. Ivan Ortiz, English

An Exploration of Gothic Literature as a Mode of Social Commentary & an Original Short Story Collection

In this project, I explore the hidden truths buried within the genre of Gothic Literature and uncover commentary on historical and cultural events through textual analysis and creative writing. Gothic Literature built the foundations of Horror as we think of it today, which includes renowned works from authors such as Mary Shelley, Edgar Allen Poe, and Bram Stoker. The project opens with an overview of the development of Gothic Literature and Horror, moves into an examination of Gothic Literature through genre theory and textual analysis, and concludes with a small collection of original short horror stories that utilize Gothic techniques to comment on current issues. Various literary techniques such as characterization, symbolism, aesthetics, and theme contain manifestations of the culture and events of the Nineteenth Century, showcasing how Horror is used as a vehicle for social commentary through various genre tropes. The genre holds the potential to be a critical literary tool in facing issues that "haunt" and "plague" the world in a modern context, as well. Gothic Literature may be full of supernatural fictitious tales, but it has also granted immortality to their authors' lived experiences in a rapidly changing world.

ENVIRONMENTAL AND OCEAN SCIENCES

JULIA HUMPHREY

Thesis Advisor: Dr. Steven Searcy, Environmental and Ocean Sciences

Can Overfished Stocks in the Northeast Rebuild in a Changing Climate?

Overfishing is an ongoing concern, and many Atlantic fish subpopulations, known as stocks, have been declared as overfished. As fisheries managers aim to rebuild stocks by reducing fishing pressure, it is important that climate variability is also considered when developing rebuilding plans. This is particularly pertinent as recruitment, or the introduction of young fish into the populations, may be driven by environmental factors. The goal of this research is to evaluate the relationship between recruitment and ocean temperature to determine whether stocks can rebuild in a warming environment. I evaluated the relationship between sea surface temperature (SST) and recruitment for 14 stocks in the Northeastern United States. Rebuilding simulations were conducted for a subset of overfished stocks to assess the ability to return to historical population baselines under both current and predicted warming conditions, considering two levels of fishing pressure. For stocks with temperature-driven recruitment, achieving rebuilding goals within the next two decades is unlikely under any scenario, particularly under predicted warming. While reducing fishing pressure may somewhat mitigate the impacts of warming, it is insufficient on its own. This research emphasizes the need to consider environmental parameters, such as SST, when projecting future stock populations for management purposes.

ETHICS

ELLE KALLSEN

Thesis Advisor: Dr. Mark Woods, Philosophy

Ethical Questions and Conservation Strategies for Diadema antillarum (Long Spined Sea Urchin) post mortality events in the United States Virgin Islands

Abstract The collaboration of ethical reasoning and conservation biology are necessary in implementing successful strategies to protect species and ecosystems in a globally changing climate. The Long Spined Sea Urchin (*Diadema antillarum*), an echinoderm endemic to the Caribbean and West Atlantic, holds strong ecological value and has been characterized as a keystone species. In 1983 and 2022, *Diadema* experienced unexpected and unprecedented die off events that have been attributed to a ciliate causative agent. Because *Diadema* is essential in consuming algae and maintaining reef metabolism, the mortality events resulted in a "phase shift"— a drastic reduction in *Diadema* abundance and a correlated increase in macroalgal coverage and decrease in coral coverage. The scientific community confronted the 2022 mortality event with citizen scientist engagement through online reporting methods and implemented proactive conservation methods such as assisted colonization and assisted natural recovery. Through an interdisciplinary utilization of biology and ethics, the intrinsic value of *Diadema* through their role as an endemic keystone species will advocate for assisted natural recovery as the most ethical, economical, and practical conservation method to recover Diadema populations and prevent future mortality events.

ETHNIC STUDIES

SOFIA HART

Thesis Advisor: Dr. Amanda Ruiz, Mathematics

Math Anxiety: What is it, Who has it, and How to Heal from it

This autoethnographic study explores math anxiety and its effect on academic identity. Focusing on the intersection of race, culture, and education, this introspective research aims to understand what math anxiety is, why it happens, and which groups of students it affects the most. Through journals and reflections, this study advocates for trauma-informed practices to foster inclusivity and equitable learning environments in general and in my future classroom as an aspiring teacher. This concise exploration sheds light on the importance of addressing personal narratives in educational research through vulnerable and deep reflections on my own experiences in the classroom and my healing process. In addition to this autoethnography I have created a physical representation of my journey in seeing myself in mathematics, with a fractured self portrait titled “I am math”.

FINANCE

MOLLIE DOSTALEK

Thesis Advisor: Dr. Melina Vosse, Finance

Navigating Risk Terrain in the Twenties: Understanding Age-Linked Gender Dynamics in Risk Aversion between 20-29 year old Men and Women

This research aims to explore the age and gender-linked dynamics of risk aversion in investment decisions among adults aged 20-29, focusing on the disparities between men and women. While most literature often portrays young men as having higher risk appetites, this study aims to evaluate such assumptions, shedding light on the nuanced relationship between gender and risk aversion across the early adult years. This research seeks to discern patterns and variations in risk aversion, investigating whether age plays a significant role in shaping these dynamics. By analyzing data that demonstrates the relationship between gender, age, and risk aversion, this study offers insights for managers, investors, and researchers. It contributes to behavioral finance and provides practical recommendations for tailored investment practices. Ultimately, aiming to empower people with specific risk profiles and foster informed decision-making.

NINA FINOCCHIARO

Thesis Advisor: Dr. Luis Ceballos, Finance

Retail Investor Response to Real Estate Events

The volatility of the housing market remains a constant challenge, shaped by a multitude of unpredictable factors. This thesis interprets the relationship between real estate market fluctuations and retail investor behavior in the stock market. Focusing on the 25 largest cities in the United States over an 18-year period, the correlation between changes in housing prices and investors' interest in stocks are examined. Leveraging Google search query data and housing price indices, the research dives into the exchange between the search volume index and the housing price index to explain patterns and fluctuations. By employing statistical analyses, the paper aims to uncover insights into how variations in real estate events influence retail investors' decision-making processes in the stock market. This study contributes to a deeper understanding of the dynamic between two unique sectors of the economy and offers valuable implications for investors, policymakers, and market analysts.

FRENCH AND FRANCOPHONE STUDIES

RILEY LIM

Thesis Advisor: Dr. Sylvie Ngilla, Languages, Cultures and Literatures

Traversing Identity through Writing: Ying Chen and Poetics of Relation

This study is a transregional project that analyzes the literary parallels between the work of Ying Chen, a Shanghainese author who moved to Québec to write in French and Édouard Glissant, a Martiniquan poet/philosopher. Chen's writing style is salient in the discourse around cultural identity, as her novels consecutively eliminate Chinese cultural markers and details anchored in real geographical settings. My project examines this stylistic progression as a rejection of "fixed cultural identity." Glissant, in this case, provides a rich theoretical perspective to further understand this progression. His text, Poetics of Relation, extensively examines "cultural identity" as a "rhizomatic" construct, where it evolves openly through interactions with different people and languages. He additionally posits the idea of the "right to opacity" which refers to marginalized groups resisting the reduction of their identities to rigid categories by remaining unknown. My project argues that Chen's stylistic transition is a way for her to engage in the concept of "Relation" and render herself "opaque" from the exotic gaze of Western readers.

HISTORY

JACK HARTLEY

Thesis Advisor: Dr. Ryan Abrecht, History

Pantheon: The Evolution of Communal Mythmaking Into Tabletop Roleplaying

Participating in communal mythmaking and oral storytelling for the purpose of entertainment is an eternal human practice, and one which is largely associated with the myths of ancient Greece. Human beings crave social connection, and what better way to achieve this than by telling stories together? This project is an exploration of how this classical human practice is performed today through tabletop roleplaying games, such as Dungeons and Dragons, Pathfinder, and others, by creating a new game designed with these concepts in mind. The outcome of this project, Pantheon, is a tabletop roleplaying game where the players work together to tell their own stories in the world of Greek myth by creating their characters and working together to create their adventures. Like most tabletop roleplaying games (TTRPGS), which are often called pen-and-paper games, Pantheon is intended to be played with a group of 2+ players, and one game master, gathered around a table while rolling dice, improvising actions and dialogue, asking questions, and writing things down. With Pantheon, this project seeks to engage with the history of ancient Greek myth through a style of gaming that necessitates curiosity, learning, and engagement.

EMILIO KOLOSTYAK

Thesis Advisor: Dr. TJ Tallie, History

Performing Gender in Japan: The Evolution of 'Gender Variance' in Japanese Media

The unification of Japan under Tokugawa Ieyasu in 1603 C.E. occurred in an era of peace, increasing time for leisure and, as an unintended consequence, a distinct form of gender variance. The *nanshoku* system presented a new gender/sexuality paradigm in the establishment of the *wakushu* (literally 'youth'). This category consisted of those who presented as adolescent males, and it became a socially constructed 'third gender,' making it such that it was socially acceptable for men (and women) to engage in relationships with them. A subsection of the *wakushu* were the onnagata, primarily kabuki theater actors who dressed in women's clothing. Despite the *nanshoku* system being suppressed beginning in the early 20th century, media following Japan's defeat in WWII reveals that the combination of assigned male at birth (AMAB) youth dressing in stereotypical women's clothing and the social acceptance of relationships between men and the *wakushu* led to a continued conflation between gender and sexuality. As such, even as the existence of transgender people in Japan has become more distinct, there is still a confusion between transgender women and gay men. In addition to this, gender variance has also continued its existence in gender non-conforming individuals, composed largely of AMAB people who wear stereotypically feminine clothing.

ABIGAIL STALLARD

Thesis Advisor: Dr. Colin Fisher, History

"That's Not What I'm Saying": Bruno Latour and the Science Wars

Since the end of World War II, the divide between science and social sciences has been a controversial topic. French philosopher, anthropologist, historian, and sociologist Bruno Latour attempted to bring together the two fields alongside the emergence of science studies, but was met with pushback from both realists and constructivists. With the outbreak of the science wars in the 1990s, science studies came under fire, as Latour was deemed a "thorn" in the side of scientists for his work that highlighted social aspects of science. Yet, this was a false perception of Latour and reveals that he was misunderstood, and as a result became a victim caught in the crossfire of the intellectual debate that pitted him as an enemy of science. In reality, Latour supported "normal" science- just through a different lens. For being one of the most cited philosophers, Latour is still misunderstood. This thesis aims to clarify Latour's ontologies in science studies, assess how he was brought under fire by intellects in the 1990s, and how the science wars initiated a change in how he communicated his conclusions in science studies, which still hold significant influence today.

INTERNATIONAL BUSINESS

NADIA ALJUNAIDI

Thesis Advisor: Dr. Eileen Daspro, International Business

Assessing the Impact: Financial Services Sector and the UN Global Compact's Principles for a Sustainable Economy

In the face of a pressing global climate crisis, there is a growing imperative to hold corporations accountable for their environmental, social, and governance (ESG) practices. The United Nations Global Compact (UNGC) serves as a pivotal international framework, rallying companies worldwide to voluntarily align their strategies and operations with its ten established principles, encompassing human rights, labor standards, environmental sustainability, and anti-corruption measures. However, amidst ongoing scandals plaguing the financial services sector, questions arise regarding the sector's adherence to these principles. Employing a mixed-methods approach integrating quantitative and qualitative analyses, this thesis aims to assess the extent to which the financial services sector has embraced and integrated the UNGC principles into its operations. The quantitative analysis delves into the Communications on Progress, which are annual reports mandated to assess adherence to the principles. This examination focuses on financial service companies in the USA, EU, and UK.The qualitative analysis delves into specific company initiatives related to the principles.This project is significant for illuminating the critical need to hold the financial services sector accountable while evaluating its effectiveness in promoting a sustainable economy. This is particularly important given the sector's profound global impact, representing a quarter of the world economy.

ANGELINA KAPP

Thesis Advisor: Dr. Eileen Daspro, International Business

De-Escalating the U.S./China Trade War Using a Conflict Resolution Framework

How can the United States and China collaboratively de-escalate their current trade relationship using a conflict resolution methodology to foster economic growth and foreign investor confidence in the evolving landscape of global trade? This presentation will serve as a guide to those wanting to gain a comprehensive understanding of the macroeconomic causes and impacts of the contentious U.S/China trade war. The year 2018 can be attributed to the start of the war when then-President Donald Trump implemented tariffs on Chinese goods and products. These back-and-forth financial and economic measures have been continually imposed to this day and tensions have escalated throughout the extensive timeline provided. This conflict is complex and multifaceted with power giants fighting on fronts such as intellectual property, technology, national security, foreign country developments and investments, trade deficit, and other factors. Various recommendations for policymakers in each country and future opportunities should utilize, emphasize, and closely follow cross-cultural communication tactics laid out at the end of the presentation. Will there ever be a solution to the seemingly never-ending fire that ignites trade titans China and the United States?

INTERNATIONAL RELATIONS

ALESSANDRA BRIZUELA

Thesis Advisor: Dr. Randy Willoughby, Political Science and International Relations

Navigating Energy Security in Germany Amidst Russia's Invasion of Ukraine

While energy security may appear to be a vague or even abstract concept, instances of its turmoil underscore its palpable reality and crucial role in supporting contemporary living. This paper will examine Europe's biggest energy crisis of the 21st century which was triggered by Russia's invasion of Ukraine. Russia took advantage of its dominant market position in Germany's energy supply to weaken Germany's response to the conflict in an attempt to deter it from increasing its support to Ukraine. This paper will explore how effectively Germany responded to this so-called "energy blackmail" by examining changes in Germany's energy portfolio across three major sectors: natural gas, offshore wind, and hydrogen. Additionally, the liberal trade and foreign policies that landed Germany in the predicament of excessive dependence on Russian oil and gas will be assessed. Ultimately, this paper will shed light on the complexities of energy security, environmental sustainability, and geopolitical dynamics as Germany's ability to balance short-term imperatives with long-term sustainability goals will greatly influence its energy future.

EVA ELEFTHERIADIS

Thesis Advisor: Dr. Andrew Tirrell, Political Science and International Relations

The Cure for World Peace: A Public Health Strategy

Health and the environment impact the security and stability of the global community, as can be seen through the effects of pandemics and climate change. This paper attempts to address these factors by helping create a preventative strategy for countries to be better equipped to face these challenges, and decrease the extent of future manifestations. Starting with a comparative analysis of the Black Death and the COVID-19 pandemic, this paper explores the relationship that exists between health, the environment, and human interaction. The analysis suggests that when these aspects are mutually beneficial, there is an increase in human security, which ultimately leads to an increase in national security. After conducting a historical analysis, the paper provides statistical support by demonstrating a correlation between the Global Peace Index (GPI), the Environmental Performance Index (EPI), and the Sustainable Development Goal 3 Index (SDG3). In summary, the statistical analysis supports two hypotheses: First, that the SDG3 and EPI are positively correlated, suggesting that health and environmental policies are mutually beneficial; second, that SDG3 and EPI are positively correlated with GPI, suggesting that increased human security via good health and environment increases peace. Finally, the paper performs a case analysis of different countries to explore how the relationship manifests in nations' policies and which of these policies are most effective. Identifying specific policies can recommend ways nation-states can improve the different aspects of the relationship and how they can become more resilient through future pandemics, resulting in a healthier, happier, and more peaceful world.

JORDAN ESKEW

Thesis Advisor: Dr. Kacie Miura, Political Science and International Relations

The Holocaust's Legacy: Influencing Jewish Political Identity

This thesis and presentation addresses the intricate relationship between the historical persecution behind the Holocaust and its enduring influence on contemporary Jewish political engagement, a subject of significant contemporary relevance in political and international relations. Despite broad recognition of the Holocaust's impact, the specific ways in which its memory affects Israeli and American Jewish political attitudes and actions in the modern day have not been thoroughly examined. Utilizing qualitative methods, including interviews with 20 individuals—public figures, Holocaust survivors, their descendants, and broader members of the Jewish diaspora— this study focuses on understanding the interplay between historical trauma, community cohesion, and the political responses to security concerns and Israel's geopolitical challenges. It hypothesizes that the collective memory of the Holocaust instills a pervasive sense of apprehension, influencing US and Israeli political affiliations and behaviors among both survivors' descendants and the wider community. The findings of this project are intended to offer critical insights into the dynamics of Jewish political identity and decision-making. By highlighting the emotional and psychological dimensions of political engagement, this thesis not only addresses a notable gap in current research but also equips policymakers with a deeper, more nuanced understanding of Jewish political responses, ultimately facilitating more informed and empathetic political formulations in a complex global landscape.

SOFIA ROSSINI

Thesis Advisor: Dr. Randy Willoughby, Political Science and International Relations

Ecuador's Security Crisis: A Struggle Against Narcotics and Organized Crime

In the heart of Latin America, Ecuador faces a severe security crisis primarily driven by the surge in narcotics trafficking and organized crime. This issue isn't just a matter of law enforcement; it's tearing at Ecuador's social fabric. Strategically located as a critical passageway for drugs moving from South American producers to the large markets in the North, Ecuador has unintentionally become a central node in the global narcotics network. This unfortunate role has brought increased violence and crime, testing the limits of its legal and security systems. Further complicated by intricate international conflicts and sophisticated criminal networks, Ecuador's old punitive laws struggle to keep up. Now, at a critical moment, the nation's new leadership faces the daunting task of innovating its approach to combat this rise in drug trafficking and gang violence, shaping not just Ecuador's future but also its role on the international stage. This paper will delve into the underlying factors driving this surge in narcotics, examine the response of law enforcement, and explore potential future scenarios in Ecuador's ongoing battle against this crisis. Culminating in how Ecuador needs to implement holistic structural solutions encompassing social, economic, and political reforms addressing the root causes of violence.

MARKETING

AUDREY BJORKLUND

Thesis Advisor: Dr. Justine Farrell Rapp, Marketing

Meditate with Aumn: The Creation of a Meditation Brand and Website

This is an applied creative project to build a brand from scratch: Aumn, a meditation company and resource. Specifically, this project focuses on building a branded platform in the form of a website for Aumn to share information regarding its purpose, resources, and business. This work uses and combines skills and knowledge from the disciplines of Marketing and Visual Communications (i.e. graphic design). Critical to this project's completion is understanding competitors in the marketplace, finding a niche, creating a brand persona and brand voice, coming up with a brand name, logo creation and development, copy writing and content creation for the site, building the site, and more. This project enables the meditation company, Aumn, to find its voice, visual style, and have a platform to communicate and connect with its audience and share its value with the world.

JAIDE COUSINS

Thesis Advisor: Dr. Josen Diaz, Ethnic Studies

Scrubbing Stereotypes: Exploring Gendered Marketing in Personal Hygiene Products

This paper investigates how the marketing of personal hygiene products perpetuates gender stereotypes in contemporary America. Through an analysis of advertisement history, consumer data, and branding strategies, the study explores the ways in which marketing tactics reinforce traditional notions of rugged masculinity and fastidious femininity. By examining the impact of gendered marketing on consumer behavior and attitudes towards personal care and grooming, the research highlights consequences of perpetuating gender stereotypes, such as body image pressures and limited expression of self, through product marketing and consumer culture. The paper also critiques the gender binary perpetuated by marketing strategies and proposes recommendations for promoting inclusivity and diversity in personal hygiene marketing. Ultimately, the study contributes to a deeper understanding of the role of marketing in shaping societal perceptions of gender and offers insights into strategies for challenging gender stereotypes in consumer culture.

RUBY GALLEGOS

Thesis Advisor: Dr. Maria Kniazava, Marketing

Scandi: Making a Brand

The aim of this paper is to explore how leveraging Scandinavian cultural principles, notably hygge and lagom, can positively impact sustainability and well-being through marketing, potentially reshaping global attitudes and behaviors. By analyzing perspectives from marketers and consumers and examining YouTube comments, this paper investigates contemporary perceptions of Scandinavian culture. The acquired findings highlight the emergence of the Dream Season, a conceptual "5th season," characterized by romanticized aesthetics and universal appeal. This season, not tied to specific geography, offers insights into consumer behavior and brand marketing strategies. Understanding and effectively branding Scandinavian culture could catalyze positive change, addressing pressing global challenges and contributing to societal transformation.

MECHANICAL ENGINEERING

KYLE CAVANAUGH

Thesis Advisor: Dr. Daniel Codd, Mechanical Engineering

The Design and Manufacturing of a Dual-Ratio Baja SAE Gearbox

The primary function of a vehicle's drivetrain is to transmit torque from the engine to the wheels. In most cases, some form of shifting mechanism is implemented to allow the rotational speed of the wheels to differ from that of the engine as the vehicle accelerates, but an additional gear reduction is often needed to optimize the performance. This undergraduate thesis presents the design, manufacturing, assembly, and testing of a custom adjustable gearbox for use in a Baja SAE competition off-road vehicle. The design process is outlined in detail, including several concept iterations and explanations for critical design decisions. The manufacturing and assembly of the gearbox is also discussed with an emphasis on challenges faced, and the results from physical testing are compared to the stress analysis performed during the design stage in order to validate the design's ability to safely handle the expected loading scenarios.

JACOB RYAN

Thesis Advisor: Dr. Frank Jacobitz, Mechanical Engineering

Analysis of Meshing Techniques and Densities for the Study of Flow Over a Roughness

Fully understanding how fluids interact with different surfaces is crucial for applications in highly precise and serious commercial fields like the airline, aerospace, and naval industries. Previously, several experiments were performed by the German Aerospace Center (DLR) to study two specific cases using actual water channels. In order to validate the results and answer some unknown questions, simulations were conducted by my research team to set up a case using a Computational Fluid Dynamics (CFD) software, Ansys Fluent, with the exact same conditions, calculate the solutions, and compare them to the experimental results. When doing CFD simulations it's essential to make sure that the software settings are set up correctly for each specific case, otherwise the simulation will provide incorrect and unphysical results. One of the most important steps of setting up the system is the mesh creation for the defined geometry. In my case, I found that a mesh with two vertical zones where the bottom zone near the plate utilizes a constant, dense mesh and the top zone away from the plate utilizes a gradually coarser mesh allows for a significant increase in data points around the surface of the plate and roughness element. This results in higher precision where the important aspects of the solution are calculated and lower precision where the data matters less. Thus, increasing the overall accuracy of the simulation in comparison to the experimental results, which is seen by a rise of the correlation coefficient for the case with and without a roughness element.

PHYSICS AND BIOPHYSICS

MAYA NUGENT

Thesis Advisor: Dr. Rae M. Robertson-Anderson, Physics and Biophysics

Creation of Time-Dependent Adaptable Materials via Circadian Clock Proteins

Active biological materials introduce a unique way to bring complex, life-like behavior to synthetic materials. Circadian rhythms are biological processes that exist in nearly all living organisms to regulate sleep, metabolism, and photosynthesis. Here we show that the cyanobacteria circadian clock can be functionalized to design a material that displays autonomous oscillations between gel-like and fluid states. The cyanobacteria circadian clock involves the cyclic binding and unbinding of proteins KaiA, KaiB, and KaiC over a 24-hr period. Throughout the period, KaiB binds to KaiC in response to KaiC phosphorylation by KaiA. Tagging KaiB with biotin allows us to incorporate streptavidin coated colloids into the Kai protein system. With this approach, we engineer time-dependent crosslinking of colloids, and find self-assembly to be dependent on the phosphorylation state of KaiC. We use microscopic and macroscopic image analysis to monitor and analyze colloidal crosslinking over time.When incorporated at low concentrations into colloidal suspensions, KaiC creates oscillations between cross linked and non-crosslinked states. We demonstrate that this material can be easily incorporated into synthetic and biological materials to facilitate time-varying properties on both microscopic and macroscopic scales. This innovative technology has applications towards the advancement of precision pharmaceutical delivery and self-healing infrastructure.

DARIUS VERA

Thesis Advisor: Dr. Chad Kishimoto, Physics and Biophysics

Exploring Sterile Neutrino Decays in the Adolescent Universe

The early universe provides a unique opportunity for researching neutrinos because in these dense and hot places, neutrinos have significant interactions with each other and everything else in the plasma of the early universe. One issue in the current cosmological paradigm is the lithium problem, where there is a discrepancy between predicted versus observed abundances of lithium produced during Big Bang Nucleosynthesis. In this talk, we look beyond the Standard Model to try and address this discrepancy by using the early universe as a laboratory to study the decay of sterile neutrinos into Standard model particles and its effect on cosmological observables. These decays create nonthermal neutrino spectra as opposed to nearly thermal spectra predicted by standard cosmology. These altered spectra affect the production of primordial elements during BBN and the formation of large scale structures.

DAVID VERA

Thesis Advisor: Dr. Maren Mossman, Physics and Biophysics

Optical Transport of Ultracold Atoms

At temperatures near absolute zero, bosons form a macroscopic quantum state that can be manipulated and imaged in a very controlled and tunable way. To reach these extreme temperatures near absolute zero, advanced methods in cooling, including laser and evaporative cooling, must be used. In addition to these techniques for cooling, atoms must also be held up against the constant pull of gravity, so additional trapping techniques using lasers and magnets are used. In our lab at University of San Diego, we are implementing a tunable lens setup to optically transfer atoms to a more optically accessible location. A tunable lens is a lens where the curvature of the lens can be adjusted through an applied electrical current, thus translating where the focus of a lens is in a controlled way. This research aims to discover the optimal setup for a tunable lens system to be used in the transportation of ultracold atoms in our system. In this research, I will report on the building of the tunable lens system within the lab and the adjustment of various systems pertaining to the tunable lens.

POLITICAL SCIENCE

SARAH ADRID

Thesis Advisor: Dr. Evan Crawford, Political Science and International Relations

The Impact of Cross-Cutting Identities on Vote Choice in American Elections

The social identities Americans carry have a large impact on their voting choices. In recent years, Americans have become increasingly sorted into either the Republican or Democratic Party, for certain social identities tend to draw individuals towards certain political parties. For instance, individuals who identify as male or upper class tend to vote with the Republican Party, while people of color or members of the LGBTQ+ community tend to support the Democrats. Conversely, there are individuals with cross-cutting, or unaligned, identities, who carry statuses that align with multiple parties. It is more difficult to confidently conclude the vote choice of these individuals because some identities suggest support for the Republicans while others imply Democratic ties. This thesis investigates the impact of cross-cutting identities, specifically race, gender, and partisanship, on voting choices. Through analyses of the 2008 and 2016 elections, this study aims to determine the most influential social identity when it comes to voting. These elections challenged people with cross-cutting identities in unprecedented ways; Barack Obama's candidacy created tensions between race and party affiliation, while the competition between Hillary Clinton and Donald Trump tested gender and party loyalties. By examining these cases, this thesis seeks to further understand the significance of social identities in Americans' voting behaviors.

IESHA BROWN

Thesis Advisor: Dr. Cory Gooding, Political Science and International Relations

The Case For Racial Justice in American Foreign Policy

The principles that guide American foreign policy reside in liberalism and the promotion of "freedom" and "democracy;" or so it's been argued since the end of World War II and America's institution as a global superpower. Amidst the shifts in foreign policy from Woodrow Wilson to Joe Biden, the election of Donald Trump in 2016 presented an isolationist America-First politics that raises questions about U.S. interventionism and international conflict. An important theory used to describe Washington's response to global affairs is the concept of the Liberal World Order (LWO), which centers an international design of institutions and patterned relationships that work to expand democracy abroad and define the global balance of power. While powerful in theory, it has proven inadequate in practice. This paper argues that while the LWO is a missionary project with rhetorical appeal it is actually focused on upholding strategic interests and perpetuating American dominance. To address these concerns and achieve a higher synthesis of American foreign policy, I argue for a reconceptualization of American values that is inspired by the political thought of Black leaders including W.E.B. Dubois, Martin Luther King Jr, and Angela Davis, as they are concerned with the incorporation of racial justice into international relations.

HANNAH HINTERMEISTER

Thesis Advisor: Dr. David Shirk, Political Science and International Relations

Rule of Law... Or Luck of the Draw? An Analysis of U.S. Immigration Judge Decision-Making

There is a general assumption that judges are impartial, objective arbiters of the law, with the outcome of a court case depending solely on the merits of the case itself. However, wide discrepancies exist between the rate at which U.S. immigration judges, or IJs, deny legal relief to immigrants in court cases. Given the high volume of cases decided each year, the fact that many high-stakes outcomes seem to depend largely on the IJ in charge raises serious questions about the legitimacy of immigration courts.

This project explores the decision-making of U.S. immigration judges, in an effort to determine whether significant biases exist in the way immigration court cases are decided. I analyze data on all IJs from Fiscal Year 2015-2020, focusing on five factors for each judge: gender, time on bench, political party of appointing administration, geographic location of court, and past employment experience. I use statistical tests to determine whether any of these experiences play a significant role in the rate at which the IJ denies relief to asylum seekers. I also interview immigration attorneys, retired immigration judges, and professors to complement these findings and add clarity to the complexity that is immigration law.

This project relates to the larger concept of the rule of law, and specifically examines the fairness and functioning of the U.S. immigration system. Understanding IJ decision-making ultimately boosts the legitimacy of this system, ensuring that decisions are based on the rule of law… and not simply luck of the draw.

NICOLE MAGLIOCCO

Thesis Advisor: Dr. Evan Crawford, Political Science and International Relations

Is the U.S. an Ethnic Democracy?: Another Perspective on Race & Government in the United States

In the study of global political landscapes, the concept of ethnic democracy is a subcategory of democracy that has emerged and started to be considered since the 1980s. It is a way that political scientists seek to understand the intersection of ethnic identity and governance. There are currently studies on how race affects the US, but not through the definition of ethnic democracy, so this will be a new perspective taken of the US from an international relations theoretical lens. This paper extends existing knowledge as more countries are studied under the lens of ethnic democracy. This specific research will analyze how racial bias exists in law and reality in the United States. This is important to not just those affected by the racial bias such as hyphenated Americans (Asian-American, African-American, Latino-American, etc) but also to the people that are influencing the system through their voting, political participation, and varying levels of political power. Since the US serves as a model of democracy to many countries, understanding the flaws in the American system will help others to learn from those mistakes and construct a less discriminatory system.

CATHERINE MANSOUR

Thesis Advisor: Dr. Casey Dominguez, Political Science and International Relations

Does a State's Civics Education Standards Impact its Youth Voter Turnout

In the United States, young voters consistently vote at much lower rates than other age groups. This means that their interests are not paid as much attention as the rest of the country and they have less of a say in the future of politics. Some contributing factors to this gap in turnout include lack of political knowledge, a tendency to procrastinate, and varying state voting laws that make voting confusing for first time voters. My research looked at each state's youth voter turnout across three elections, registration and voting laws, whether states required a civics course, how many semesters were required, if a test was needed for graduation, and whether the course met the 5 C standard set by political scientists to evaluate civics curriculum. I then performed statistical analysis to see if any correlation could be found between a state's civics education program and its youth voter turnout. Depending on whether a correlation was found across the board or only under certain conditions could help determine which kinds of education policy reforms would be helpful to raising the youth voting rate based on the numbers and data we have.

CALLI ORTEGA

Thesis Advisor: Dr. Randy Willoughby, Political Science and International Relations

Terrorism in the Sahel: What is at stake for the U.S.?

In this paper, I will shed light on the complex state of terrorism in the Sahel region of Africa and explore how U.S. interests are at play. The Sahel is plagued by instability, insecurity, and a subsequent high volume of terrorist activity, accounting for almost half of the world's terrorism deaths. To help explain this phenomenon, I will begin by delving into the background of the Sahel region and examining its current terrorism landscape made up by several Islamic State and Al-Qaeda affiliate groups. In profiling the membership, structure, goals, types of activity, and scope of influence of each group, I will demonstrate the nuance of terrorism in the Sahel. I will then address the situation from a U.S. perspective. I will outline what the U.S. is already doing to quell violence in the region, as well as discuss the current geopolitical context that heightens the stakes for the U.S., particularly the growing Russian presence in the region. This paper will serve as a comprehensive overview of terrorism in the Sahel from a U.S. perspective, highlighting the importance of understanding the nuance of terrorism in the region.

EMMA PETERS

Thesis Advisor: Dr. Evan Crawford, Political Science and International Relations

Building a Bridge to Civic Equity: Advancing Civics in the American K-12 Education System

The American K-12 education system continues grappling with deep-seated disparities, perpetuating economic segregation and hindering equitable access to quality education. Such disparities particularly impact minority and economically disadvantaged students. This paper examines the disproportionate reality of civic education within this system and its ramifications for democratic governance and citizenship. It delves into the distinction between taking a civics class and engaging in active civic learning, such as service and experiential learning. Despite the pivotal role of schools in shaping civic attitudes and behaviors, current methods of civic education often fall short, exacerbating political inequality and marginalizing disadvantaged communities. The analysis explores the efficacy of active learning approaches in promoting civic participation among diverse student populations, while also highlighting the importance of informed, engaged citizenship in a democratic society. Additionally, it evaluates existing initiatives like the No Child Left Behind Act and the Civic Mission of Schools coalition, while proposing recommendations for addressing the systemic disparities in civic education. By prioritizing professional development, curricular support, and interventions at the school level, policymakers can strive toward a more inclusive and effective civic education system, ultimately empowering all students to become informed, active citizens in a democratic society.

CELIA RANEY

Thesis Advisor: Dr. David Shirk, Political Science and International Relations

Navigating the Palm Oil Industry: Visions for a Sustainable Future

Fifty percent of packaged products on the market contain palm oil, but its production introduces an array of social and environmental sustainability issues. There have been several efforts to mitigate these negative effects, but the problems still persist. Considering this, it is important to explore alternative solutions that may prove more effective. The purpose of this project is to analyze the top palm oil producing countries, and create an original data set for each country with characteristics that play a part in the manner of their palm oil production. This data set supports the effort to discover sustainability strategies that are specifically tailored to the unique conditions of these countries. Additionally, this project considers previous policies that were implemented to address problems similar to those currently faced by the palm oil industry. The data set serves as a filter when selecting pre-existing solutions in order to optimize their effectiveness in the top palm oil producing countries. This research ultimately serves to inform policy that can shape a more sustainable future for this widely-used commodity, a mission that is becoming increasingly important as the world population and demand for palm oil continues to grow.

PRYSCILLA SANCHEZ

Thesis Advisor: Dr. Timothy McCarty, Political Science and International Relations

Navigating the Palm Oil Industry: Visions for a Sustainable Future

In June of 2023, the Supreme Court of the United States ruled 6-3 to strike down race conscious affirmative action in college admission programs in *Students for Fair Admissions, Inc. (SFFA) v. President & Fellows of Harvard College and SFFA v. University of North Carolina*. Chief Justice John Roberts, in the majority opinion, stated that Harvard and University of North Carolina's race-based admissions systems violate the 14th Amendment Equal Protection Clause because the programs' policies did not meet the standard of "strict scrutiny." However, an intriguing part, and focal point of this project, in this 40 page opinion is a brief 3 sentence footnote that excludes military academies from this decision. This thesis aims to examine four potential explanations as to why Roberts' may have made this exclusion. These explanations range from national security interests, facilitation of racist exploitations, voices and deference at the Court, and the broader politics of military loopholes. Furthermore, this thesis aims to explore historical examples of the voices of the military receiving priority over the voices of educational institutions and vulnerable people in society.

PSYCHOLOGY

MIRANDA BALL

Thesis Advisor: Dr. Steven Berkley, Psychological Sciences

Shared Reading in Early Childhood Education: Social and Emotional Learning with Equitable Considerations

Social and Emotional Learning (SEL) is a strengths-based approach to education that expands the impact of classroom instruction beyond academic achievement by facilitating holistic development. The Collaborative for Academic, Social, and Emotional Learning (CASEL) identifies five core tenets of SEL: self-awareness, self-management, responsible decision-making, relationship skills, and social awareness. The benefits of SEL are especially pertinent in Early Childhood Education (ECE) as children are in the critical period of development (birth to five years). Research has suggested that shared reading, a bidirectional reading strategy between teachers and students, has demonstrated the potential to sustainably integrate SEL into ECE curricula through literacy. However, literacy programs have often been criticized for their lack of equitability, and failure to consider the needs of students from marginalized communities, who face increased developmental risk factors. Furthermore, those who possess overlapping marginalized identities (e.g., racial and socioeconomic status) remain the most at risk for underdeveloped literacy skills. Transformative equity-based SEL takes these intersectional identities and systemic barriers into consideration. This paper will utilize a sociocultural perspective to draw from the current empirical literature to critically examine the advantages and limitations of shared reading as a literacy-based SEL tool. Moreover, this paper aims to guide future research in improving the equitability of shared reading and expanding the impact of SEL to promote inclusivity in ECE.

MAKENA JOHNSON

Thesis Advisor: Dr. Rebekah Wanic, Psychological Sciences

The Effects of Classroom Integration on Children with Autism Spectrum Disorder

Inclusion refers to the practice of fully educating students with special learning and/or behavioral needs within the traditional classroom. Such students participate in age-appropriate classes for the entirety of the school day, integrating them into the general school program with the intent to foster successful academic and social outcomes. Because inclusion is often driven by the desire to promote social integration, disorders that involve social dysfunction may be associated with additional challenges that hamper any potential inclusive benefits. Autism spectrum disorder (ASD) is one such candidate. This literature review aims to integrate research exploring the impact of separating or including children with ASD from mainstream classrooms, focusing on outcomes of academic performance, emotional well-being, and social skills. In addition to exploring child outcomes, this review will also offer evidence on how separation or inclusion might also impact educators, parents of children with ASD, and classmates. The literature review is augmented by interviews provided by special education providers (n= 4) for a qualitative account of their perspective on inclusion and its impact. Both qualitative and quantitative assessments coincide to provide support for exclusion in contributing to social stigma and impaired social development. Educational policies and practices that foster inclusive environments support the diverse needs of all students that can support both academic and social achievements.

LUCIE RUSSELL

Thesis Advisor: Dr. Rebekah Wainc, Psychological Sciences

Addressing the Opioid Epidemic in America: Integrating Patient and Prescriber Education Programs

The United States is facing a massive problem of substance abuse and overdose deaths, in a significant public health crisis referred to as the opioid epidemic. From the lens of psychology, the present study aims to comprehensively analyze the opioid epidemic in the United States, identifying best practices for addressing the crisis. Namely, I explore how opioid abuse and overdose can be prevented by focusing on education for patients being prescribed opiates and physicians prescribing them. This paper will discuss the effectiveness of patient education programs, which involve providing naloxone education to individuals when prescribed painkillers. It will also explore how more regulations and standardization surrounding opiate prescription could be beneficial. Presently, general awareness – of the opioid epidemic, the potential harms of opioids, and naloxone – has been established in the American public. General public awareness campaigns are well-intentioned, however, resources could be better allocated to mitigate overdoses at the source. I aim to show how patient education programs and prescriber regulation may be a more effective use of resources, preventing overdose for the most susceptible group of people. The opioid epidemic, a pressing public health crisis in America, is an incredibly complex issue that requires complex solutions. Rather than further funding general public awareness campaigns, resources may be better allocated towards solutions that address the systemic nature of the issue, like patient education programs and prescriber regulation. These initiatives will help us move forward as a society toward ending overdose.

REAL ESTATE

SYDNEY MADELINE BUI

Thesis Advisor: Roger Simsiman, Real Estate

Balancing Profit and Impact in Indonesia's Affordable Housing: A Real Estate Development Proposal

This presentation focuses on illuminating how private developers can partner with public entities to provide quality affordable housing while maximizing profit for a sustainable development cycle. According to the World Economic Forum, "The United Nations estimates that 1.6 billion people do not have access to adequate housing and this number is expected to grow to 2 billion by 2030," (Nita Bhalla, 2023). This equates to every person in the United States not having access to adequate housing five times over. Although this is a global issue, this thesis focuses specifically on the market of affordable housing in Indonesia using the United States as a comparative country. By comparing the main challenges to affordable housing developments and government programs for assistance, this thesis draws out socioeconomic and culture-focused recommendations for how to improve private-public partnerships to close the gap of inadequate supply. Through this framework, this thesis utilizes a physical site in Indonesia to offer a real estate development that implements the research program that would contribute to a balanced solution for profit and impact. From idea inception to feasibility, this real estate development proposal will prioritize building an affordable housing development ground up as a private developer in Indonesia. The goal of this proposal is to encourage a path for more private developers to follow suit in adding to the global supply of affordable housing.

MONICA WISHARD

Thesis Advisor: Dr. Charles Tu, Real Estate

Has Office Left Its Previous Glory Days: Insights in the Past, Present, and Future of the Office Sector in the United States

Office has been one of the four core types of commercial real estate due to its popular demand at the center of bustling downtown economies; however, since the pandemic it has encountered difficulties in reaching its previous positive returns. Now professionals are questioning whether it will ever return to its previous 'glory days' with hybrid and remote working still being preferred by employees. Office has been in a precarious position but in real estate that could also mean great opportunity for those who can see a vision. This project provides insights into additional investments that may have been overlooked with the economic position the office has been in since the pandemic. By delving into how office had once soared, where it currently is, and future possibilities, this paper will demonstrate the opportunity for investing in office commercial real estate.

SOCIOLOGY

NATALIE WRIGHT

Thesis Advisors: Dr. Julia Cantzler and Dr. Greg Prieto, Sociology

The Influence of Parental Socialization on the Generational Gap Between Mothers and Their Daughters in Attitudes Toward Heterosexual Relationships

Growing literature about women's inclination towards patriarchal models of heterosexuality brings about questions regarding the sexual socialization of children. Varying attitudes around relationships between mothers and daughters represents an intergenerational gap relating to dating and sexual culture. The overarching theme in this continuing inquiry regarding women relates to the factors that impact their reasons for participating in heteronormativity. Then when faced with a series of potential violence, control, diminishment, and disappointment, the question turns to why women stay. I hypothesize that the reason women participate heterosexual culture despite its overwhelming evidence of displeasure, as demonstrated in the literature, is because they are socialized as such. Many socialization sources reinforce heteropatriarchy as ideal, though I argue that is the parental socialization piece that directly draws young women into this cycle of toxic heteronormativity. This research study aims to make meaningful connections between parental socialization from mother to daughter and the opinions that women hold on their participation in heteropatriarchal models of relationships. Through a series of one-on-one interviews with mothers and college-aged daughters, I will illuminate the ways in which parental socialization is one of the various ways in which young women's attitudes toward heterosexual relationships are shaped.

THEATRE

SYD GAGER

Thesis Advisor: Robin Roberts, Theatre

A Guide to Stage Management at USD

Stage managers are responsible for the flow of information that determines if a theatrical production will succeed. Here at USD, student stage managers work directly with faculty members in production meetings, but must learn on the job exactly what is expected of them as there is no faculty member that directly oversees stage managers. This guide aims to fill this gap and will largely focus on the importance of the stage manager's communication in differing ways, such as the rehearsal reports, production meetings, run sheets, and in the rehearsal room. By collating my years of experience into a guide, I hope to make the transition for students into the role of stage manager easier and leave behind a living document that future stage management students can add to with their own experiences.

THEOLOGY

SEAN BILLINGS

Thesis Advisor: Dr. Mary Doak, Theology and Religious Studies

An Exploration of the Heart and Its Relation to Truth, Goodness, and Beauty

This presentation will be an examination of the affective capacity of the human person, otherwise known as the "heart," and how it relates to the human search for truth, goodness, and beauty. In the history of philosophy, oftentimes the role of affectivity within the person has been overlooked. While humanity's intellectual and volitional powers have been widely discussed by philosophers, there remains much confusion about how a person's feelings should be integrated as they go about attempting to live a fulfilling life. The presentation will aim to provide clarity regarding the roles of the intellect, will, and heart, their relation to the person's psychological life, and how they are meant to work together in their pursuit of the transcendentals of truth, goodness, and beauty. As mentioned, there will be a particular emphasis on the role of the heart, and this will be fleshed out using the personalist philosophy of Dietrich von Hildebrand. The presentation will offer a critique of von Hildebrand's thesis, highlighting points of agreement and disagreement between him and the presenter. The end of the presentation will explore the theological implications that this particular view of human nature has on a person's relationship to the Trinity. Finally, it will claim that these trinitarian structures of intellect, will, and heart and truth, goodness, and beauty can lead a person to a greater belief in and relationship with the Trinity that is professed in Christian theology.