March 3, 2023

Welcome all student participants, faculty mentors, judges, and other guests attending the Annual Student Symposium on Research, Scholarship, and Creative Activity. This annual event allows undergraduate and graduate students to present their research and scholarly work in a public forum similar to a professional research conference. Students' work spans a wide range of disciplines and represents the dedicated efforts of the many individuals involved in ground-breaking and innovative research and scholarly activity on our campus. We feel you will agree the research and scholarly activities shared today present evidence of the high standards and academic quality of our university.

This year's symposium features 142 oral presentations and poster exhibits. We invite you, first, to choose from among the seven groups of oral presenters at the University-Student Union. Then, you may explore the poster exhibits in the Golden Eagle Ballrooms, where you can interact with the many student researchers who are exhibiting their work. Last but not least, join us for the reception at Golden Eagle Ballrooms in the afternoon.

Each year, winners of the Cal State LA Symposium will go on to represent our campus in a competition with representatives of the other California State University campuses. We know our campus will excel again this year at the statewide competition which will be held at San Diego State University on April 28 and 29, 2023.

We are pleased that you have chosen to be part of this exciting day, and we hope that you enjoy, learn, and are impressed by the many examples of student achievement. We wish each participant the best, academically and personally. To the faculty mentors and others attending this Symposium, please accept our sincere appreciation for your role in supporting and guiding our next generation of creative individuals, scholars, and scientists.

Jeffrey Underwood
Associate Vice President for Research

Jason Shiotsugu
Director of Research

Symposium Schedule

ORAL PRESENTATIONS

8:45 AM - 12:00 PM University-Student Union, 3rd Floor

POSTER PRESENTATIONS

11:00 AM - 1:00 PM Golden Eagle, 3rd Floor, Ballroom 3

RECEPTION

3:30 PM – 5:00 PM Golden Eagle, 3rd Floor, Ballroom 2
Awards Reception will begin at 4:00p.m.

Group 3 ▪ Humanities and Letters I
▪ University-Student Union – Boardroom South Room 303A

8:45 Dominic Sheehan
9:00 Jennifer Johnson
9:15 Jasmine Juette
9:30 Diana Gavidia
Break 9:45 – 10:00
10:00 Josephine Thilo Yasuda
10:15 Esmeralda Del Rio
10:30 Tania Galvez
10:45 Selena Morentin
Break 11:00 – 11:15
11:15 Diana Ponce
11:30 Katherine Lainez

Group 4 ▪ Humanities and Letters II
▪ University-Student Union – Los Angeles C Room 308C

8:45 Cole Costello
9:00 Elisa Holley
9:15 Karina Gutierrez
9:30 James Carter
Break 9:45 – 10:00
10:00 Gloria Sosa
10:15 Robert Coronado, Jr.
10:30 Monica Alvarenga
10:45 Hazel Carias-Urbina

Group 5 ▪ Engineering and Computer Sciences I
▪ University-Student Union – Los Angeles A Room 308A

9:00 Cesar Leal
9:15 Luis Sosa
9:30 Elizabeth Nunez
9:45 Anayely M. Saguilan
Break 10:00 – 10:15
10:15 Allan Hernandez
10:30 Britney Gallego, Andy Damas, Richard Damas, Christian Chavez, and Kevin Pang
10:45 Nicholas Gerlits
11:00 Yousef Ajrab

DR. RAYMOND GARCIA POSTER SESSION

11:00 a.m. – 1:00 p.m. Golden Eagle, 3rd Floor, Ballroom 3

Behavioral and Social Sciences

1. Angela Shi
2. Sarah Schuster
3. Villiam Ralica, Sabrina Zambon, and Aida Benitez
4. Victor Pinzon Gonzalez
5. Brittany Margulieux
6. Krystine Curtis

7. Sabrina Zambon, Ivan Cobian, and Villiam Ralica
8. Dana Yassin
9. Darlene Ramirez, Melissa Rios, and Shelby Detweiler
10. Karina Olmos and Andrea Manzur
11. Ethan Lamborn
12. Ivan Cobian
13. Nakyah Bourgeois

14. Crystal Wu
15. Yolanda Estela Segura
16. Amber Pereira and Kazi Salsabil
17. Briana Martinez
18. James Hummel
19. Kimberly Conde

20. Jiawei Xiang
21. Katherine Lainez
22. Lami Glenn
23. Mary Donelan
24. Jarenni Ambriz

Engineering and Computer Science

45. Janice Nguyen
46. Abigail Martinez, Erick Carmona, Nicholas Pimentel, and Gustavo Magana
47. Melody Hashemian, Brandon Wilson, Liana Zhu, Sophia Sherzai, Alex Sherzai, Alex Gaeta, Brayan Salgado, Ashley Lewelling, Kody Woo, and Suvam Patel
48. Erick Carmona, Michael Zitzer, Muzna Shafqat, Laura Fredericks, and Sebastian Luna
49. Catalina Lee
50. Aishwarya Gupta, Rahul Bhogale, and Priyanka Thota
51. Stephen Finn
52. Stellina Ao and Gregory Sercel
53. Lekha Ajit Kumar, Dauren Omarov, Sushmitha Dandu, and Navyasree Sriramoju

54. Liana Zhu
55. Anthony Trujillo
56. Aliannea Sherman
57. Adolfo Retana
58. Michael Maciel
59. Matthew Engquist and Amir Shakibi
60. Cesar Cerda Solorio

61. Jinwei Zhang and Estefani Ontiveros
62. David Strickland and Suthawit Udomnopwitthayakul
63. Deep Bhakta, Anayely Saguilan, and Roger Roldan
64. Isaac Aldape Torres

Health, Nutrition, and Clinical Sciences

65. Sydney Tan
66. Ignacio Montoya
67. Megan Mendoza, Sahiba Aggarwal, James Bagsic, Lilyann Hopkins, and Jessica Wu
68. Mohamed Khalil, Leticiana Conover, Birgitta Martinez, Jasmin Ha, and Bryanna Avina
69. Ceren Acik

Physical and Mathematical Sciences

70. Dennise Valadez
71. Rhemrose Sabio, Nidhi Lakshmanan, and Tarrah Bubenik
72. Elena Mosham and Kelly Nguyen
73. Cathy Lam, Anthony Segura, Jacky Chan, and Rayana Ramirez
74. Arianna Camarena

75. Matthew Perez
76. Juliann Panehal
77. Timothy Harris
78. Jonah Baughman, Cristian Reynaga Gonzalez, and Henry Bagramyan

Etim Ndifreke	Public Health
Michele Nicolo	Kinesiology and Nutritional Science
Socorro Orozco	Curriculum & Instruction
Andrea Ostorga	Engineering
Henry Phan	Finance, Law, and Real Estate
Edith Porter	Biological Sciences
Mijanur Rahman	English
Leila Rahnama	Kinesiology and Nutritional Science
Gustavo Ramirez	Biological Sciences
Karina Rebolledo	Communication Studies
Joshua Ruffin	Criminal Justice and Criminalistics
Melanie Sabado	Public Health
Jeffrey Santer	Mechanical Engineering
Tatev Sarkissian	Psychology
Sue Saul	Anthropology
Caitlin Scott	Chemistry & Biochemistry
Jason Shiotsugu	Office of Research, Scholarship, and Creative Activities
Jeffrey Underwood	Office of Research, Scholarship, and Creative Activities
Leonor Vazquez	Child and Family Studies
Ericka Verba	Latin American Studies
Petr Vozka	Chemistry & Biochemistry
Sen Wang	Computer Science
Stacey Warner	Nursing
Xin Wen	Chemistry & Biochemistry
Howard Xu	Biological Sciences

This list was created on 03/02/2023; we apologize if you have been omitted.

Break 11:00 – 11:15

11:15 **Veronica Varner**
Master of Social Work
Anti-Recidivism Coalition Women's Department: Women Members Needs Assessment
Faculty Mentor: Dr. Anh-Luu Huynh-Hohnbaum

11:30 **Cristina Zetino**
M.A. Psychology
Right-wing Authoritarianism as a Mediator between Religiosity and Racism toward African Americans
Faculty Mentor: Dr. Heidi Riggio

11:00 **Cassandra Tamayo and April Marangco**
B.S. Public Health
Health Promotion Intervention for Students with Eating Disorders
Faculty Mentor: Dr. Behjat A. Sharif

11:15 **MaryJay Villavicencio**
B.A. English
Presenting an engaged classroom assignment developed through analysis and careful consideration of previous research to progress a culturally-responsive pedagogy in introductory English courses
Faculty Mentor: Dr. Danelle Dyckhoff Stelzriede

11:30 **Aishwarya Sonawane and Akshata Kadam**
MS in Healthcare Management
Proposal of a Queue Management System (QMS) to reduce hospital emergency department wait time.
Faculty Mentor: Barrington Hunt

11:00 **Selena Morentin**
M.A. Sociology
The Gays are Coming! The Gays are Coming!: A Historical Analysis on the Origins of Criminalizing Homosexuality in the United States From Colonistic Times to Present
Faculty Mentor: Dr. Gabriela Fried Amilivia

11:15 **Diana G. Ponce**
M.A. Chicana/o/x Latina/o/x Studies
Reimagining the U.S. Medical Education Pipeline (LatinxMEP): A Critical Intersectional Analysis of the Latina/o/x MEP
Faculty Mentor: Dr. Anita Revilla Tijerina

11:30 **Katherine Lainez**
M.A. Latin American Studies
The Erosion of Family Caused by 'Land Grabbing' in Honduras: Migration, Gendered Expectations, and those left-behind in Honduras.
Faculty Mentor: Dr. Enrique Ochoa

Group 5 ▪ Engineering and Computer Sciences I
▪ University-Student Union – Los Angeles A Room 308A

9:00 **Cesar Leal**
B.S. Civil Engineering
Developing a Partial Drainage Filter for Offshore Wind Turbine Foundation
Faculty Mentor: Dr. Wing Shun Kwan

9:15 **Luis Sosa**
M.S. Civil Engineering
Single degree of freedom analysis of tunnel liner and soil behind the liner
Faculty Mentor: Dr. Tonatiuh Rodriguez-Nikl

9:30 **Elizabeth Nunez**
B.S. Civil Engineering
The Effect of Wildfires on the Properties of Clay – Civil Engineering Point of View
Faculty Mentor: Dr. Wing Shun Kwan

9:45 **Anayely M. Saguilan**
M.S. in Mechanical Engineering
Fuzzy Control Strategies of an Inverted-Pendulum on a Cart
Faculty Mentor: Dr. Arturo Pacheco-Vega

Break 10:00 – 10:15

10:15 **Allan Hernandez**
M.S. Mechanical Engineering
Laminar Burning Velocity Measurements for Reaction Rate Characterization
Faculty Mentor: Dr. Jeff Santner

10:30 **Brittney Gallego, Andy Damas, Richard Damas, Christian Chavez, and Kevin Pang**
B.S. Mechanical Engineering
An Engineering Solution to a Cryogenic Mirror Suspension
Faculty Mentor: Dr. Harry Themann

10:45 **Nicholas Gerlits**
M.S. Mechanical Engineering
Electrochemical conditions and it's effects on electrochemical 3d printing of nickel
Faculty Mentor: Dr. John Christopher Bachman

11:00 **Yousef Ajrab**
M.A. Materials Science and Engineering
Evolution of the mechanical properties of biodegradable materials with respect to time and aspect ratio
Faculty Mentor: Dr. Mathias Brieu

Group 7 ▪ Biological Sciences
▪ University-Student Union – Los Angeles B Room 308B

8:45 **Shanti Raminani and Cindy Nguyen**
B.S. Biochemistry; B.S. Biochemistry
Investigating the Effects of Thermolysis on the Purification of Recombinant Antifreeze Proteins
Faculty Mentor: Dr. Xin Wen

9:00 **Harry Bevir**
M.S. Biological Sciences
Dynamic localization of circadian clock proteins Rbp2 and KaiB in cyanobacteria
Faculty Mentor: Dr. Susan Cohen

9:15 **Helen Nguyen**
M.S. Biological Sciences
Testing the keystone-molecule hypothesis: Do defensive chemicals from a common gastropod alter estuarine communities?
Faculty Mentor: Dr. Patrick Krug

9:30 **Dana Abou Abbas**
M.S. Biological Sciences
Antimicrobial Effector Molecule Response in Alveolar Type II Cells after Stimulation with the TH17 Cytokines IL17 and IL22
Faculty Mentor: Dr. Edith Porter

Break 9:45 – 10:00

10:00 **India Wesley-Cardwell, Dana Abou Abbas, and Janette A. Dzul**
B.S. Biological Sciences, Option in Microbiology
Title*: Effect of TH 17 cytokines on the antimycobacterial activity of lung epithelial cell secretions*
Faculty Mentor: Dr. Edith Porter

10:15 **Akalpit Shukla**
B.S. Biochemistry
A Tightly Folded Antifreeze Protein Resists Trypsin Digestion
Faculty Mentor: Dr. Xin Wen

10:30 **Jin Hyeok Yoon**
M.S. Chemistry
Regiochemistry of the Singlet Oxygen Ene Reaction in Metal-Organic Frameworks
Faculty Mentors: Dr. Mathias Selke and Dr. Yangyang Liu

10:45 **Alfredo Gonzalez**
B.S. Exercise Science
Investigating delta-tocotrienol as an inhibitor of oxidative phosphorylation in HER2+ breast cancer.
Faculty Mentor: Dr. Anureet Kaur

Break 11:00 – 11:15

11:15 **Stacey Lau**
B.S. Food Science and Technology
Effect of Transglutaminase Treatment on Rice Protein Functionality
Faculty Mentor: Dr. Sunil Mangalassary

Abstracts of Oral Presentations

Group 1 ▪ Behavioral and Social Sciences I
▪ University-Student Union – Alhambra Room 305

Alejandro Hernandez
M.A. Psychology
Perceptions of Interethnic Couples Among Latinx American College Students
Faculty Mentor: Dr. Heidi Riggio

Individuals in interracial relationships may experience stigmatization from family, friends, and the general public, with stigmatization associated with anxiety and depressive symptoms (Rosenthal, 2019). Riggio and colleagues (2012) found that Latinx participants' showed more negative evaluations of interethnic couples compared to evaluations of intraethnic couples, especially when the female partner was Latinx and a male partner was African American. In a replication of Riggio et al. (2012), this study examines perceptions of interethnic couples by Latinx college students, and links such perceptions to social attitudes linked with hierarchical orientation, (social dominance orientation, right-wing authoritarianism). Students completed anonymous online surveys, including measures of social dominance orientation, right-wing authoritarianism, and an impression formation task focused on a couple described in a scenario (with racial make-up of the couple manipulated). Results indicate that participants form the most negative impressions of couples where the female partner is Latinx and the male partner is Asian American. More negative impressions of interethnic couples are linked with greater social dominance orientation and greater right-wing authoritarianism. Results are discussed in terms of social identity theory (Tajfel & Turner, 1982).

Erika De La Torre
M.A. Psychology
Sexual Communication among Young Adult Siblings: Links with Sexual Outcomes
Faculty Mentor: Dr. Heidi Riggio

Communication about sexuality occurs within parent-child relationships and in relationships with peers (Jerman & Constantine, 2010). The effectiveness of these conversations in predicting and influencing safe sex behaviors is not yet clear. Research indicates positive relations between communications with parents and attitudes about contraception and safe sex, especially communication with mothers (Harris et al., 2013; Riggio et al., 2014). Other research indicates that for 9th graders, knowledge about sex from parents, peers, and siblings predicted safer sex practices and fewer pregnancies (Secor-Turner et al., 2011). Although relationships with siblings are the longest relationship for most people that spans across one's lifetime (Cicirelli, 2013), research examining communications with siblings about sex and sexuality is lacking. This study examines communications with siblings about sexuality and how such communications and quality of relationships with siblings link to attitudes toward sexuality and sexual outcomes. Students completed an anonymous online survey examining communications with siblings about sex, quality of sibling relationships, and sexual outcomes (attitudes toward condom use, hooking up behaviors, sexual shame). Results indicate significant correlations between greater communication with siblings about sex and more positive sexuality attitudes and outcomes. Results are discussed using family systems theory (Rothbaum et al., 2002).

Teresa Virgen and Aundia Dianat
M.S. Forensic Psychology
Dynamics Between Defendant Race, Victim Race, and Racial Identity on Verdicts of Hispanic Mock Jurors
Faculty Mentor: Dr. Mitchell Eisen

Previous research has demonstrated that mock jurors are more lenient towards defendants of the same race (in-group) and less lenient towards defendants of a different race (out-group), a phenomenon known as the same-race leniency effect. Pilot work found that racial identity of mock jurors has a moderating effect on same-race leniency. The current study examined the same-race leniency dynamics between victim race, defendant race, juror race, and racial identity. Hispanic participants were randomly assigned to read one of four trial case summaries: White Defendant/White Victim, Hispanic Defendant/Hispanic Victim, White Defendant/Hispanic Victim, or Hispanic Defendant/White Victim. It was hypothesized that participants who had higher racial identity would demonstrate more leniency toward an in-group defendant than an out-group defendant. As expected, results revealed that Hispanic mock jurors were more

Group 3 ▪ Humanities and Letters I
▪ University-Student Union – Boardroom South Room 308A

Dominic Sheehan
M.A. History
Defining Thirdteenth-Century Chivalry: Crusader Justification for the Fourth Crusade, 1198-1204
Faculty Mentor: Dr. Scott Wells

I will connect chivalry and the Fourth Crusade in my paper. My main argument is that the crusaders used the practice they claimed as "chivalry" as the primary justification for the outcome of the Fourth Crusade. The concept of chivalry was in its infancy during the thirteenth century, and it took until the fifteenth and sixteenth centuries for it to gain popularity all over Europe. Chivalry set the baseline for how crusaders understood their warrior ideology. To the crusaders during the Fourth Crusade, chivalry was about camaraderie, the shedding of enemies, and one's blood in the name of Christ. The paper explores the separate topics the practice of chivalry and the event known as the Fourth Crusade, combining them in a way other historians have not. The complexities of the Fourth Crusade enable the study of how warriors justified their actions when their higher purpose became unachieved.

Jennifer Johnson
M.A. Television, Film and Media
Origins of Inequity: Women's Pictures & Vanishing Female Creative Labor
Faculty Mentor: Dr. Suzanne Regan L. Hayes

Although women played a significant role in early film history, female creative labor is largely overlooked and even erased from the beginnings of Hollywood. This study focuses on what happened in the industry that made filmmaking a “boys club” and how that legacy disempowers both female creators and female audiences, then and now. This research focuses on the state of the industry in the 1930s/40s, the “ideal” audience, and the creation of women’s pictures. While women’s pictures provided an opportunity for women to feel seen, these films were often more limiting than empowering. The film Gaslight (1944) is used in this paper as a case study for the absence of women behind the camera. The methodology used is an exploration of the public discourse surrounding Gaslight, the evidence was gleaned from newspaper reviews and articles in 1940s. Ironically, while women were being edged out from behind the camera, studios wanted to fill the seats with female patrons because they were the ideal clientele. Therefore, the 1930s/40s saw a missed opportunity for Hollywood. The studios were desperate to attract female audiences but did so by giving men the power to write and direct these stories.

Jasmine Juette
M.A. Anthropology, Option in Biological Anthropology
Organizing Chaos: What We Can Learn from a Subsample of Commingled and Fragmented Human Skeletal Remains
Faculty Mentor: Dr. Michele Bleuze

The Midnight Terror Cave (MTC) in Belize has produced an osteological assemblage of over 10,000 commingled and fragmented bones making needed research hard to identify. This study approaches such a large assemblage from a perspective of a subsample to identify possible research topics without analyzing the entire sample. The goal is to determine limitations and benefits of doing this style of analysis. The benefits to doing this type of study include a source for interobserver data, contextualizing areas of the cave, identifying the possible range of pathology, activity, and taphonomy, and the attention to detail that can be paid to individual bones that might otherwise be lost in population studies.

Diana Gavidia
M.A. History
Women and Popular Organization: Changing Roles and Opportunities for Women in El Salvador, 1965 - 1980
Faculty Mentor: Dr. Enrique Ochoa

While the current historiography on women in revolutionary movements in Latin America focuses on masculine interpretations of women's entry into armed guerilla struggle and their motivations, this paper centers on a feminine examination of women's organizing efforts in the community examining their participation in organizing others in the workplace and the communities in which they reside. An understudied and vital period in the history of El Salvador and its women remain largely unexamined. Despite a growing body of literature on revolutionary movements and the Salvadoran Civil War, scholars have largely neglected the decades before the outbreak of hostilities in 1980. This paper explores the roles and participation of women in popular peasant, labor, and teacher

enslaved people and Native Americans facing genocide. It is here where we see the formulation of the harmonic "rules" that music students learn in "music theory" classes. What's more is that music academics in the Western world operating from an archaic historiography reflexively compare music from diverse peoples and cultures to the music from this period in European history. The music of a handful of 17th century musicians, in undergraduate education, is often seen as the cultural default not just for Western harmonic traditions but for music of the world's music. This work will examine the musical elements of the "Baroque" period and critically examine why this music in particular is presented as the default for nearly all music humans make in Western academic institutions.

Gloria Sosa

M.A. Anthropology
Decolonizing Research Through the Analysis of Undoculeaders Oral Histories
Faculty Mentor: Dr. Ester Hernandez

This paper contributes to the decolonization of academic research by examining oral histories addressing ignored experiences that motivated undocumented students to organize and become leaders in their communities despite their vulnerable positionality. The undocumented students' movement narrative has been thoroughly researched from an ally perspective and an autoethnographic approach. I argue that oral histories provide a holistic approach to investigating the role of activism in undocumented leaders' professional and personal development. Analyzing eight oral histories and using a critical race theory frame, I contend that undocumented student activists' leadership inspired profound changes in the ways community members advocate for themselves by contesting their liminality.

Robert Coronado, Jr.

M.A. History
Finding Rome in Michoacán: The Relación and the Spanish Renaissance in 16th-century New Spain
Faculty Mentor: Dr. Manuel Aguilar-Moreno

The Renaissance is often analyzed as a solely European event, but building on the work of scholars such as Walter D. Mignolo and Andrew Laird, I argue in my paper that the influence of the Renaissance can also be seen across the Atlantic in the imperial efforts of the Spanish Empire, particularly those in New Spain (modern-day Mexico) in the 16th-century. When analyzed through the lens of the Renaissance, the 16th-century colonial codex, The *Relación de Michoacán* (The Tale of Michoacán), reveals Spanish efforts to evoke the legacy of the Roman Empire and use Renaissance ideals in the colonization of the Purépecha people of Michoacán. Using the codex and other 16th-century Spanish accounts of New Spain, such as those of Hernán Cortés, Bartolomé de las Casas, and Francisco López de Gómara, I argue that these efforts are most evident in the superimposition of Latin principles onto the written portions of the Purépecha language in the codex; the use of Roman iconography in the codex's illustrations; and the application of Renaissance humanist ideals in the codex's narrative of the history of the Purépecha people, as well as other 16th'century accounts of the conquest of Michoacán.

Monica Alvarenga

B.S History
Red Among the Gold: The Violent Expulsion of Indigenous Peoples During the California Gold Rush
Faculty Mentor: Dr. Camille Suarez

An estimated 120,000 of 150,000 indigenous people were eliminated within Californian state boundaries between 1848 and 1869. Historians are still piecing together the story of mass elimination to answer the question of how this took place. My research investigates Northern California during the rise of the Gold Rush. I focus on two key elements involved in the Gold Rush— Anglo-American immigrants and the California State government—to piece together an overlooked history of discrimination, violence, and rapid expulsion of indigenous communities. Building on the historical research of Brendan Lindsay's *Murder State: California's Native American Genocide* and William Simmons' *Contested Even: California Before the Gold Rush*, I use first-hand accounts of American immigrants, state documents, and newspapers to uncover the key ingredients that drove Americans to displace indigenous people violently and mercilessly within the span of two decades.

Hazel Carias-Urbina

B.A. History, Minor in Latin American Studies
Conspirando en Los Angeles: History of Central American Solidarity Organizing at MacArthur Park
Faculty Mentor: Dr. Camille Suarez

I argue that political organizing in 1980s MacArthur Park transformed its spatial and cultural meaning into a site of resistance and civic life for the local Central American community. Using a combination of archived photographs and newspaper articles from Calisphere, the Historical Los Angeles Times, and La Opinion, I identify multiple political protests during the 1980s that reveal the important political issues within the Central American community. By uncovering who got involved in protests and how the park was used, it reveals how the recreational area gave opportunities to repressed

Central American immigrants to organize and advocate for peace in their home countries, which extended in their participation in other leftist movements in Los Angeles against Reagan era policies. My research adds to the existing literature about the Sanctuary Movement and late-20th century Los Angeles history by detailing how these demonstrations played an influential role in affecting local immigration and labor policies, as well as establishing a robust immigrant community in the city.

Group 5 ▪ Engineering and Computer Sciences I ▪ University-Student Union – Los Angeles A Room 308A

Cesar Leal

B.S. Civil Engineering
Developing a Partial Drainage Filter for Offshore Wind Turbine Foundation
Faculty Mentor: Dr. Wing Shun Kwan

The goal is to present an iterative method for customizing a partial drainage filter using needle valves. A series of tests were performed to determine how the flow rate at multiple pressures was affected by one, two, and three valves. The purpose of the partial drainage filter is to simulate situations of excess water pressure generation or dissipation in soil, representing more realistic field conditions. Simulating the natural behavior of soils is essential during laboratory testing to obtain accurate soil parameters for foundation design. The results show that a single needle valve does not provide sufficient flow resistance to reach partial drain conditions. Adding a second valve in series significantly increases the flow resistance opening the possibility for partial drain conditions. The results also show that adding a third needle valve in series has no significant effect on the resistance to flow.

Luis Sosa

M.S. Civil Engineering
Single degree of freedom analysis of tunnel liner and soil behind the liner
Faculty Mentor: Dr. Tonatiuh Rodriguez-Nikl

The purpose of the study was to model the maximum displacement of tunnel liner loaded by an explosive charge using a simplified single degree of freedom approach implemented in Matlab. The interest of this study came from the alarming amount of Improvised explosive device (IED) and vehicle borne Improvised explosive device (VBIED) being used to target passages of transportation like tunnels and subways. In contrast to previous single degree of freedom models, the soil behind the liner was explicitly modeled using an elastic foundation. The model considers 6 parameters for the liner, charge, and soil and outputs the displacement history of a reference point on the liner. The model was verified against results in the literature. Following verification, a sensitivity analysis was conducted to determine which parameters had the greatest influence on the maximum displacement. My role is to begin building the model, develop the model with linear parameters while subsequent work will include nonlinear and hysteresis parameters.

Elizabeth Nunez

B.S. Civil Engineering
The Effect of Wildfires on the Properties of Clay – Civil Engineering Point of View
Faculty Mentor: Dr. Wing Shun Kwan

Wildfires are one of the most common natural disasters California endures yearly. The damages above the ground surface are visible and can easily be seen. However, the damages done below the ground surface are not. This research explores the response(s) of reconstituted clay samples due to simulations of wildfires in the lab using a burn gun for control burning. Wildfires can alter the mechanical properties of soil, and it is essential to know what those changes are for civil engineers to act appropriately to prevent mudslides and cause any further damage to the surrounding area. We used geophysical methods, bender element and electrical resistivity, to detect the change of soil properties before and after control burning, and our results show there are noticeable changes.

Anayely M. Saguilan

M.S. in Mechanical Engineering
Fuzzy Control Strategies of an Inverted-Pendulum on a Cart
Faculty Mentor: Dr. Arturo Pacheco-Vega

In this work, we develop intelligent control strategies based on the fuzzy logic technique, which has the ability to describe complex systems via linguistic variables and human-defined rules, to stabilize an inverted pendulum located on top of a cart. This system is set up such that the mass of the pendulum is able to revolve around a hinge located on top of the cart. Two potential steady states for the system are possible: a stable downward position and an unstable upright position. To describe the dynamics of the system, a mathematical model consisting of two coupled second order non-linear differential equations were first set up and then converted into a set of four first order non-linear differential equations. For control purposes, three different fuzzy logic-based controllers - each including an increasing amount of information about the pendulum position, the position rate of change, and its corresponding averaged integral - were built and applied to stabilize the inverted pendulum-mass system in its upright position. Although all controllers performed well, it was found that controller performance improved by increasing the information about the system dynamics provided to the controller. Results demonstrate that it is possible to control in effective manner mathematical representations of mechanical systems through linguistic based control strategies.

Allan Hernandez

M.S. Mechanical Engineering
Laminar Burning Velocity Measurements for Reaction Rate Characterization
Faculty Mentor: Dr. Jeff Santner

Combustion is an integral part of our society utilized daily having drawbacks in its inefficiency. The after-products of the process are greenhouse gas emissions which are also responsible for deteriorating the ozone layer, human, and biological health. Combustion chemistry models, which describe and predict the chemical kinetics of fuels, require improvement since it can lead to higher quality combustion designs. These models are important because chemical kinetics are known to majorly influence the burning velocity of fuels and predict emissions. This project will measure the laminar burning velocity of propane through the use of the externally heated diverging channel. The laminar burning velocity will be measured experimentally and then compared to established experimental data and simulations to verify the experiment setup. Verification of the diverging channel using propane allows for future testing of different fuels to improve chemical kinetic models.

Brittney Gallego, Andy Damas, Richard Damas, Christian Chavez, and Kevin Pang

B.S. Mechanical Engineering
An Engineering Solution to a Cryogenic Mirror Suspension
Faculty Mentor: Dr. Harry Themann

Following past successes in gravitational wave detection, the Capstone Senior Design team at Cal State LA is collaborating with European universities toward an engineering solution for cryogenic mirror suspensions. The requirements impose the use of monocrystalline silicon. This solution proposes two-meter-long, large cross-sections, counterweighted suspension beams combined with thin flexures working in compression to avoid the problems involved by silicon's fragility. It is intended for the Einstein Telescope, a next-generation gravitational wave observatory including three cryogenic detectors. The proposed solution optimizes, at the same time, high thermal conductivity, long pendulum lengths, and low mechanical dissipation to reduce the thermal noise of the Fabry-Perot cavities and maximize gravitational wave detectability at low frequency.

Nicholas Gerlits

M.S. Mechanical Engineering
Electrochemical conditions and it's effects on electrochemical 3d printing of nickel
Faculty Mentor: Dr. John Christopher Bachman

Additive manufacturing has become increasingly more available for commercial use, primarily with printing plastics. However, the uses for plastics are limited and the ability to easily print a wider range of materials would broaden the application of 3d printing. Electrochemical 3d printing takes metallic ion within solution and deposits the metal through electrodeposition. This research investigates different methods of electrochemical 3d printing to increase the amount of deposition from nanoscale to millimeter-scaled for nickel printing. Nickel was chosen because of its strength and resistive properties, and applications in turbines, rockets, and aerospace. The electrochemical 3d printing process used to fabricate the nickel prints for this study is meniscus confined electrodeposition (MCE). The effects of potential and time were observed on the deposition rate and morphology. The effects were evaluated through measured mass deposition, calculated mass, and measured mass of the nickel print before and after the test was run. Increasing the potential will increase the deposition rate of the nickel, especially with its

concentration around the edges of the printed area where the nickel print brakes away from the substrate. The longer tests demonstrated an increase in nickel breaking away from the substrate and increased thickness.

Yousef Ajrab

M.A. Materials Science and Engineering
Evolution of the mechanical properties of biodegradable materials with respect to time and aspect ratio
Faculty Mentor: Dr. Mathias Brieu

Biodegradable materials are widely utilized to reduce waste, particularly in the medical industry where they are preferred over biostable materials due to their biocompatibility with the body, resulting in faster recovery. These biodegradable polymers can either be derived from natural sources like collagen, cellulose, and starch or synthetic polymers made from petroleum. The degradation process of these materials has been extensively documented in literature with regards to molecular mass, weight, crosslinking density, copolymer composition, and crystallinity, but not their mechanical properties during degradation. The aim of the proposed study is to address this gap by characterizing the mechanical properties of three biodegradable materials (PGA, PGCL and PDO) as they undergo degradation. The study is conducted by testing the mechanical properties of these polymers at various stages of degradation through tensile testing. This will enable the monitoring and examination of the change in mechanical properties of these materials, leading to a deeper understanding of the degradation mechanism.

Group 6 ▪ Engineering and Computer Sciences II ▪ University-Student Union – Boardroom North Room 303

Harshil Kotamreddy

B.S. Computer Science and Mathematics
AI-based TSA Passenger Arrival Prediction
Faculty Mentor: Dr. Jiang Guo

The Transportation Security Administration (TSA) needs to be able to forecast the number of travelers that will arrive per terminal in every airport within the United States for more efficient operation. We conducted research and provided a forecasting solution that will improve TSA security checkpoint operations throughout all the airport terminals in the country. Our solution consists of a real-time dashboard that shows nationwide passenger throughput data and a forecast of future throughput. We use a ARIMA model to perform time series prediction for airport throughput.

Yougender Chauhan, Nagender Chauhan, and Suman Chauhan

M.S. Information Systems
Data and Sentiment Analysis of Amazon Book Reviews
Faculty Mentor: Dr. Jongwook Woo

This project uses the Dataset of a well-known e-commerce website Amazon.com to analyze the Sentiment of the review text and summary text of the reviews (posted by customers) of books on Amazon. When a user posts a review on amazon.com, they have the option to post the review text and summary text. Review text, as the name suggests is an elaborate review typically ranging from 1-2 paragraphs whereas summary text is a crisp description ranging between 1-3 sentences. The primary focus of this project is to analyze the reviews of the books that are posted on Amazon.com using data analysis techniques such as Sentiment Analysis, Context N gram, data visualization etc. This project provides a clear flow of handling big data files, data engineering and analysis processes using Hadoop and Hive/Beeline. In addition to that, visualization of this analyzed data is conducted using Excel and Tableau, depicting the visuals such as Line charts, bar charts, pie charts, hybrid charts etc.

Alvin Lew and Kim Kha

B.S. Computer Science; M.S. Mathematics
Mastering Modern Tetris with Multi-Agent Deep Reinforcement Learning
Faculty Mentor: Dr. Jie Zhong

Tetris is a very popular puzzle game that has evolved tremendously since its inception. Classic Tetris, the original version, has been used as a benchmark test for artificial intelligence (AI) research. However, the inclusion of piece previews, holds, block predictability, and new rotation systems have transformed modern Tetris into a significantly different game. Currently, there are a handful of search-based AI models (such as ColdClear and Zetris) that surpass human ability in modern single-player Tetris. However, due to their lack

of adaptive strategy against different opponents, they succumb to human tactics in multiplayer games. To address this shortcoming, we have designed a novel algorithm utilizing Multi-Agent Deep Reinforcement Learning (DRL) to better model modern multiplayer Tetris.

Farzana Yasmin Boby

M.S. Electrical Engineering
Comparison of activity classification performance based on internal and external accelerometry for stimulation-based Parkinson's disease therapy
Faculty Mentor: Dr. Deborah Won

To develop a closed-loop deep brain stimulation (DBS) system to treat Parkinson's disease (PD), an externally worn Apple Watch is being considered for feedback control. Here, we investigate whether accelerometers provide sufficient information to classify different physical activities and compare performance using the implanted accelerometer versus the Apple Watch. We developed a method to classify physical activity into 3 classes (rest, tremor, or non-tremor voluntary activity) based on accelerometry. During controlled validation experiments, our clustering algorithm performed with 85% accuracy with a high-end accelerometer and 75% with the Apple Watch. We applied our validated algorithm to 35 different datasets from 5 participants acceleration streamed from the RC+S (IPG) with those based on the Apple Watch during daily living activities. The classification based on the two accelerometer signals matched for 43% of the activity. Overall, the percentage of activity classified as tremor was higher in Apple Watch classification than the IPG. On the contrary, the percentage of rest was higher in IPG than Apple Watch. The results point toward feasibility of classifying activity continuously based on data streamed from an implanted accelerometer integrated in the DBS device as well as the benefit to using an implanted accelerometer versus and external accelerometer.

Larry Rodriguez

B.S. Biochemistry and Biological Sciences
Vibrational Electronic Structure Prediction via Machine Learning and Neural Networks
Faculty Mentor: Dr. Olaseni Sode

Property prediction is an important objective of computational materials science. We developed a flexible-monomer two-body carbon dioxide-rare gas (Rg-CO2) potential energy surface (PES), extending the previous work with the Ar-CO2 van der Waal (vdW) complex. We trained and validated the potential energy function (PEF) for each Rg-CO2 (Rg = Ne and Kr) through a Tikhonov regularization against a training set and validated the PES on a test set of ab initio energies. The PES was used to compute the theoretical vibrational frequencies for both complexes. We compared our theoretical vibrational frequencies to band assignments found in experimental literature. We observed splitting in vibrational frequencies of the doubly degenerate $\nu 2$ modes of CO2 in the Krypton and Neon complexes. In our current work, we are expanding to developing a neural network prediction model for molecular crystals.

Daniel Ramirez

M.S. Mathematics
Two-Compartment Pharmacokinetic Modeling of Paracetamol
Faculty Mentor: Dr. Melissa Hendrata

Paracetamol is an over-the-counter pain reliever that is primarily used to treat acute pain but has also been used in opioid sparing regimens for postoperative patients. Paracetamol has been observed to offer the same pain-relieving effects taken orally as when it's administered intravenously. Understanding how the body processes this drug allows individuals to make informed decisions on how to appropriately administer oral dosages when treating non-severe level pain. Using a two-compartment pharmacokinetic model expressed by a system of first-order ordinary differential equations, the concentration of paracetamol is calculated in different bodily compartments over time. This model demonstrated that the average adult experiences a maximum concentration of 18.4 mg/L in 1 hour and 15 minutes and drops to 0.016 mg/L after 7 hours in the body's vital compartment after a 1000 mg oral dose. After a 2000 mg single dose, the max concentration was 36.8 mg/L and took 8 hours to drop to 0.015 mg/L. Observing the body's response to a single dose, we can determine the optimal frequency and strength of the following doses to ensure the drug's concentration is at least 12 mg/L to treat medium-level pain while not exceeding 4000 mg in a 24-hour period.

Cristian Reynaga Gonzalez, Henry Bagramyan, and Jonah Baughman

B.S. Physics
Synthesis and Characterization of Magnetic Nanoparticles Coated by Carbon for Biomedical Applications.
Faculty Mentor: Dr. Armen Kocharian

The development of novel magnetic nanoparticles (MNPs) with sustainable biocompatibility and high efficiency of thermal energy transfer suitable for use in magnetic fluid hyperthermia has been the subject of extensive exploration over the past decade. In this work, we investigate ways to synthesize novel

magnetic MNPs obtained by pyrolysis of iron porphyrin and iron phthalocyanine. By then annealing in oxygen or nitrogen, we can significantly improve their magnetic and structural properties. We conducted systematic investigations of the structural and magnetic properties of these materials annealed at different temperatures using X-ray diffraction (XRD), X-ray Photoelectron Spectroscopy (XPS) measurements, Scanning Electron Microscope (SEM), Scanning Transmission Electron Microscope (SSTEM) images, and Physical Property Measurement System (PPMS) measurements. We observe nanoparticles having a "core-shell" structure with a diameter ranging from 7 to 30 nm, with a high magnetic moment due to the Fe core, and a biocompatible shell about 2-4 nm thick, consisting of iron oxide, iron nitride or carbide. The measured magnetization of magnetic saturation (Ms) and coercivity, as well as the specific absorption rate (SAR), show that these materials are attractive for magnetic hyperthermia medical applications. The hysteresis loop of the (Fe-Fe_3C)@C and (Fe-Fe_3O_4)@C nano-composites are of particular interest because of the high remanence (Mr) to magnetic saturation ratios, Mr/Ms.

Kaseylin Yoke

M.S. Physics

Search for Non-circular Gas Motion in the Outer Disks of Protostars

Faculty Mentor: Dr. Susan Terebey

For star formation to occur, a dense cloud must accrete enough material such that the gravitational potential energy overcomes the internal gas pressures of the cloud. From this, a new structure is formed containing the protostar, outflowing gas, a protostellar disk, and a gaseous envelope. As molecular gas flows into the disk from the Young Stellar Object's (YSO) envelope, it experiences a shock wherein energy is lost in the form of radiation. After this shock, it is uncertain how the gas moves towards smaller radii and eventually arrives at the protostar. If we can understand the motion of this gas, then we will be able to trace the flow of water and organics that are relevant to the origin of life. New theoretical models for the gas motion allow us to search for the signature of non-circular gas motion in other disk regions. Using these models, we will search for these gas motions by comparing a set of seven protostars from ALMA data. For this sample of protostars, we will present a comparison between the sample data and the new theoretical models.

Group 7 ▪ Biological Sciences
▪ University-Student Union – Los Angeles B Room 308B

Shanti Raminani and Cindy Nguyen

B.S. Biochemistry; B.S. Biochemistry

Investigating the Effects of Thermolysis on the Purification of Recombinant Antifreeze Proteins

Faculty Mentor: Dr. Xin Wen

Antifreeze proteins, a class of proteins which inhibit ice-crystal growth by a depression of the freezing point of fluids, are attributed to the survival of various organisms in sub-zero conditions. This property of AFPs, known as thermal hysteresis, has been the subject of investigation for its application in various preservation techniques. AFPs derived from the beetles *Dendroides canadensis* and *Tenebrio molitor*, DAFP-1 and TmAFP respectively, are commonly expressed as fusion proteins in *Escherichia coli* (*E. coli*), enzymatically lysed, and purified. However, this widely utilized method can be costly and inefficient. Literature that has evaluated alternative purification procedures of thermostable proteins expressed in *E. coli*, have investigated the replacement of a lysis step with a period of heat treatment that lyses the cell with comparable efficiency and yield, known as thermolysis. As such, we have investigated the implementation of a thermolysis step in the place of enzymatic lysis during the purification of recombinant TmAFP and DAFP-1. Studies have revealed that thermolysis effectively lyses the cell, with an efficiency and yield comparable to enzymatic lysis, while also minimizing the presence of impurities in the sample post-lyse.

Harry Bevir

M.S. Biological Sciences
Dynamic localization of circadian clock proteins Rbp2 and KaiB in cyanobacteria
Faculty Mentor: Dr. Susan Cohen

Circadian rhythms regulated by molecular “clocks” are synchronized with the environment and control a variety of biological activities over the course of the day. My work in *Synechococcus elongatus*, the premier model for studying circadian rhythms in cyanobacteria, focuses on determining the localization of two actors of the circadian clock within the cell: Rbp2 and KaiB. The KaiABC core oscillator keeps ~24-hour time in *S. elongatus,* where KaiC localizes to the poles of cells at night. We recently identified Rbp2 as being required for wild-type rhythmicity and for the localization of KaiC to the pole. KaiB maintains rhythmicity in cyanobacteria by opposing KaiA activity and promoting KaiC dephosphorylation. In order to determine the sub-cellular localization of Rbp2, I constructed a strain of *S. elongatus* with fluorescently tagged Rbp2. As fluorescent constructs of KaiB are not functional, I made a construct with an epitope tagged variant of KaiB and adapted a mammalian system for endogenous production of fluorescent antibodies to operate in cyanobacteria. My fluorescence microscopy time courses revealed that Rbp2 and KaiB localize to the pole of the cell at night, providing further evidence that a complex of multiple circadian proteins forms at the pole of the cell at night.

Helen Nguyen

M.S. Biological Sciences
Testing the keystone-molecule hypothesis: Do defensive chemicals from a common gastropod alter estuarine communities?
Faculty Mentor: Dr. Patrick Krug

By analogy to keystone species, new theory proposes that compounds with disproportionate effects on an ecosystem may be keystone molecules, regulating communities with outsized impacts relative to their abundance in the environment. The release of defensive chemicals produced by a highly abundant species may alter community compositions and food web interactions, but this has not been tested for a benthic marine animal. Small but abundant sea slugs (*Alderia* spp.) are found in estuarine mudflats throughout the Northern Hemisphere, and produce compounds called polyketides as a defense against predators. I tested whether polyketides act as keystone molecules by altering the invertebrate community living in the mudflat in two field experiments. I compared species abundance and diversity in mud cores exposed to slug-extracted polyketides versus control cores. Polyketide treatment reduced the abundance of crustaceans, polychaete and nematode worms, and molluscs, thus changing the infaunal community of non-predatory species. However, polyketides also induced egg deposition from another common gastropod, the California horn snail, a potential adaptation to exploit the effects of slug compounds on other community members. Although community composition of invertebrates changed with season, the effect of polyketides was largely consistent between summer and winter trials.

Dana Abou Abbas

M.S. Biological Sciences
Antimicrobial Effector Molecule Response in Alveolar Type II Cells after Stimulation with the TH17 Cytokines IL17 and IL22
Faculty Mentor: Dr. Edith Porter

Mycobacterium tuberculosis (Mtb) is the main cause of tuberculosis (TB), which primarily affects the lungs. Globally, TB is considered the second greatest infectious disease-related cause of mortality to this date. This is in part due to the prevalence of multidrug-resistant Mtb strains and poor efficacy of the existing TB vaccine. Thus, novel methods for combating Mtb must be developed. Epithelial cells, among them alveolar cells, are one of the first in line to come in contact with inhaled Mtb. Our lab pursues the concept that lung epithelial cells increase their antimycobacterial activity after stimulation by cytokines made by T helper cell subset TH17, and that incorporating this response in vaccine design could afford better protection against TB. The objective of this study was to test antimicrobial effector molecule production of A549 cells in response to TH17 cytokines in vitro. We observed a significant increase in antimicrobial peptide positive cells/ events for treatment with the control cytokine IL1b and with the TH17 cytokines IL17/IL22 ($p < 0.001$ and $p = 0.018$, respectively). Furthermore, in a pilot experiment, intracellular lipid content increased in IL1b, and IL17/IL22 treated cells compared to the solvent control. This research may govern future vaccine design for TB.

India Wesley-Cardwell, Dana Abou Abbas, and Janette A. Dzul

B.S. Biological Sciences, Option in Microbiology
Title*: Effect of TH 17 cytokines on the antimycobacterial activity of lung epithelial cell secretions*
Faculty Mentor: Dr. Edith Porter

Mycobacterium tuberculosis (Mtb), an airborne pathogen, affects people on a global scale. Increasing bacterial resistance against antimycobacterial drugs and the limited efficacy of the current tuberculosis

vaccine warrant novel approaches to combat tuberculosis. Epithelial cells lining the airways are the first to encounter Mtb. T helper cells of the subtype TH1 are activated with the current tuberculosis vaccine. The subtype TH17 is known to activate epithelial cells and we hypothesize that incorporating responses of TH17 cells in tuberculosis vaccines may offer enhanced protection. We aimed to test the antimycobacterial activity of A549 lung epithelial cells stimulated with TH17-derived cytokines using M. smegmatis (Ms), an avirulent model organism for Mtb. Mycobacteria tend to aggregate making it unreliable to measure bacterial proliferation by colony-forming unit assays. Therefore, we first developed a nucleic acid based protocol for quantifying the genomic DNA as a measure of bacterial proliferation and then assessed the inhibitory activity of A549 secretions. Preliminary data suggest that some TH17 cytokines may induce antimycobacterial activity in A549 cell secretions as reflected in reduced quantities of gDNA. This research may inform future tuberculosis vaccine design that incorporates TH17 and lung epithelial cell responses and may aid in the battle against tuberculosis.

Akalpit Shukla

B.S. Biochemistry
A Tightly Folded Antifreeze Protein Resists Trypsin Digestion
Faculty Mentor: Dr. Xin Wen

Antifreeze proteins (AFPs) are a class of proteins found in organisms that contribute to cell survival in subzero conditions. AFPs achieve this by inhibiting the formation of ice crystals via a mechanism involving the depression of water's freezing point, known as thermal hysteresis. This characteristic of AFPs highlights its potential as a proteinaceous cryoprotectant of organs and tissues. The AFP from the fire beetle Dendroides canadensis (DAFP-1) has been recently shown to promote cell survival post-cold preservation. Trypsin is a digestive protease produced by acinar cells that target the C-terminal of lysine and arginine. This study investigates DAFP-1 as a prospective proteinaceous protectant for acinar cell preservation by analyzing interactions between DAFP-1 and trypsin. The stability of DAFP-1 against trypsin was compared to another proteinaceous protectant, bovine serum albumin (BSA). The ability of trypsin to cleave both proteins was compared in their native and heat-treated states. SDS-PAGE was used to analyze the samples. The results demonstrated that trypsin could digest heat-treated BSA almost completely and native BSA to a lesser extent. However, trypsin could not digest DAFP-1 in either its native or heat-treated form to a comparable degree, despite the presence of cleavage sites in DAFP-1.

Jin Hyeok Yoon

M.S. Chemistry
Regiochemistry of the Singlet Oxygen Ene Reaction in Metal-Organic Frameworks
Faculty Mentors: Dr. Mathias Selke and Dr. Yangyang Liu

We investigated the photooxidation of an alkene (2-methyl-2-heptene) in a metal-organic frameworks (MOFs). This is the first study of the singlet oxygen ene reaction in this commonly used material. In order to understand the reaction's selectivity and mechanism in this material we (i) synthesized and characterized MOFs with different unique properties, and (ii) analyzed the solvent effect and the MOFs' pore size on the reaction. This study highlights the MOFs' versatilities to function as both photosensitizers and active sites and expand our current knowledge of singlet oxygen ene-reaction.

Alfredo Gonzalez

B.S. Exercise Science
Investigating delta-tocotrienol as an inhibitor of oxidative phosphorylation in HER2+ breast cancer.
Faculty Mentor: Dr. Anureet Kaur

HER2+ breast cancer represents one-fifth of all breast cancers and is characterized by rapid growth and lower survival rates. Advancements in HER2-targeted therapies, such as trastuzumab, have significantly reduced recurrence and mortality. Unfortunately, drug resistance remains a great challenge for a majority of patients. However, recent research has shown that acquired resistance to trastuzumab creates a new vulnerability to inhibition of oxidative phosphorylation, the major metabolic pathway in the mitochondria. Previous research into the anti-cancer properties of delta-tocotrienol, a Vitamin E isoform, has revealed mechanisms involving mitochondrial impairment. Therefore, we investigated delta-tocotrienol's potential to inhibit oxidative phosphorylation in HER2+ breast cancer cells. We observed that delta-tocotrienol significantly reduces mitochondrial respiratory capacity through an increase in reactive oxygen species and a disruption of the mitochondrial membrane potential. Our findings suggest that delta-tocotrienol may be an effective inhibitor of oxidative phosphorylation for overcoming trastuzumab resistance in HER2+ breast cancer cells.

Stacey Lau

B.S. Food Science and Technology

Effect of Transglutaminase Treatment on Rice Protein Functionality

Faculty Mentor: Dr. Sunil Mangalassary

An increase in dietary restrictions concerning wheat, especially gluten, necessitates the development of a similarly functioning hypoallergenic ingredient. Rice protein is hypoallergenic, colorless, and bland-tasting, making it an ideal gluten substitute. However, its ability to promote network development needs improvement. Transglutaminase is an enzyme that catalyzes cross-linking between lysine and glutamine residues in rice protein. The objective of this research was to observe the impact of the enzyme transglutaminase on physiochemical and functionality changes in brown rice protein. Physiochemically, there were no significant differences in molecular weight caused by transglutaminase treatment, but there was a significant decrease of 33.5% in free amino groups in samples treated with 20U/g of transglutaminase, indicating cross-link formation. For functionality, protein solubility remained close to zero, and no significant changes occurred in water or oil holding capacity. Emulsion ability increased slightly but was unstable, and foaming capacity was less than 1.5%. This research demonstrates that transglutaminase treatment has the potential to improve network development. Future studies should examine the impact of transglutaminase on rice bran protein, which is higher in lysine content than rice protein and may produce more cross-linking and better network development.

Samuel Groysman

B.S. Biochemistry

Development of Non-contact Plasmonic Electrochemical Microscopy Using Mesoporous Silica Films for Sensitivity Enhancement

Faculty Mentor: Dr. Yixian Wang

Plasmonic electrochemical microscopy (PEM) refers to a group of optical imaging techniques that utilize surface plasmon resonance to map local changes in response to electrochemical reactions near an electrode surface. However, the potential applied during PEM can limit biologically relevant applications by disturbing cellular functions. To that end, this work develops the technique of non-contact plasmonic electrochemical microscopy (NC-PEM), whereby the electrode surface is coated with a mesoporous layer of silica to segregate large molecules from the electrode surface. Gold electrodes were coated with mesoporous silica films by electrochemically assisted self-assembly (EASA). NC-PEM images of the resulting electrodes were taken for the redox species 1,1'-ferrocenedimethanol (FC), dopamine, and ferricyanide. Calibration plots constructed for FC concentrations ranging from 100 μm to 1 mM were linear with increasing FC concentration, exhibiting greatly enhanced sensitivity as compared to bare electrodes. Furthermore, images from a boundary area between the silica film and the bare gold surface exhibited enhanced detection of FC on the silica-coated portion. NC-PEM's enhanced sensitivity compared to traditional PEM and its ability to shield cells from electrochemical potentials make it a promising technique for analyzing biological systems.

Genesis Barzallo

M.S. Chemistry

Quantitative Analysis of Olefins in Alternative Fuels Made From Conversion of Plastic Waste via GC×GC-FID

Faculty Mentor: Dr. Petr Vozka

Over the previous several decades, there has been a substantial buildup of plastic waste in landfills and the environment, amounting to over 10 billion tons. Conventional methods including incineration and mechanical recycling are ineffective in reducing plastic waste. Alternative fuels made from plastic waste can be produced using conversion techniques like hydrothermal processing and pyrolysis. The alkene (olefin) content in these fuels may vary from a few ppm to tenths of a wt. %. However, at these high concentrations, there are currently no methods for the detailed quantitation of olefins. In this work, we developed a novel method applicable for the characterization and quantitation of aliphatic olefins in fuels (gasoline, kerosine, diesel) made from plastic waste pyrolysis. Comprehensive two-dimensional gas chromatography with flame ionization detector (GC×GC-FID) and the derivatization method utilizing DMDS was used for this analysis and was tested with olefin standards ranging from C 5 to C25. Results were compared to those obtained via ASTM D1159 (Bromine Number), ASTM D5554 (Iodine value), and ASTM D1319 (FIA method).

Abstracts of Poster Presentations

Behavioral and Social Sciences

1. Angela Shi

B.S. Biology

Levels of Grit, Self-Compassion, and Burnout in Nursing Students

Faculty Mentor: Dr. Stacey A. Warner

A study reported increased self-compassion lead to decreased burnout among nurses. A literature search was then conducted specific to the dates of the Coronavirus-19 (COVID-19) pandemic (2020-2022) on burnout among nursing students. Studies noted self-compassion and grit are characteristics that are perceived to decrease burnout. It is hypothesized that graduate nursing students have higher grit and self-compassion levels than undergraduate pre-licensure nursing students, therefore having less burnout. The Short Grit Scale (Grit-S), Self-Compassion Scale Short-Form (SCS-SF), and Maslach Burnout Inventory-General Survey for Students (MBI-GS) be utilized to conduct a study on the relationship among burnout, grit, and self-compassion in nursing students.

2. Sarah Schuster

Master of Social Work

The Meaning People Make of Their Passive Suicidal Thoughts

Faculty Mentor: Dr. Huynh-Hohnbaum

Suicide is a complicated public health issue that impacts millions of Americans every year. Passive suicidal ideation – or the experience of having suicidal thoughts without a specific suicide plan – is one part of the suicide prevention puzzle that is often overlooked. This study asks the question: What meaning do people make of their passive suicidal thoughts? Through qualitative interviews with advocates who have spoken and written about their experiences with suicidal ideation, the study explores exposure to suicide, nature of suicidal thoughts, and any meaning/personal narrative people have created about their experiences. More deeply understanding passive suicidal ideation – its characteristics, why people experience it, and how people interpret their own experiences with it – can add nuance to conversations about suicide risk. People who've lived through periods of suicidality have insights and experiences that could enrich our current knowledge about suicidality, introducing information about protective factors and inspiration for interventions. This qualitative study examines mental health advocates' relationship with their passive suicidal thoughts, exploring exposure to suicide, nature of suicidal thoughts, and any meaning participants have created about their experience with passive suicidal ideation.

3. William Ralica, Sabrina Zambon, and Aida Benitez

M.A. Psychology; M.A. Psychology; B.A. Psychology

Honor Endorsement: Links with Self-Efficacy, Self-Esteem, Anxiety, and Depression

Faculty Mentor: Dr. Heidi Riggio

Honor is an individual concept related to feelings of moral integrity and character, and a social concept that involves feelings of status, power, and standing in social interactions (Baldry et al., 2013). Traditions that involve honor vary across groups and include ideas about family, gender roles, masculinity, and femininity, including the role of morality in gender ideology (Rodriguez Mosquera, 2016). Honor involves ideas about masculine honor that specifically involve men's response to threats against masculinity and reputation, and so involve derogation of the feminine, which is viewed as weak (O'Dea et al., 2017). Views of the self as weak or ineffective also involve self-judgments of self-esteem and self-efficacy, and may involve other psychological processes, including anxiety and depression. This study examines endorsement of traditional honor in relation to self-reports of self-efficacy, self-esteem, depression, and anxiety. Christian adults (168 women, 129 men, *M* age = 38.5 years) completed an anonymous online survey including assessments of honor endorsement, self-efficacy, self-esteem, anxiety and depression. Results indicate that higher scores on honor endorsement are significantly negatively correlated with anxiety and depression, and positively correlated with self-efficacy and self-esteem ($ps < .01$). Results are discussed in terms of social identity theory (Tajfel & Turner, 1979).

4. Victor Pinzon Gonzalez

Master of Social Work

Social Support for Foster Youth

Faculty Mentor: Dr. Jieru Bai

Many foster youth aged out of the foster care system with little or no social support. Previous research has shown that foster youth face negative outcomes such as homelessness, lack of education, and unemployment while transitioning into independence. The purpose of this study is to examine the impact of social support on foster youth, specifically, if having consistent social support while in foster care diminishes the unfavorable odds, such as homelessness, low

academic attainment, and unemployment. The data on this study is secondary data collected by Journey House's research study called "Beyond Foster Care: Needs Beyond the Age of 21." A total of 432 participants answered a one-time survey either online or in-person. The survey consisted of a total of 183 questions. The survey questions were broken down into seven categories: demographics, care history, education, housing, employment, family life and well-being, and social support. This study will use descriptive analysis and inferential statistics to understand if social support makes any difference in the outcomes of foster youth. Based on the findings, the data will provide future recommendations to support foster youth better.

5. Brittany Kalaj Margulieux and Madeline Bourdeau

B.A. Sociology, M.S. Sociology
Changing Attitudes of Full-Spectrum Doulas, Effects of Dobbs v. Jackson
Faculty Mentor: Dr. Katie Dingeman

The 2022 *Dobbs v. Jackson Women's Health Organization* Supreme Court decision handed over the power to regulate abortion access to individual states. This paper will present the results of semi- structured interviews conducted with 25 full-spectrum doulas with emphasis in states where abortion access became severely restricted or eliminated due to the reversal of *Roe*. This study examines the effects of the court's decision on attitudes toward pregnancy, birth, abortion, contraception, fertility treatments, as well as medical and legal safety.

6. Krystine Curtis

Master of Social Work
The Complexity of Identifying Incest
Faculty mentor: Dr. Anh-Luu Huynh-Hohnbaum

It is a widely held belief among child advocates and researchers alike that incest, like other forms of abuse, happens at rates higher than what is reported, making accurate attempts to identify rates of incest difficult to achieve. When reported, professionals confronting incest are generally unprepared, do not want to risk traumatizing themselves, and avoid the topic altogether. Incest is often included under child sexual abuse and may or may not be identified as member-specific (father-daughter, sister-brother, brother-sister, etc.). In addition, operational definitions of incest vary widely, creating opportunities for underreporting, overreporting, and misclassifying incest. Existing literature has found barriers to disclosure of incest are imbedded in the power and control of the existing relationship, that abusers use shame, fear, and guilt to maintain secrecy, and that the risk of a victim being displaced from their family, school, and community may outweigh a victim's willingness to disclose. The purpose of this study is to provide a scoping literature review that synthesizes existing literature and highlights unexplored areas of interest regarding incest. Identifying incest as a subgroup of CSA and annotating member-type of incest can lead to better treatment for victims and better training for professionals interacting with victims.

7. Sabrina Zambon, Villiam Ralica, and Ivan Cobian

M.A. Psychology; M.A. Psychology; B.A. Psychology
Self-Efficacy in Romantic Relationships: Links with Quality of Relationships with Mothers and Fathers
Faculty Mentor: Dr. Heidi Riggio

Relationships with parents have a meaningful impact on young adults' social and psychological outcomes (Tubman & Lerner, 1994). Research indicates that quality of relationships between young adults and their parents is linked to relationship anxiety, with more negative relationships with parents predictive of greater anxiety (Riggio, 2004). Self-efficacy as a romantic partner involves beliefs in one's ability to persevere in relationships despite difficulties. Riggio et al. (2013) found scores on their self-report measure of Self-Efficacy in Romantic Relationships to be predictive of later relationship outcomes, including relationship satisfaction and commitment. This study examines quality of relationships with mothers and fathers and links with self-efficacy in romantic relationships. Students (N = 247, 208 women, M age = 23.8 years) completed an anonymous online survey assessing self-efficacy in romantic relationships, self-esteem, and relationships with parents (affective quality, emotional support, facilitation of independence). Results of correlations (controlling for gender, age, race, social desirability, self-esteem) indicate that all three qualities of relationships with mothers are correlated with self-efficacy in relationships, while relationships with fathers are unrelated to young adult self-efficacy. Recollections of parental conflict are not related to reports of self-efficacy. Results are discussed in terms of social learning/social cognitive theory (Bandura, 2001).

8. Dana Yassin

B.A Political Science, Minor WGSS
This Looks Familiar: A Comparison of Methods of Repression
Faculty Mentor: Dr. David Green

There has been a shift in American Political discourse over the past couple of years. Moral policing with a highlight on religious conservatism has been on the rise, and women and members of the LGBTQ+ people are often first to fall victim to that. Trans people

especially have been under massive attack, and the overturning of Roe v. Wade has ushered in a new era in the Supreme Court. Because of my own background as an Egyptian citizen as well as an American one, this looked eerily familiar to me. The Egyptian government has been using its explicitly religious constitution to terrorize and threaten specific communities with the same tactics and vague legal guidelines for decades. The U.S should be held to a higher standard of secularism and separation of church and state. For this research project, I wanted to use examples of repression and legal persecution of women and queer people in Egypt to highlight the slippery slope America is currently down in terms of its use of religious law and moral policing.

9. Darlene Ramirez, Melissa Rios, and Shelby Detweiler

M.A. Psychology; M.A. Psychology; B.A. Psychology
Honor Endorsement: Links with Traditional Family Ideology and Negative Attitudes toward Women
Faculty Mentor: Dr. Heidi Riggio

Honor is an individual concept related to feelings of moral integrity and character, and a social concept that involves feelings of status, power, and standing in social interactions (Baldry et al., 2013). Traditions that involve honor vary across cultural and social groups and include ideas about family, gender roles, masculinity, and femininity, including the role of morality in gender ideology (Rodriguez Mosquera, 2016). Honor also involves ideas about masculine honor that specifically involve men's response to threats against masculinity and reputation, and so also involve derogation of the feminine, which is viewed as weak (O'Dea et al., 2017). The current study examines endorsement of traditional honor in relation to negative attitudes toward women and endorsement of traditional family ideology. Christian adults (168 women, 129 men, *M* age = 38.5 years) completed an anonymous online survey, including measures of honor endorsement, attitudes toward women, and traditional family ideology. Results indicate that higher scores on honor endorsement are significantly positively correlated with endorsement of traditional family ideology and with more negative attitudes toward women, with rather large effects sizes (rs = .68 and .49, respectively, *p*s < .001). Results are discussed in terms of social identity theory (Tajfel & Turner, 1979).

10. Karina Olmos and Andrea Manzur

B.A. Psychology; B.A. Psychology
You're the only one who gets me!": Differences Across Perceived Social Support
Faculty Mentor: Dr. Karen Wu

Social support (SS) is important for well-being (Cohen et al., 2000). However, culture and gender may influence SS. We examined racial (Latinx vs. Asian American) and gender (men vs. women) differences in perceived SS among undergraduates in committed relationships. Therefore, we hypothesized that men would perceive less SS from family, friends, and significant others (SO) than women. Regarding cultural differences, Asians may be more vertically collectivistic than Latinxs due to their emphasis on hierarchy (Triandis & Gelfand, 1998). We surveyed 556 undergraduates (*M* age = 19.24, *SD*= 2.70) in committed relationships for at least one month. Independent sample t-tests indicated that our hypotheses were partially supported. Women reported higher perceived SS from their SO than men (p =.005), and Asians reported higher SS from friends than Latinxs (p < .001). There were no other differences between groups (*ps* > .05). Women might perceive more support from their SO due to their interpersonal orientation, whereas men may not recognize the SS they receive from SOs due to societal pressures to be "the rock" of the relationship. Asians might perceive greater SS from friends but it did not differ from Latinxs' perceived SS from their family.

11. Ethan Lamborn

B.A. Psychology
The Mediating Influence of the Locus of Control on Religiosity and Cultural Orientation
Faculty Mentor: Dr. Austin Attaway

Culture and religion are integral components of one's identity and influence how we think about and experience life. One's cultural background impacts their perception of the world and decisions; on the other hand, many religions use the concept of fate and predeterminism that may also influence one's perception of their control over their life. The current study explored the mediating effect of the Locus of Control on the relationship between Cultural Orientation and Religiosity on academic achievement. Locus of Control (LOC) refers to an individual's perceived control over the outcomes of their life. According to Uguak et al. (2007), students with more Internal LOC attitudes typically showed higher academic achievement. 79 Cal State LA students participated in a 73-item survey that measures Locus of Control, Religiosity, and Cultural Orientation. The data was non-significant; however, supported the current literature, indicating that those with an Internal

Locus of Control typically exhibited higher academic performance than those with an External Locus of Control. Additionally, those with moderate levels of Religiosity and Cultural Orientation typically received higher grades, but this lacked any correlation or interactions with the Locus of Control.

12. Ivan Cobian

B.A. Psychology
Sex Differences in Sexual Attitudes and Homonegativity among LGBTQ+ Adults
Faculty Mentor: Dr. Heidi Riggio

LGBTQ+ individuals have been subject to social stigma and shaming for centuries (Riggio, 2021), and the culture of the United States is deeply heteronormative and condemning of other sexualities (Herek, 1997). Cultural institutions, particularly formalized religions, strongly condemn sexualities outside of heterosexual sex for reproductive purposes (Leeming, 2003). Because the general majority culture is deeply heterosexist, LGBTQ+ individuals may experience internalized homonegativity (Herek, 2019), negative attitudes toward themselves because of their sexuality. This study uses an anonymous online survey to collect data on sexual attitudes and internalized homonegativity and homophobia among LGBTQ+ adults recruited through Amazon Mechanical Turk. Adults (*N* = 406, 232 bisexual, 72 lesbian, 71 gay, 17 Queer, 15 other) participated for 50 cents and completed self-report measures of sexual shame (Mendoza et al., 2018), internalized homonegativity (Mayfield & Wayne, 2001), internalized homophobia (Martin & Dean, 1987), and sexual satisfaction (Hudson, 1982). Results indicate that men identifying as LGBTQ+ are higher in sexual shame, and internalized homophobia and homonegativity than women identifying as LGBTQ+, and that LGBTQ+ women are higher in sexual satisfaction than LGBTQ+ men. Results are consistent with Herek's theory that internalized homonegativity will develop within religious and heteronormative cultures that stigmatize other sexualities.

13. Nakyah Bourgeois

B.A. Psychology
Experiences and Views within the Criminal Justice System
Faculty Mentor: Austin Attaway, M.A.

An individual's experiences influence their reactions and responses to future situations. Previous research by Byrne et al., (1999) suggests that victims who experience partner violence were less likely to report satisfaction within the Criminal Justice System than other participants. The present study examines whether a negative emotional attachment with the justice system is shared amongst racially underrepresented populations who have had negative experiences associated with the justice system. The scales used to measure these variables are the Scale of Positive and Negative Experiences (Diener et al., 2010) and the General Fairness Index (Hurwitz & Peffley, 2005). I hypothesized people with prior negative experiences within the justice system felt negatively towards the Criminal Justice System. The results provide context that supports negative emotions of the criminal justice system are significant amongst all participants. An indicative difference within the Latinx population was shown in the results when measuring the significance of perceptions of fairness within the justice system. Justice-related research has the potential to provide awareness and allow for organizational transformations that will allow for future research to analyze the relationship between the criminal justice system thus allowing implementation for improvements.

14. Crystal Wu

M.S. Business Administration, Management and Information Systems
Improving Social Determinants of Health among Medicaid Recipients: A MOOC-inspired Prototype
Faculty Mentor: Dr. Pamella Howell

Multiple social determinants impact Medicaid recipients; educational inequality is one such factor that negatively impacts health outcomes. In the study, we aim to reduce educational inequalities by designing a prototype to enable collaboration between state agencies and Massive Open Online Courses (MOOCs). The Centers for Medicare and Medicaid Services encourages states to provide education and employment opportunities for enrollees. This objective can be achieved by partnering with organizations that offer educational programs over the internet. To explore this initiative, we created a low-code mobile application using the MOOC architecture that would allow Medicaid recipients to participate in high-quality training programs and enable state agencies to track their progress. Through the delivery of free educational content, our prototype can increase educational growth, thereby improving health outcomes. The novelty of our intervention warrants continued research to examine its implementation and other opportunities to maximize the health benefits for vulnerable populations.

15. Yolanda Estela Segura

M.A. Education, Option in Educational Foundations
A Caring Classroom: First Year Sixth Grade Teacher Desires to Use Social and Emotional Learning
Faculty Mentor: Dr. Ezekiel Joubert III

Post-Covid urban educators express how k-12 students, particularly those of color, face challenges to their social and emotional development. Trauma-Informed Teaching and Social Emotional Learning (Osher et al., 2021) help teachers create a classroom that meets social and emotional needs. This case study explores the possibilities and limits of these pedagogies in a sixth-grade classroom within a Los Angeles charter school with a predominantly Latinx, African American, and low socio-economic student population. This study draws from Piepzna-Samarasinha (2018) notion of *care work*. Schools, like many institutions, do not prioritize care. First-year teachers prioritize academics, unlike social and emotional development. Using auto-ethnographic methods, the researcher, a first-year teacher, recorded daily journals tracing actions, reactions, and questions regarding curriculum to nurture collective wellness, minimize triggers and anxiety. Over one semester, research examining social awareness, relationship skills, responsible decision-making, self-awareness, and care, found that giving time and space to understand social and emotional behaviors in the classroom creates a safer and happier community. Trauma-informed and social-emotional learning in classrooms help students understand their feelings and experiences. The study is significant because it offers a framework that can help teachers apply and adapt to social and emotional needs in a sometimes-uncaring world.

16. Amber Pereira and Kazi Salsabil

M.A. Psychology, B.A. Psychology
Gender Differences in Factors AffectingAcademic Persistence
Faculty Mentor: Dr. Gaithri A. Fernando

Pursuing a college degree can be challenging, and men and women may navigate their paths differently towards this important milestone. The current study examined psychosocial variables that could predict college persistence for men and women. Prior research having established that perceived sense of belonging (PSB), academic self-efficacy (ASE) and social support (SS) predicted persistence in college students in general, we examined whether these variables would also predict persistence for a group of mostly Latinx, first-generation college students. A group of 578 college students (males = 174, females = 398) between the ages of 18 and 51 years (M= 18.94 years) participated in an online survey that included the variables of interest. Multiple regression models indicated that while PSB and SS significantly predicted persistence for men, ASE and PSB significantly predicted persistence for women. Sense of belonging was the strongest predictor for men, while academic self-efficacy was the strongest predictor for women. The findings indicate that male students benefit from feeling that they belong on campus to overcome their academic challenges, while female students benefit from believing they have the capacity to achieve their academic goals. The meaning of these two trajectories and their implications for policy are discussed.

17. Briana Martinez

AuD. Doctorate of Audiology
Fusion and identification of vowels in the free field
Faculty Mentors: Dr. Michelle Molis, Dr. Lina Reiss, and Dr. Chandan Suresh

Binaural fusion occurs when signals arriving separately at the two ears are perceived as one sound. Previously, Reiss and Molis (2021) showed that listeners with normal or impaired hearing fused and perceptually averaged dichotic vowels presented through headphones, especially vowels with the same fundamental frequency. To extend these findings to a more real-world listening context, the current study investigated if vowel fusion and averaging would replicate in the free field. Stimuli were good exemplars of /æ/, /a/, /u/ or /i/ synthesized with fundamental frequencies of 106.9, 151.2 or 201.8 Hz. On each trial, vowels were presented simultaneously via speakers located on the left and the right at ±60°. On test trials, vowels presented from the left and right were different; fundamental frequencies could be the same or different. Listeners indicated which single vowel or two vowels they heard. Preliminary findings from normal-hearing listeners suggest there are fewer single vowel responses—fusion is decreased—in free field compared with headphone presentation. As demonstrated with headphones, vowels with the same fundamental frequency are more often fused. Results indicate that vowel fusion patterns previously observed with headphones can also be observed in the free field. Supported by NIH R01DC013307 and CSULA SPROUTS program.

18. James Hummel

Ed.D. Educational Leadership
Social Robots, Vocabulary Acquisition, and Students with Autism
Faculty Mentor: Dr. Jiwon Hwang and Flavio Argueta

This research proposal aims to investigate the effectiveness of using social robots as a tool for vocabulary acquisition in elementary school children with autism. The study will employ a mixed-methods

approach, including both quantitative and qualitative data collection methods. The participants will be a sample of elementary school children with autism, aged 8-12, who will participate in a 10-week intervention program using social robots. Participants' vocabulary acquisition will be measured through pre- and post-intervention assessments and the study will gather qualitative data through interviews and observations. Findings from this study will contribute to the understanding of how social robots can impact student outcomes related to vocabulary acquisition in children with autism and the potential impact on their language and communication development. This research has the potential to inform educational practices and the development of educational technologies for children with autism.

19. Kimberly Conde

B.A. Political Science, Option in General
Peer Mentoring Evaluation
Faculty Mentor: Dr. Valerie Talavera-Bustillos

The focus of this project will be on investigating the administration and core elements of peer mentoring programs. These initiatives are becoming increasingly well-known, especially on Hispanic-serving institutions (HSI) like ours, making this a crucial subject for study. As a result, since many generations after us will use these programs, we should be more critical of their introduction, purpose, structure, and adaptation. Mentoring programs are also important to me because I see this as a career and a passion of mine that will extend beyond my field of study. While my research question is still under advisement, here is what I have thus far: What does the research say about the effectiveness of academic peer mentoring programs? What pedagogies and frameworks are people in charge of running these peer mentoring programs using? Finally, my methodology will entail conducting interviews with various administrators who oversee peer mentoring programs.

20. Jiawei, Xiang

B.A. Psychology
Less Pain with Darker Skin: Individual Racial Judgement on Social Pain Perception with Presenting Variation in Human Features
Faculty Mentor: Dr. Austin Attaway

Racial bias has been shown to affect an individual's pain perception of others (Brosch et al., 2012). There is an accepted belief that Black people are less sensitive to physical and psychological pain than White people (Deska et al., 2018, 2020; Siedlecki et al., 2021). We investigated whether this phenomenon may be expanded to other racial minorities like the Latinx-Americans and how personal differences moderate this relationship. The racial bias on pain perception was operationalized by priming participants with ten mentally aversive scenarios (Trawalter et al., 2012; Deska et al., 2020) followed by presenting Black, White, and Latinx target faces after each of the scenario from the Chicago Face Database (CFD; Ma, Correll, & Wittenbrink, 2015). Participants were asked to rate how mentally painful each scenario would be for each target. Results suggested that given the same socially aversive events, participants would rate White faces as the most sensitive to all of the given scenarios than Black and Latinx faces. In addition, Latinx faces were rated less sensitive to social pain than Black faces. By focusing on the racial bias of pain perception, the current study could contribute to contemporary interracial dynamics.

22. Lami J. Glenn

B.A. Sociology
"Intersections of Black Gang Criminalization"
Faculty Mentor: Dr. Robert D. Weide

The objective of this Honors Thesis will be to further examine the intersections of systemic oppression and the hyper-criminalization experienced by Black gang members here in Los Angeles County. Utilizing emerging and relevant literature on African American and Chicano gangs in Los Angeles, I will provide a literature review and contemporary analysis of the work that has been read. This literature will contain both historical and evolved perspectives and offer a theoretical framework for the basis of my analysis. In consonance with the readings, I will further expound upon this study by using my familiar practices and observations in the field as manager at the community-based organization *Homeboy Industries* and conduct qualitative interviews with clients/program participants at Homeboy to examine the intersections of oppression and criminalization experienced by other Black gang members. Lastly, the project will conclude with an analysis based on the application of the literature that I have read in conjunction to the experiences of the clients at the field site that I currently work at. The objective of the project is to bring noteworthy awareness on the intersections of racial oppression and criminal marginalization experienced by Black gang members in Los Angeles.

23. Mary Donelan

M.A. Archaeology
Irish Ringforts and Their Role in Archaeology, Irish Folklore, and Modern Society
Faculty Mentor: Dr. Amira Ainis

Although among the most common archaeological monuments in Ireland, research on ringforts remains

obscure and debatable. Irish ringforts are circular enclosures of earthen and/or stone materials dating from the Early Christian Era to the Medieval Era, ~A.D. 400-1169 (Barrett & Lynn 1975: 33). However, a closer assessment of ringforts reveals a more complex definition as ringforts are highly variable in size, morphology and possibly function. As a literature-based thesis, this research provides a unique look at the various perceptions of ringforts in Ireland, including the mythological, modern cultural, and archaeological perspectives. The mythological perspective provides insight into the culture and folklore of Celtic and pre-Christian Ireland, as well as the Christian influences on Irish folklore. The cultural perspective demonstrates the perception within local communities and the folklore surrounding ringforts today. The archaeological perspective is more speculative by examining ringforts from an objective and theoretical stance. Additionally, I created a map of ringforts in County, Galway, Ireland utilizing GIS (Geographic Information Systems) to display the spatial relationships of ringforts based on differing classifications. Reviewing ringforts from multiple perspectives reveals a timeline of Irish history, in which narratives of ringforts have transformed due to several factors, including folklore, Christianity, and Archaeology.

24. Jarenni Ambriz

B.A. Anthropology, B.A. Asian American Studies
The Selectivity of Imperialist Roots in Korean Rock
Faculty Mentor: Dr. Waikit Choi

During the United States military occupation in the 1950s and 1960s in South Korea, U.S. military personnel introduced rock music to South Korea through radio broadcasts in response to their demand for American entertainment from Korean musicians**.** Since its initial introduction, rock has become a source of entertainment and expression in South Korea. This study aims to answer whether the rock scene in South Korea is an example of what some critics refer to as "media imperialism." This research is important because studies conducted on media imperialism often simplify the act of exercising power, limiting its complexities; thus failing to acknowledge that the overtaking and controlling of people can be practiced in indirect manners. This study found that other factors have influenced Korean rock aside from its initial influence by American rock. It is argued that the initial introduction of rock illustrates media imperialism, which is a form of power expansion across borders; however, during its later development, several factors weakened its imperialist roots, and thus media imperialism is not directly applicable to its development. It is suggested that media imperialism is not stagnant but is selective and shifts between space and time.

Biological Sciences

25. Eric Tran

M.S. Biology
Characterization of the physiology of the Acinetobacter baumannii *LAC-4 K-locus mutant: the biosynthesis of the capsular polysaccharide as a potential target for anti-virulence therapeutics* Faculty Mentor: Dr. Howard Xu

In the healthcare setting, the effectiveness of antibiotic treatments has severely declined while multi-drug resistant microorganisms continue to evolve with enhanced survival and infective mechanisms. Specifically, the bacterial capsule provides an additional external layer to protect the bacteria against environmental factors and increase its persistence. The LAC-4 strain of the bacterial species, *Acinetobacter baumannii*, has been shown to be resistant to multiple classes of common antibiotics and hypervirulent to mice. The genome of LAC-4 contains a K-locus gene cluster that is predicted to be critical to the biosynthesis of its capsule. To determine the role of capsule synthesis gene cluster in LAC-4's structure and virulence, a mutant strain, LAC-4-∆KL49b (abbreviated as ∆KL49b), was generated by removing its K-locus. We hypothesize the ∆KL49b strain will have an altered structure and limited biofilm production. Capsule staining results confirm that the LAC-4 strain is capsulated while ∆KL49b is non-capsulated. Contrary to other biofilm forming *A. Baumann* strains, the biofilm formation results show that LAC-4 and ∆KL49b do not produce biofilm. Membrane permeability results indicate ∆KL49b is slightly more permeable than that of LAC-4.

26. Janette A. Dzul, N. Harun Cerkezi, Nancy Diaz, Rachelle Soriano, Dana Abou Abbas

M.S. Biology
Evaluation of Antimicrobial and Cytotoxic Activity of Grape Seed Protein Hydrolysates Considered as Wine Additives to Increase Wine Stability
Faculty mentor: Dr. Edith Porter

The effects of climate change on agriculture are of concern around the world. The rising temperatures make it difficult to grow crops sensitive to these conditions, such as grapes for wine production. Research has revealed that high temperatures result in unripe seeds, contributing to low quantities of phenols and co-pigments. This can be problematic to

the wine industry, making it difficult to maintain color stability when aging and storing wine. It has been suggested to add natural sources of proteins, like grape seeds, as stabilizing agents to balance the wine color. However, any wine additives cannot inhibit bacteria during wine fermentation and cannot be cytotoxic to human cells. The objective of this study was to test four protein hydrolysates from white and red grape seeds for antimicrobial activity against two bacteria, *Oenococcus oeni* and *Lactobacillus plantarum*, and for cytotoxicity against human lung derived A549 cells, employing the resazurin assay, which measures cellular metabolic activity. Preliminary data of this study indicate that three of the four protein hydrolysates did not inhibit bacterial metabolic activity and two hydrolysates tested did not exhibit noticeable cytotoxic activity. Introducing grape seed protein hydrolysates to wine may promote stabilization of wine without harming the wine consumer.

27. Jason Chen

B.S. Biology
Investigating the role for gene SynPCC7942_0417 in regulating the cyanobacterial circadian clock
Faculty Mentor: Dr. Susan Cohen

Cyanobacteria are the only prokaryotes known to have a circadian clock and are thus a model organism for the study of circadian biology. KaiC is one of the core oscillator proteins of the cyanobacterial circadian clock and exhibits rhythms of cellular polar localization that are poorly understood. Previous research using immunoprecipitation and mass spectrometry has found SynPCC7942_0417 to interact with constitutively polar localized KaiC. Disruption of SynPCC7942_0417 resulted in alterations to the circadian clock, where long period rhythms of gene expression and decreased KaiC polar localization were observed. We are working on confirming the effects of this disruption using mutagenesis techniques and circadian bioluminescence monitoring. A preliminary bioinformatic analysis has revealed that SynPCC7942_0417 possesses an ATPase of the AAA+ family of ATPases and similarity to the cell division protease FtsH. Future research will involve more in-depth differential mutagenesis to gain a better understanding of SynPCC7942_0417's function and role in circadian rhythms of gene expression and KaiC localization. Understanding the role this gene plays in regulating the clock will provide novel insights into cyanobacterial circadian biology.

28. Kam Hang Chan, Nancy Diaz, Juan L. Luis

M.S. Chemistry, B.S. Microbiology, B.S. Biology
Method development for Surface Plasmon Resonance Microscopy (SPRm) with live bacteria: optimizing bacterial load and accessing viability
Mentors: Dr. Edith Porter, Dr. Yixian Wang

Healthcare associated infections (HAI) with multidrug resistant bacteria such as *Staphylococcus epidermidis* (SE) are on the rise and new prophylactic and therapeutic approaches are needed. Our labs explore the use of liposomal formulations of antimicrobial lipids and antimicrobial peptides to interfere with SE. We wish to employ surface plasmon resonance microscopy (SPRm), a label-free and real-time monitor for biomolecular interaction, to examine the action of our liposomes on live SE. The objectives of this study were to optimize how many bacteria should be deposited on the chip for SPRm analysis for single cell analysis and to confirm that the SPRm procedure itself does not kill SE. In a setting that mimics the SPRm environment, we determined that deposition of ~ 15,000 SE in a 3 μL volume will allow for analysis of single bacteria and that bacterial viability can be qualitatively assessed by colony formation. To be able to accurately quantify bacterial survival, we examined various live/dead stains. We found that BCECF-AM, a cell-permeant non-fluorescent dye that is hydrolyzed in live bacteria to the green fluorescent impermeable BCECF, is a promising candidate for quantifying viability of SE. If successful, this research may lead to the development of novel antimicrobials.

29. Heidy Castellon

M.S. Biology
Iron acquisition: A possible target to treat hypervirulent Acinetobactor baumannii LAC-4
Faculty Mentors: Dr. Howard Xu

The CDC has identified *Acinetobacter baumannii* as an "Urgent Threat" to health care. Iron is a critical micronutrient for bacteria. Most of iron in the human body is bound to hemoglobin and glycoproteins, thus is unavailable to bacteria. Siderophores are potent chelating molecules capable of stealing iron from glycoproteins, which is crucial for host invasion and progression. The LAC-4 strain of *A. baumannii* produces two siderophores, acinetobactin and baumannoferrin, to acquire iron. Our lab has generated three LAC-4 mutant strains, one in which the genes for synthesis of acinetobactin was deleted (ΔACB), a second in which the genes for synthesis of baumannoferrin was deleted (ΔBFN), and the third in which both gene clusters were deleted (ΔACB:ΔBFN). Phenotype studies on iron limited media agar plates demonstrated that under iron-limited conditions, the

growth of ΔACB:ΔBFN is severely impeded compared to wild-type. CAS assays showed ΔACB:ΔBFN produced significantly less siderophores than ΔACB, ΔBFN and the wild-type. Furthermore, Arnow's assays showed ΔACB:ΔBFN and ΔACB produced significant less catechol based siderophores than ΔBFN. These results demonstrate that targeting LAC-4 siderophore acquisition systems is a viable approach for the development of novel antivirulence therapeutics.

30. Daria Smith and Brian Rawles

B.S. Biological Science, M.S. Environmental Science
Vegetation, phenology, temperature feedback in grasslands
Faculty Mentor: Dr. Alexandra Wright

Global land surface models predict that surface temperatures could increase by up to 5.4°C by the year 2100. These large changes in temperature will affect plant community composition, structure, diversity, and productivity in unprecedented ways. Changes in mean temperatures and shifts in seasonal temperature patterns within ecosystems will likely affect temperature-sensitive plant phenological processes which may decouple species interactions between plants and pollinators. Vegetation has the capacity to buffer ecosystems against changes in temperature and humidity. Here, we collected plant phenology data on emergence, leaf area, and flowering phenology of eight herbaceous species at four levels of plant diversity in the BioCon experiment at Cedar Creek, Minnesota. We then quantified developmental stages for each plant at three dates over the course of a single growing season. Using this methodology, we determined that plants growing in the lower diversity plots flowered earlier and completed their growing season earlier than plants growing in higher diversity plots. This was correlated with higher temperatures and lower relative humidity in lower diversity plots. Our results suggest that loss of biodiversity in grasslands could further drive asynchrony between plants and their pollinators and further reduce biodiversity over time.

31. Henri Searles

B.S. Biology
Turning Over an Old Leaf: Modeling Phenological Trends in California Flowers
Faculty Mentor: Dr. Kirsten Fisher

As climate change causes increasing global temperatures and extreme variability in water availability, our world's plants are being forced to adapt. Studying phenological changes over time can provide insights into these adaptations. Phenology is the study of the timing of occurrences in relation to the annual seasonal cycle; in flowering plants, this is the day that life cycle events like leaf budding, flower blooming, and fruiting begin. Understanding phenological shifting is important to understanding climate change's possible effects, as pollinators crucial to the world's ecosystems rely on plants' phenological consistency for their own life cycles, and these life cycles desynchronizing may harm both plants and pollinators. In this study, herbarium data was collected from ten species of flowering plants found in mainland Los Angeles and the Channel Islands and modeled to examine how locational differences affected the beginning and duration of the flowering period. It was found that overall, flowers collected from the mainland bloomed earlier than their island counterparts, possibly responding to Los Angeles's warming temperatures, but flowers that bloomed unexpectedly early for their species were more likely to do so in both locations. This could be due to factors of climate change not examined in this study.

32. Crystal Ramirez

M.S. Biological Sciences
Microclimate temperature in the 'three sisters' (maize/bean/squash) polyculture food systems
Faculty Mentor: Dr. Wright

Efficiently growing food crops requires that we know how the environment influences the growth of plants and how the plants grown in an agricultural context influence each other. Densely planted crop species will often be resource-limited and require artificial fertilizers to ensure maximum growth. However, positive interactions between neighboring crops are also common, and often overlooked in an agricultural context. We must understand the ways in which plants affect their neighbors in both positive and negative ways if we want to efficiently grow crops. To address these issues, I manipulated planted crop diversity (monoculture vs polyculture) using the Three Sisters (squash, bean, corn) and measured microclimate temperature, microclimate humidity, soil moisture, and crop yield in an urban farm at CSULA. I found no overall effect of planting scheme (monoculture vs. polyculture) on microclimate temperature or yield, but squash grew more in high diversity mixtures during some weeks, whereas bean and corn did not. Additionally, complementarity effects were stronger in drier soils and selection effects were stronger in areas that received more light over the course of the day. These results can assist in designing more efficient urban farms for maximum productivity and yield in an increasingly stressed food system.

33. Vivian Pham

B.S. Biology
Reexamining Circumorbital Bones in Geckos
Faculty Mentor: Dr. Raul Diaz, Jr.

Squamate reptiles are widely diverse in their color, size, and shape, with over 11,000 known species. Bone loss and fusion are considered responsible for their skull diversity (themes applied across all vertebrate skulls); however, we challenge that any bones have been lost in the skull of lizards. Previous studies have used fossils or adult dry skulls to examine the circumorbital bones in geckos and proposed that only Eublepharid geckos have a lacrimal (with Eublepharid geckos only making up 2% of the currently recognized 2,252 species of geckos). Here, I looked at a developmental series for two species of morphologically and phylogenetically divergent families of geckos. Crested gecko (Diplodactylidae: *Correlophus ciliatus*) and leopard gecko (Eublepharidae: *Eublepharis macularius)* embryos were cleared and stained to show skull development and test whether bones that are considered absent are present during embryonic development. Our data show that the lacrimal is present in crested geckos and that this bone is fused to the maxilla, causing it to be overlooked by other researchers. Moreover, not only do crested geckos have a lacrimal, but they also have one of the largest lacrimals among extant tetrapods relative to skull size.

34. Austin Huynh

M.S. Biology
Atmospheric and soil drought effects on California native perennial grass community composition
Faculty Mentors: Dr. Alexandra Wright

Ongoing anthropogenic activities have resulted in an increase in the occurrence of drought. This change in drought frequency is already driving a shift in grassland vegetation productivity and plant functional composition. However, experimental drought studies have historically focused on precipitation inputs but largely ignored the role of atmospheric relative humidity. A recent study found that reduced precipitation in the soil limited aboveground biomass of a grassland plant community but only when the atmosphere was also dry. We manipulated atmospheric relative humidity and soil moisture in an outdoor pot experiment growing eight species of native CA grasses at California State University, Los Angeles. We measured biomass and composition of the community after two years of growth. We found significant difference in grass community composition between treatments experiencing dry soil and humid atmosphere (typical of rainout shelter-based experiments) vs. those experiencing dry soil and dry air. In particular, pots experiencing atmospheric drought and soil drought conditions favored E*. glaucus*, *H. californicum*, and *S. cernua*. The role of atmospheric drought is capable of altering grasses' community composition under drought and non-drought conditions. Without manipulating atmospheric drought, these changes would have been overlooked.

35. Ulysses Hernandez

M.S. Biology
Improving environmental DNA detection of California marine ostracod crustaceans
Faculty Mentor: Dr. Elizabeth Torres

Identifying species is important given the rapid decline of wildlife populations. However, traditional methods for identification of species can be challenging because they are time consuming and require expertise. DNA metabarcoding is an effective method used to assess biodiversity in habitats. In this approach, environmental DNA (eDNA) is obtained from soil or water samples collected in a habitat. The DNA is analyzed and species are identified by matches to published DNA databases. This technique is able to pick out a single species within a sample containing a diversity of other organisms, but a lack of reference DNA sequences for some species leads to underestimates in biodiversity. Ostracods are tiny crustaceans that have a complex body structure and are hard to identify. This study will develop a DNA barcoding reference database for California marine ostracods to improve their detection in future metabarcoding studies. Ostracods were collected in kelp holdfasts off the California coast, sorted by their morphological features, and matched to published descriptions to identify them. DNA is extracted from each species and metabarcoding genes are being sequenced to increase the detection of ostracods within eDNA samples collected from the sea.

36. Karen Stephanie Lemus

M.S. Biochemistry
Modification of the RNA editing protein PPR65 to target an exogenous sequence
Faculty Mentor: Dr. Michael Hayes

Mitochondrial genetic diseases are challenging targets for the existing gene editing tools that require guide RNAs (gRNAs). Guide RNAs currently cannot be supplied exogenously or expressed locally in mitochondria without further developments in efficient mitochondrial import or transformation technology. Some Pentatricopeptide Repeat (PPR) family members with a C-terminal DYW-deaminase domain can specifically edit mitochondrial mRNA sequences C-to-U in plants. If PPR editing proteins could be retargeted to exogenous sequences, they could be a

potentially valuable tool for repairing pathogenic SNPs at the level of RNA. Mitochondrial mutations have been linked to inherited diseases such as Leigh syndrome. Since sequence recognition by PPR proteins is based on a predictable code where two amino acid positions make specific electrostatic interactions with a single base, this project aims to modify an editing factor to direct the PPR editing factor to a human mitochondrial SNP linked to a pathology. The techniques include rational design based on the predictable code, recombinant expression, protein purification, and a quantitative *in vitro* assay to determine if an editing factor can be retargeted by comparing percent conversion of wild-type and RNA sequences that match predictions based on the combinatorial code.

37. Hope Hua

B.S. Biochemistry

qRT PCR Analysis of RNA Co-Immunoprecipitating with Editing Factors RIP9, OZ1, ORRM1

Faculty Mentor: Dr. Michael Hayes

Chloroplasts and mitochondria convert cytidine nucleotides to uridine (C-to-U editing) in RNA, which maintains conserved codons. In flowering plants, this process requires an editing complex (editosome) composed of several families of nuclear encoded proteins, including PPR, RIP/MORF, OZ and ORRM. PPR proteins provide sequence recognition of the editing site and the catalytic DYW domain. The role of the non-PPR proteins remains unclear. RNA sequences that co-immunoprecipitate (Co-IP) with various *Zea mays* (maize) plastid editing factors showed a negative correlation between fold purification and translational efficiency for OZ1 and ORRM1. This may indicate a way in which RNA editing is linked to translation. Reads per kilobase pair per million reads mapped (RPKM) values indicated an enrichment of 5S rRNA in OZ1 and ORRM1 pull-downs compared to total chloroplast RNA, providing further evidence for a direct link between OZ1, ORRM1 and translation. However, when converted to fold purification compared to a bead control, there was little enrichment of the 5S rRNA in OZ1 and ORRM1 samples. qRT PCR analysis was conducted on RNA samples co-immunoprecipitated with RIP9, OZ1, and ORRM1 and found that the 5S rRNA is not enriched in pull down samples compared to the bead and pre-clear controls.

38. Bryan Garcia

M.S. Biology

Phentypic characterization of an Acinetobacter bauannii LAC-4 mutant with the deletion of the heme oxygenase gene cluster (HOC)

Faculty Mentor: Dr. Howard Xu

Acinetobacter baumannii is an opportunistic pathogen recognized for various healthcare-acquired infections in immunocompromised and critically ill patients. *A. baumannii* LAC-4 was identified as a hypervirulent strain in mice models. LAC-4 was found to have the ability to scavenge iron from the host for infectivity and survival. The chromosome of LAC-4 contains a heme oxygenase gene cluster (HOC) that encodes proteins that sequester iron from heme. A HOC mutant strain (ΔHOC) was generated to determine its role in the hypervirulence of LAC-4. Our results indicate that in Luria-Bertani broth (an iron- rich medium) ΔHOC and LAC-4 exhibited similar dose responses to an iron chelator 2,2'-dipyridyl. However, in iron-limited agar media, ΔHOC was found to have smaller colonies and significantly reduced growth compared to LAC-4. The HOC encoded pathway may be a potential target for the discovery and development of novel anti-virulence therapeutics.

39. Jennifer, Funes

M.S. Biology

Phenotypic characterization of an Acinetobacter baumannii LAC-4 mutant with the deletion of heme utilization cluster I (HUT I)

Faculty Mentor: Dr. Howard Xu

Although not thought of often, bacteria are everywhere, from hospitals to the human gut. These ubiquitous bugs can be either beneficial or dangerous to our health. Like most forms of life, bacteria require iron as a critical nutrient. One dangerous bacterial species is *Acinetobacter baumannii*, which can cause infections in the blood, lungs, or wounds. An *A. baumannii* strain, LAC-4, has been determined as hypervirulent, as it causes pulmonary dissemination and severe bacteremia in immunocompetent mice. The LAC-4 genome contains two large gene clusters involved in iron acquisition and utilization, Heme Utilization Clusters I and II. To determine the role of ΔHUT in the hypervirulence of LAC-4, members of Xu Lab constructed three deletion mutants, where Heme Utilization Cluster I (ΔHUT), II (ΔHOC), or both clusters (ΔHOC/ΔHUT) were deleted. We hypothesize ΔHUT has additional phenotype changes different from those of LAC-4. LAC-4, ΔHUT, and ΔHOC/ΔHUT were studied under various conditions. In the presence of solid or liquid media, there is a similar growth pattern between LAC-4 and the ΔHUT mutant, but ΔHOC/HUT mutant has severe growth defects.

Overall, this research will contribute to the understanding of the roles of heme acquisition gene clusters in LAC-4 physiology and pathogenesis.

40. Cindy Nguyen and Shanti Raminani

B.S. Biochemistry
Investigating the Effects of Thermolysis on the Purification of Recombinant Antifreeze Proteins
Faculty Mentor: Dr. Xin Wen

Antifreeze proteins, a class of proteins which inhibit ice-crystal growth by a depression of the freezing point of fluids, are attributed to the survival of various organisms in sub-zero conditions. This property of AFPs, known as thermal hysteresis, has been the subject of investigation for its application in various preservation techniques. AFPs derived from the beetles *Dendroides canadensis* and *Tenebrio molitor*, DAFP-1 and TmAFP respectively, are commonly expressed as fusion proteins in *Escherichia coli* (*E. coli*), enzymatically lysed, and purified. However, this widely utilized method can be costly and inefficient. Literature that has evaluated alternative purification procedures of thermostable proteins expressed in *E. coli*, have investigated the replacement of a lysis step with a period of heat treatment that lyses the cell with comparable efficiency and yield, known as thermolysis. As such, we have investigated the implementation of a thermolysis step in the place of enzymatic lysis during the purification of recombinant TmAFP and DAFP-1. Studies have revealed that thermolysis effectively lyses the cell, with an efficiency and yield comparable to enzymatic lysis, while also minimizing the presence of impurities in the sample post-lyse.

41. Irene Ngo

M.S., Biology
Investigating the role for Rbp2 in regulating the circadian clock in Synechoccus elongatus
Dr. Susan E. Cohen

Circadian rhythms regulated by a 24-hour biological clock in cyanobacteria enhance fitness for cells exposed to environmental cycles. The circadian clock in cyanobacteria is carried out via the KaiA, KaiB, and KaiC oscillator proteins. Previous work from our lab has shown that RNA-binding protein 2 (Rbp2) is an important factor for clock function in the model cyanobacteria, *Synecocchus elongatus*. Rbp2 is a eukaryotic-like RNA-binding domain that contains a single RNA recognition motif (RRM). It was found that Rbp2 interacts with KaiC and deletion of Rbp2 (Δ*rbp2*) results in reduced localization of KaiC at night and a long-period rhythm of gene expression. Expression of mutant variants of Rbp2 incapable of RNA binding resulted in a long-period rhythm revealing that RNA binding activity of Rbp2 is involved in the regulation of the circadian clock. My project is focused on analyzing the role for RNA bound to Rbp2 in the regulation of the circadian clock by first seeking what RNA(s) are bound to Rbp2. My preliminary data shows the co purification of RNA bound to Rbp2, which can be used to determine whether RNA is bound to Rbp2 at specific times in the circadian cycle.

42. Gwendolyn Kikkert

B.S. Biology
Investigating the interactions between circadian clock proteins KaiC and Rbp2 in Synechococcus elongatus
Faculty Mentor: Dr. Susan Cohen

Circadian rhythms are ~24-hour cycles that drive various biological processes, such as sleep and wake cycles in humans. Circadian rhythms are found in nearly all organisms, the simplest being cyanobacteria. There are three core oscillator proteins, KaiA, KaiB, and KaiC that drive circadian rhythms in *S. elongatus*, the model organism for studying cyanobacterial circadian rhythms. We had previously discovered that oscillator protein KaiC associates with the RNA binding protein known as Rbp2 through a screen aimed at identifying novel interaction partners. To investigate this interaction in more detail, we tagged Rbp2 with a strep tag and monitored the association via co-immunoprecipitation under various conditions. My data suggests that KaiC and Rbp2 associate with each other throughout most of the day with the notable exception at dawn, where an association was not observed. Amino acids R11, R36, and R70 of Rbp2 were identified as potentially being required for association with KaiC. We mutated each of these residues to Alanine in single, double, and triple mutation combinations. However, all mutant strains were still associated with KaiC, suggesting that these amino acids are not required for binding to KaiC and invalidating our model.

43. Pablo Flota and John Guanzon

M.S. Biology, B.S. Biology
Determining the role of linker-region phosphorylation in dSmad2 signaling and degradation
Faculty Mentor: Dr. Edward Eivers

The Transforming growth factor β (TGF-β) signaling pathway is known to be involved in cell proliferation and differentiation during embryonic development. TGF-β signals are primarily divided into two major signaling pathways; the Activin/TGF-β pathway and Bone Morphogenetic Pathway. Our research focuses on the Activin/TGF-β pathway and the mechanism by which the transcription factor *Drosophila* Smad2 (dSmad2) is degraded shortly after C-terminal phosphorylation. Most research regarding Smad2

protein degradation has come primarily from mammal cells/tissues. Research from others has shown mammalian Smad2 is linker phosphorylated after C-terminal activation, it is then ubiquitinated by an E3-ligase, Nedd4L, and transported to proteasomes for degradation. Our understanding of what causes dSmad2 to be degraded is largely limited; however, we and others have shown that dSmad2 undergoes bulk degradation after C-terminal phosphorylation and our project aimed at deciphering what degrades dSmad2. We explored the role of linker-phosphorylation in dSmad2 degradation and mutated two conserved linker sites into non-phosphorylatable alanines. When misexpressed in transgenic *Drosophila* wing imaginal discs it resulted in severe disruption of adult wing size and venation. We also demonstrated that mutation of these linker phosphorylation sites did not seem to be involved in regulating protein stability when analyzed on western blots. Finally, we show that cellular proteasomes are not involved in the bulk degradation of dSmad2.

44. Christina Dhoj

M.S. Biology

Scanning Ion Conductance Microscopy Reveals Differential Effect of Short-Term Particulate Matter Exposure on Membranes of A549 Lung Carcinoma Epithelial Cells Compared to SH-SY5Y Neuroblastoma Cells

Faculty Mentor: Dr. Edith Porter, Dr. Yixian Wang

Incense sticks are widely used across the world. However, harmful particulate matter (PM) emissions from incense sticks can penetrate the lower respiratory tract and circulatory system potentially reaching the central nervous system. There are limited reports on biophysical properties of cell membranes induced by PM including $PM_{2.5}$. Our study assesses the membrane topographical and structural effects from incense $PM_{2.5}$ exposure in real time on A549 lung epithelial cells and SH-SY5Y neuroblastoma cells that had been fixed to preclude adaptive cell responses. Nanoscale morphological monitoring of the cell membranes utilizing scanning ion conductance microscopy (SICM) indicated statistically significant increasing membrane roughness at A549 cells after 30-minutes exposure and visible damage after four-hour exposure. In contrast, no significant increase in roughness was observed on SH-SY5Y cells after 30-minutes of $PM_{2.5}$ exposure, although continued exposure to $PM_{2.5}$ for four hours effected an expansion of lesions present before exposure commenced. Findings suggest that A459 cell membranes are more susceptible to structural damage by $PM_{2.5}$ compared to SH-SY5Y cell membranes corroborating enhanced susceptibility of airway epithelial cells to short term exposure to $PM_{2.5}$ and susceptibility of neuronal cells to long term exposure of $PM_{2.5}$. These data caution against the use of incense stick.

Engineering and Computer Science

45. Janice Nguyen

M.S. Electrical and Computer Engineering

A Classification Model for Facial Landmark Tracking to Determine Sentence Types for American Sign Language Recognition

Faculty Mentor: Dr. Y. Curtis Wang

The deaf and hard of hearing community relies on American Sign Language (ASL) as their main form of communication, but communication with those not fluent in ASL can be burdensome, especially during emergencies when no interpreter is available. To alleviate this problem, research in real time ASL interpreting models is ongoing, but are limited in their abilities to interpret complete sentences. Most of these models are hand gesture based and perform well on simple tasks such as spelling or basic vocabulary. However, these models perform poorly on sentences that require facial cues to convey its meaning. Thus, the integration of facial cues has the potential to improve the performance of ASL interpreting models. We propose a facial expression-based classification model that can be used to improve ASL interpreting models. This model utilizes the relative angles of facial landmarks with principal component analysis and a Random Forest Classification tree model to classify frames taken from videos of ASL users signing a complete sentence. The model classifies the frames as statements or assertions. The model was able to achieve an accuracy of 82%.

46. Abigail Martinez, Erick Carmona, Gustavo Magana, Nicholas Pimentel

B.S. Electrical Engineering
LiDAR vs Camera Self- Driving Car
Faculty Mentor: Dr. Harry Themann

In the presentation of "LiDAR vs Camera Car" the Self-driving Car team presents information encountered and discovered within a years' worth of research regarding the controversy encountered between automobile manufacturers. The controversy over self-driving cars arises with Musk's claims of using a camera-based system without the use of a LiDAR sensor, which most manufacturers and engineers believe is impossible. The purpose of this project is to grasp an understanding of the importance of using a variety of sensors rather than just using a camera-based system as well as to understand the difference between each sensor's parameters. The Camera-based car will use machine learning and Open CV and will be programmed to detect and track lanes as well as grasp the distance of target objects. The LiDAR based car will use ROS (Robot Operating System) for auto navigation via object avoidance, path planning, and localization. In order to achieve this, we are using a Raspberry PI 3 that has ROS (Robotic Operating System) and/or OpenCV (computer vision) which will be the main computer for each car.

47. Melody Hashemian**, Brandon Wilson, Liana Zhu*, Sophia Sherzai**, Alex Sherzai*, Brayan Salgado, Alex Gaeta*, Ashley Lewelling, Kody Woo, and Suvam Patel

B.S. Electrical Engineering**, B.S. Physics/Mechanical Engineering, B.S. Computer Science*, B.S. Mechanical Engineering, B.A. Psychology, B.A. Television, Video, and Film (TVF), M.S. Environmental Science
Cryogenic Unmanned Aerial Vehicle (UAV) Swarms for Lunar Permanently Shaded Regions.
Faculty Mentor: Dr. Charles Hays

In this poster presentation, the Cryogenic Unmanned Aerial Vehicle (UAV) Swarms for Lunar Permanently Shaded Regions team will present the results of work conducted in the 3rd year of our NASA-MINDS project. NASA plans to deploy robotic platforms (e.g., rovers and flyers) on the lunar surface to conduct observation, prospecting, excavating, transporting, and building, tasks. The NASA Technological Area: TA4- Robotics, Telerobotics and Autonomous Systems, supports NASA's objective of returning astronauts to the moon and establishing a sustainable presence. The Cryo-UAV task supports NASA's TA4 Technological Area by conducting laboratory experiments that will enable cryogenic unmanned aerial vehicles (Cryo-UAVs), as robotic swarming platforms with machine learning capabilities for autonomous exploration in the lunar permanently shaded regions (PSRs). At present, there are no flight-qualified robotic systems capable of autonomous exploration in the cryogenic conditions present in the PSRs. Our project will develop enabling hardware in the following technological areas: 1) algorithms and machine learning codes required for autonomous swarming of robotic flyers; 2) reusable propulsion system enabling robotic flyers to conduct long-duration sorties in PSRs, and 3) design and implement a sensor suite (e.g., IR-camera, LiDAR, and LIBS) for the identification of water-ice predicted to be present in the PSRs.

48. Erick Carmona, Michael Zitser, Muzna Shafqat, Sebastian Luna, Laura Fredericks

B.S. Electrical Engineering; B.S. Biochemistry; M.S. Mathematics; B.S. Computer Science; B.S. Physics
Cryogenic SpyderBot Swarms for Lunar Permanently Shaded Regions
Faculty Mentor: Dr. Charles Hays

In this presentation, the Cryogenic SpyderBot Swarms for Lunar Permanently Shaded Regions team presents the results of work conducted in the 3rd year of our NASA-MINDS project. The objective of our research is to develop a Cryo-SpyderBot that could be operated on the lunar surface via algorithms and machine learning, which could be an enabling breakthrough technology to aid NASA's quest for technologies needed to inhabit the moon. The research supports NASA's objective of returning astronauts to the moon and establishing a sustainable presence by designing a lunar science mission that delivers a cryogenically rugged Hexapod Lander to the Moon's permanently shaded regions (PSR). Our goal is to detect the presence of water-ice and accurately mark these locations. The 1st-generation Cryo-SpyderBot Hexapod is based on a modified COTS hexapod, outfitted with a sensor suite (e.g., IR-camera, LiDAR, and LIBS) for the identification of water-ice. The Cryo-SpyderBots will be part of a robotic swarming technology platform to support the identification of water-ice present in the PSRs, and to aid the mining of water-ice via In-Situ Resource Utilization (ISRU) methods. The Cryo- SpyderBot currently uses single-board-computers to execute machine-learning codes being developed to enable autonomous navigation.

49. Catalina Lee

M.S. Mechanical Engineering
Design of Truss Structures Made of Linear Elastic Materials for Hyperelastic Anisotropic Applications
Faculty Mentor: Dr. Mathias Brieu

Pelvic organ prolapse (POP) is a disorder in which the uterosacral ligaments (USL) are not able to adequately hold the pelvic organs in place. The current treatment for severe POP uses a mesh implant that reinforces the USL. The implants used for this procedure cause many complications in patients because of the incompatibilities in structural/mechanical tissue properties between the implant and native tissues. The implants deform when subjected to loads that occur naturally within the pelvic region which led to injury, inflammation, and scarring. To avoid these issues, the potential mesh designs must be evaluated to determine which geometries would behave like the USL (nonlinear, anisotropic) and maintain a certain stiffness without exceeding the stiffness of the native tissues. To construct this, a computer program that generates truss structures based on given structural parameters is created. The program conducts finite element analysis and tests for ideal behaviors. To determine the optimal lattice structures, numerous designs with varying angles and spacings are automatically generated and tested using python and Simulation of Open Framework Architecture (SOFA).

50. Aishwarya Gupta, Rahul Bhogale, & Priyanka Thota

MS Information Systems
Health Insurance Marketplace Analysis
Faculty Mentor: Prof. Jongwook Woo

It has been difficult to find the necessary healthcare insurance in the USA with competitive market. Thus, it is amicable for individuals to assess their needs & thereafter choose the appropriate care with the use of the dataset produced & made available by the Centers for Medicare & Medicaid Services (CMS – 4GB). Thus, we used Health Insurance Exchange Public Use Files (Exchange PUFs) are accessible for plan years 2017 through 2022 for analysis. Here are some first research possibilities because the dataset is intricate & nuanced. How do plan rates & benefits differ by: MoM / YoY, State, Region, Zip code, Family size, Occupation, Age, Insurance-Coverage? How are discounts applied to various insurance types differentiating plans? What conditions/treatments are covered by various insurance plans? Draw attention to the audience whose health insurance policies are about to expire. In essence, we may adopt a consumer- centered approach that meets the needs of families, individuals that enables them to browse through different healthcare insurance plans & select the most important one based on their household income & expenses.

51. Stephen Finn

M.S. Mechanical Engineering
Modeling the Ligaments of the Female Pelvic Floor System Through Iteration of Finite Element Analysis and Transverse Isotropic Constitutive Model
Faculty Mentor: Dr. Brieu

A significant number of women suffer from Pelvic Organ Prolapse, often accompanied by pain, discomfort, and embarrassment. By using a method known as Finite Element Analysis (FEA,) a 3D computer model can be used to help find answers to the problem. The usual method of obtaining anatomically accurate 3D models of human tissue, Magnetic Resonance Imaging (MRI,) separates tissues by water content. The ligaments and their surrounding fat tissue appear the same on common MRI machines though. Thus, another method must be found to model the ligaments. In this study, a FEA model of the pelvic region was constructed in FEBio, without any ligaments. Since ligaments impose strain on connected tissues, high strain in the model was localized. These locations had the direction of strain and a small surrounding volume along that direction also identified. Then the volume's properties were changed to match that of ligament tissue, employing the Transverse Isotropic constitutive model. An iterative process, looking at strain on the tip of the previously modified volume, using a Python script, was then used. This iterative process allowed the rebuilding of ligaments that are consistent with known anatomy and allows assessment of the assumption of the numerical approach developed.

52. Stellina Ao and Gregory Sercel

B.S. Computer Science, Minor Biomedical Engineering, Minor Mathematics; B.S. Microbiology, Minor Biomedical Engineering
Development of a surface electroencephalography acquisition system to validate a movement-encoding forward model.
Faculty Mentor: Dr. Deborah Won

Brain-computer interfaces (BCI) acquire electrophysiological signals from the brain to decode motor intent. The result is translated into commands to be executed by a prosthetic device. BCI systems traditionally acquire neural signals via invasive electroencephalography (EEG). Invasive EEG techniques pose high risks to patients, require complex implantable hardware, and are expensive. In contrast, surface EEG (sEEG) is acquired from electrodes placed on the scalp, which is significantly less risky and costly. The tradeoff is lower-resolution motor

information decoded from the neural signals. This makes sEEGs ill-suited for integration with BCI systems. We aim to develop the experimentation system providing the data that validates our prediction model of gripping forces and binary movement in sEEG. Specifically, we wish to test the resolution that can be determined from sEEG. Our experimental system consists of sEEG acquisition, virtual instruments to conduct behavioral tasks, and a force feedback circuit to acquire the data our model will encode to predict the source sEEG. This system enables us to create a BCI that is significantly less risky to the patient without impacting the quality of data. Such a non-invasive BCI will positively impact the lives of many suffering from paraplegia or tetraplegia.

53. Lekha Ajit, Sushmitha Dandu, Dauren Omarov, and Navyasree Sriramoju

M.S. Information Systems
eCommerce behaviour data from multi-category store
Faculty Mentor: Dr. Jongwook Woo

This paper explains about customer behavior patterns for an online eCommerce muti-category store. We can interpret data by seeing the customer buying and viewing behavior for a particular brand and category. The paper explains the method and process used for data manipulation and further analysis. The major goal of the project is to give a clear flow of handling big data files and data cleaning processes using Hadoop and Beeline. The data interpretation and analysis of this data was done using Excel, Tableau and Power BI. Charts and visuals like as bar diagrams, timeline and charts on customer behavior patterns for an online eCommerce muti-category store.

54. Liana Zhu

B.S. Computer Science
Prediction of California Mass Flowering Phenomena using Machine Learning Approaches
Faculty Mentor: Dr. Jie Zhong

Despite California's persistent drought, desert regions still witness the rare mass flowering phenomenon of wildflowers, known as Superblooming. Desert Superblooming occurs when consistent rainfall and warmth allow dormant seeds to germinate and bloom in abundance. However, predicting when a Superbloom will happen is challenging as it relies on a specific sequence of environmental conditions. Due to its unpredictability, many communities have faced challenges in effectively managing the impact of Superblooms – including the significant ecological and economic effects, both from the influx of human tourists and the presence of diverse wildlife attracted by the flowers, as well as the potential reinforcement of invasive plants and displacement of native species within the imbalanced ecosystem. However, machine learning enables techniques for more thoroughly interpreted predictions than human observations. Thus, the research aims to use machine learning capabilities to deepen understanding of the mass flowering phenomena. The project will analyze data focused on various environmental factors, such as precipitation, wind patterns, soil conditions, temperature, cloud cover, and wildlife activity, to determine where and when a Superbloom is likely to occur. By utilizing machine learning techniques, Superblooms may be accurately predicted and allow for proper prevention against habitat destruction and invasive species establishment.

55. Anthony Trujillo

M.S. Civil Engineering
Post-fire Hydrologic calibration using ECOSTRESS
Faculty Mentor: Dr. Sonya Lopez

With more wildfires being caused by global warming, it is important to better understand the effects of wildfires. After a wildfire the watershed undergoes changes in land composition and vegetation. Modeling postfire hydrology is essential to predict extreme events and simulate how it will affect the watershed and help to come up with a land management plan that will suit the future event. The motivation behind this research is to test if hydrologic models such as Parflow CLM can be calibrated through open access remote sensing data. It is well known that the regrowth rate of vegetation is slow and will take years to fully recover to the same levels as before the fire event. With Parflow CLM simulation runs, it will be possible to see how accurate the simulations are compared to the observed data gathered from ECOSTRESS and MODIS database. With the compared results Parflow CLM will be calibrated to have a hydrologic model that is accurate and predict fire events to minimize the damages created from wildfires.

56. Aliannea Sherman

M.S. Computer Science
Using Immersive Technologies to Explore Cultural Awareness Skills in Healthcare Training with the Virtual Interface for Increasing Kind Interactions (VIIKI)
Faculty Mentors: Dr. David Krum and Dr. Jung Soo Lim

Black or African American patients face many obstacles to receiving equitable healthcare. In the United States, non-Hispanic Black mothers are three times more likely to die of pregnancy-related complications, and Black patients' pain is twice more likely to be underestimated by physicians. During the COVID pandemic, Black, Latino, American Indian, and

Alaska Native communities had higher rates of hospitalization and death. In conjunction with policy changes and efforts to address systemic inequities, healthcare researchers and practitioners recommend anti-bias training and methods to increase empathy for Black patients. Participation in virtual reality simulations may be able to decrease bias in participants and increase empathy. The Virtual Interface for Increasing Kind Interactions (VIIKI) provides a training space for healthcare providers to interrupt biases against historically marginalized communities, practice displays of empathy, and make culturally aware advisement to patients. Healthcare students wear a virtual reality headset and have conversations with a virtual character that is controlled by an instructor. Students are given guidance to improve their communication skills. It is our hope that by using anti-bias and cultural awareness training such as VIIKI, Black or African American patients will receive more equitable treatment, which will ultimately improve patient outcomes.

57. Adolfo Retana

M.S. Water Resources Engineering
An "off-the-shelf" Post-Fire Hydrologic Model for California
Faculty Mentors: Dr. Sonya Lopez

In recent years, we have observed increased fire events due to climate change, land use changes, and human activities. Wildfires are an important natural process that plays a vital role in our ecosystem, but frequent wildfire events have substantially disrupted and reshaped these forest ecosystems. To better understand the impact and dynamics of wildfires, research is necessary to fully comprehend and understand their effects on ecological, social, and economic platforms. This study involved diving deeper into several data parameters used in hydrological models called ParFlow-CLM to overlook water resources, soil conditions, burn ratio, and several other parameters. Currently, our community needs several studies that conduct fire simulations and focus on water resources, vegetation growth, overland flow, burn rations, forecasting, wildfire prediction, and other essential parameters. As this is just the beginning, we are developing the "off-the-shelf" model and testing it on a watershed with a degree of freedom incorporated into it that can spark the next generation of fire modeling. This research study is the start of a long-term goal where our end goal is to create an "off-the-shelf" product for all research community members to use this model for fire simulation for any wildfire event.

58. Michael Maciel

B.S Computer Science
Data Processing and Visualization for TSA Passenger Arrival Prediction
Faculty Mentor: Dr. Jiang Guo

Transportation Security Administration (TSA) needs to be able to forecast the number of travelers that will arrive per terminal in every airport within the United States. We conducted research on how to extract and provide clean airport terminal passenger throughput data within the United States. We also investigate how to use Python and Django to visualize historical data and forecasting data.

59. Matthew Engquist and Amir Shakibi

M.S. Materials Science
Microstructural Analysis of Laser-Wire Direct Energy Deposition 316L Stainless Steel
Faculty Mentor: Dr. Moshen Eshraghi

Direct Energy Deposition (DED) is a type of additive manufacturing that utilizes powder, wire, or a combination of the two as a feedstock. DED is notable for its high deposition rate and is capable of printing large-scale components and thin walls. Identifying appropriate processing parameters is crucial for the printability of these components in order to reduce defects and improve mechanical properties. In this study, a laser-wire DED system with 6 lasers and a coaxial wire feed was used to print 316L stainless steel samples using a variety of processing parameters. The effect of these parameters on the microstructure & single-track bead geometry is discussed and explained.

60. Cesar Cerda

M.S Mechanical Engineering
Evolution of the Mechanical Properties of degradable biomaterials
Faculty Mentor: Dr. Mathias Brieu

With the increase of plastic waste pollution and lack of information about their degradation it is necessary to study and identify appropriate biodegradable biomaterials to decrease the accumulation of non-degradable packaging waste. The purpose of this work is to determine the mechanical characteristics of 3D printed compound biomaterials made from polylactic acid (PLA) and polycaprolactone (PCL) during degradation. Filaments were manufactured by physical blending of both materials in pellet form using a filament extruder. The filaments manufactured included 100% PLA, 100% PCL, and ratios of 90/10, 80/20, 60/40 and 40/60 of PLA and PCL respectively. A 3D printer was used to print dog-bone shaped geometries out of the previously extruded filaments.

The printed samples were submerged in saline solution at 38°C for 10 weeks. The mechanical characterization was done with a uniaxial tensile machine. The data collected was processed to obtain the elastic modulus, Yield and Ultimate tensile stress (UTS). It was observed that as PCL is increased, the compound presents an elastic behavior with lower modulus, Yield and UTS. At the end of the degradation process the elastic modulus remains constant while Yield and UTS decrease. Also, as PCL content increases the behavior becomes more linear elastic with brittle breakage.

61. Jinwei Zhang and Estefani Ontiveros Najera

B.S. Mechanical Engineering
Flow Sensing Testbed for Investigation of Oscillating Heath Pipe Efficiency
Faculty Mentor: Dr. Deborah Won

Oscillating heat pipes (OHP) are pressure-driven two-phase flow devices that successfully transfer thermal energy, usually fluid, between a heat source and a heat sink. The flow within an oscillating heat pipe is uncontrolled. To investigate the flow along OHPs and the factors that affect the flow, we need to determine which sensors to use, how many, and in which locations to most accurately assess, and eventually predict, the flow in OHPs. Toward this end, we are designing and building an experimental testbed to measure flow under controlled conditions. We will present a trade analysis of the different sensors under consideration, our design of the sensor configuration, and preliminary results from our experimental testbed. Firstly, various flow rate sensing devices, such as thermal, turbine-based, and doppler-based sensors, were considered. Various micropumps for which the output flow rate was approximately 20mL/min were also considered. We will determine the accuracy of our proposed flow sensing system and the feasibility of applying it to measuring the flow rate of a copper pipe oscillating heat pipes with a diameter of ⅛ inch.

62. David Strickland and Suthawit Udomnopwitayakul

M.S. Materials Science and Engineering
Replication of an anthraquinone-ferrocyanide redox couple synthesis for redox flow battery
Faculty Mentor: Dr. John Christopher Bachman

Redox flow batteries represent a viable pathway for grid-scale renewable energy storage. To replicate the results of a previous study, a catholyte solution was produced using potassium and sodium salts of ferrocyanide at a 1:1 ratio. The complementary anolyte solution was produced using the active species, AQDS-IER, produced by cation exchange from anthraquinone-2,7-disulfonic acid disodium salt, adding ethylene glycol to improve solubility. Potassium chloride was used as a supporting electrolyte for both solutions. Cyclic voltammetry results of the catholyte resulted in cathodic and anodic peaks of 0.44V and 0.16V, respectively, matching closely with the original study. The anolyte, however, showed a cathodic peak of 0.4V, 0.8V higher than the study, along with the expected anodic peak of -0.5V, representing a large, unexplained overpotential. Testing for pH neutrality showed the only component that showed neutral results was the KCl supporting electrolyte. The pH of the ferrocyanide catholyte is 10 and the pH of 2,7-AQDS is 1. Further study will seek to explain the difference in experimental results of the anolyte by examining the AQDS compound via characterization to validate the results of the cation exchange process.

63. Deep M. Bhatka, Roger Roldan and Anayely M. Saguilan

B.S.Computer Science; B.S. Mechanical Engineering; M.S. Mechanical Engineering
Toward Experimental Dynamics and Fuzzy Control of an Inverted Pendulum – Cart System
Faculty Mentors: Dr. Arturo Pacheco-Vega and Dr. Gustavo B. Menezes

This two-part work deals with the dynamics and intelligent control of an inverted pendulum-cart system via numerical simulations and experiments. The control strategies are based on the fuzzy logic technique, which has the ability to describe complex systems via linguistic variables and human-defined rules. The system is set up such that the mass of the pendulum is able to revolve around a hinge located on top of the cart. Two states for the system are possible: a stable downward position and an unstable upright position. For control purposes, three different fuzzy logic-based controllers - each including an increasing amount of information about the pendulum position, the position rate of change, and its corresponding averaged integral – were coded in MATLAB. For the numerical simulations and control, a mathematical model consisting of two coupled second order non-linear differential equations were first set up and then converted into a set of four first order non-linear differential equations, while the experimental setup is under development. Theoretical results demonstrate that it is possible to control in an effective manner. Once the testbed is built and tested, the corresponding experiments will be both conducted and compared to the numerical solutions.

64. Isaac Aldape Torres

M.S. Mechanical Engineering

Optimization of a Redox Flow Battery Power Cell for Clean Energy Storage

Faculty Mentor: Dr. John Christopher Bachman

As renewable energy is on the raise, technology to store that energy is as equally as important. A redox flow battery will change the way we store energy by using liquid non-acidic electrochemistry charged through our battery cell prototype. This research focuses on encountering the effects of the application of different flow patterns, flow rates, and charging rates in our experimental battery prototype. These variations will exhibit their effect in the performance of the redox flow battery over time. The goal is to create a baseline for our future generation of battery cell prototypes that are more efficient at charging and transforming energy from electrical energy to chemical energy.

Health, Nutrition, and Clinical Sciences

65. Sydney Tan

B.S. Nutritional Science

The Relationship Between Self-efficacy and Engagement in Healthy Behaviors Among Los Angeles Community Members Living with Chronic Conditions – A Qualitative Study

Faculty Mentor: Dr. Kathryn Hillstrom

Chronic conditions, such as diabetes, high cholesterol, and high blood pressure, affect millions of people in the United States. Effective management of these conditions requires dedicated attention and daily adherence to healthy behaviors. This qualitative study summarizes the results of key informant interviews with 37 diverse Los Angeles community adult members conducted as part of the Centers for Disease Control and Prevention-funded Solutions for Healthier Communities Initiative. Examined through the lens of the Health Belief Model and Stages of Change Model, the study findings show how self-efficacy and readiness to change can impact health behaviors among people with chronic conditions. Interviewees with high self-efficacy reported an increase in initiating behavior change and maintaining healthy behaviors such as regular exercise, a healthy diet, and taking medications as prescribed. Those with lower self-efficacy reported more barriers, denial, and were more often in the pre-contemplation or contemplation stages of change when asked about engaging in healthier behaviors. For all interviewees, the maintenance of healthy behaviors varied based on chronic condition/disease type and severity and the length of time since their diagnosis, with diabetes being the most challenging to manage. Healthcare professionals have an essential role in growing and supporting their client's self-efficacy.

66. Ignacio Montoya

M.S. Kinesiology

Effectiveness of Progressively Reducing Robot Assistance with an Exoskeleton to Regain Stepping after a Complete Spinal Injury

Faculty Mentor: Dr. Ray de Leon

We assessed the effectiveness of an exoskeleton in aiding weight-bearing stepping in individuals with complete spinal injury. Previous studies have shown that rehabilitation training combined with spinal epidural stimulation can result in some degree of recovery, allowing for weight-bearing stepping with assistance. Our study utilizes a noninvasive spinal stimulation strategy combined with a programmable exoskeleton that can provide different degrees of assistance when training to regain unassisted stepping. We hypothesize that this strategy provides the subject with the ability to reestablish functional connectivity between the brain and spinal circuitry which enables the subject to learn to generate a progressively greater amount of the work as less robotic assistance is provided. Key observations have shown that the subject can regain stepping properties with reduced assistance, exhibiting bilateral consistency in step cycles and EMG patterns. Our interventions have shown that the subject can consistently adapt to reduced assistance levels while maintaining relatively normal biomechanics, indicating functional recovery between the supraspinal and spinal centers. This learning process is greatly dependent on the relatively normal proprioception from the rhythmic loadbearing that guides the emergence of functional connectivity among spinal and supraspinal networks to activate motor pools with a pattern consistent with stepping.

67. Sahiba Aggarwal, James Bagsic, Lilyann Hopkins, Megan Mendoza, and Jessica Wu

B.S. Nursing

Effects of Gestational Diabetes Mellitus on Fetal Growth and Potential Health Outcomes: A Narrative Literature Review

Faculty Mentor: Dr. Stefanie Varela

This study is aimed at reviewing the state of research in regards to risk factors for gestational diabetes mellitus (GDM). GDM is a severe hormonal disorder that is defined as the development of chronic hyperglycemia during the second or third trimester without a previous diagnosis of diabetes. We searched ten databases–CINAHL, EBSCO, Medline, PubMed, PsycINFO, SocINDEX, UpToDate, ERIC, ProQuest, and Google Scholar–from 2007 to 7 November 2022. We selected eleven articles that met our selection criteria which included prospective cohort studies that evaluated the risk factors correlating to resultant diagnosis of gestational diabetes. This literature review also discusses the main gaps in GDM management and prevention, current health education effectiveness, and barriers to interventions. From this, we hope to educate healthcare professionals on the gaps of knowledge that exist and reduce the number of gestational diabetes cases.

68. Mohamed Khalil, Leticiana Conover, Jasmin Ha, Birgitta Martinez, Bryanna Avina

M.S. Public Health

A cross-sectional analysis of cigarette smoking status and perceived oral health.

Faculty Mentor: Dr. Ndifreke Etim

Previous studies have shown that smoking has a negative impact on oral health. Thus, it is crucial to better understand the relationship between smoking cessation and oral health. This study examines the difference in self-perceived oral health between current smokers and former smokers. A data set from CHIS 2020 was obtained with a total of participants (N=14,149). This study uses a multivariable logistic regression to assess the association between smoking status and self- reported condition of teeth after controlling for dental visits, dental insurance, age, gender, and ethnicity. Data analysis accounted for the complex survey design from CHIS by applying replicate weights for variance estimations. Compared to nonsmokers, current smokers were likely to rate their teeth as poor (OR: 2,61, 95% CI: 2.10, 3.24). Similarly, former smokers rated their teeth poorer than nonsmokers (OR: 1.58, 95% CI: 1.33, 1.88), however, they were significantly better than current smokers. Based on our analysis, current smokers reported worse perceived condition of teeth than former smokers. This result correlates with previous research showing the importance of smoking cessation. It may be beneficial to integrate smoking cessation programs into dental care offices.

69. Ceren Acik

M.S. Kinesiology

An insight on functional and morphological symmetry in neck muscles in baseball players

Faculty mentor: Dr. Leila Rahnama

Background: Baseball involves unilateral activities during pitching and bat swing. Previous studies showed that shoulder muscle strain and imbalance have been reported in baseball players. Neck and shoulder muscle functions are intercorrelated due to their extended muscle attachments. However, there is no evidence showing that this unilateral repeated activity can lead to neck muscle hypertrophy on the pitcher's dominant side that is used for throwing the ball. Purpose: To determine if there is any asymmetry in muscle morphology, cervical range of motion (ROM), and bilateral proprioceptive accuracy in baseball players. Methods: A total of twenty baseball players and twenty healthy controls will participate in this study. Cervical flexion, extension, and lateral flexion ROM will be measured with a bubble inclinometer. Neck extension maximum voluntary contraction (MVC) will be measured using a handheld dynamometer. Muscle thicknesses will be measured via ultrasonography, at rest, and neck extension MVC. Conclusion: The finding of this study will help us have a better understanding of the morphology and function of neck muscles in baseball players, which in turn helps us learn about mechanisms of injury and how to prevent them in players of baseball.

73. Anthony Segura*, Cathy Lam, Rayana Ramirez, and Jacky Chan

B.S. Chemistry*; B.S. Biochemistry
Analysis of Microplastics in Beach Samples by Gas Chromatography - Time Of Flight Mass Spectrometry (GC-TOFMS)
Faculty Mentor: Dr. Petr Vozka

Plastics are found everywhere in Californian's daily lives and environment. As plastics are ubiquitous, it is estimated that 11 million metric tons of plastic enter our oceans annually. Over time plastics degrade into smaller pieces called microplastics, defined as five millimeters in size and below. This project uses various methods to develop a separation technique for separating microplastics from organic and inorganic residues (e.g., sand and wood). With varying degrees of environmental contamination, our goal is to determine what organic compounds are absorbed on the surfaces of microplastics by using GC- TOFMS. A separation technique will be developed to separate the bulk sand from the microplastic beach samples. Upon successful completion, this research will provide information on the frequencies, trends, and patterns of microplastics along the shorelines in question and develop long-term methods for analyzing the effects of microplastic presence in a coastal ecosystem.

74. Arianna Camarena

M.S. Geological Sciences Environmental Hydrogeology
Groundwater Imprint on the Hydrochemistry of the Upper Los Angeles River above Sepulveda Basin
Faculty Mentor: Dr. Barry Hibbs

The Los Angeles River is a fifty-one-mile channel which began channelization in 1938. The Los Angeles River has not been studied extensively with environmental isotopes in the upper part of the LA River, which extends from its headwaters near Calabasas to Sepulveda Dam. Researching the isotopic, general inorganic chemistry, and trace element concentrations in this part of the river will provide great insight into the potential for this part of the river to be improved or restored, for ecological and recreational purposes. My study tested field parameters, major ions (sulfate, chloride) nutrients (nitrate, ammonium, orthophosphate), trace elements (selenium, arsenic) and stable isotopes of oxygen, hydrogen, and sulfur. The study period was during the summer dry season, 2022. A significant finding of the study is that there is much loading of groundwater between headwaters and Tampa Avenue, which carries selenium and nitrate into the river. Below Tampa Avenue to Sepulveda Dam there is no groundwater loading, and hydrochemical changes due only to dry weather urban runoff. Along Sepulveda Basin, the input of large volumes of treated wastewater dominates the hydrochemical signature of the river, adding moderate amounts of nitrate, but diluting the chloride and sulfate concentration of the river. The addition of treated wastewater also increases discharge of the LA River by orders of magnitude below Sepulveda Dam.

75. Matthew Perez

B.S. Mathematics
Mathematical Modeling of COVID-19
Faculty Mentor: Dr. Melisa Hendrata

Mathematical modeling has become an important tool in epidemiology that enables us to project how infectious disease progresses, predict the likely outcome of the epidemic, and ultimately allows us to better develop intervention strategies to mitigate the spreading of the disease. The SIR-model is a widely-used model in mathematical epidemiology that divides the population into three compartments—Susceptible, Infected and Recovered populations. As intervention strategies often focus on isolation of infected individuals as well as vaccination, we study the extended SIR-type models involving more compartments to accommodate different states of infection and intervention strategies. By applying the least square technique to COVID-19 dataset, we estimated its transmission parameters, and by using the next generation matrix, we further computed its basic reproduction number, a quantity that determines whether the infection will increase, remain constant, or die out. By solving the model numerically, we analyzed the effect of lockdown strategy that was implemented during the early pandemic and agreement with data was obtained with high level of accuracy.

76. Juliann Panehal

M.S. Physics & Astronomy
The Inner Workings of a Protostar: A Chemical View of the Disk and Envelope of L1527
Faculty Mentor: Dr. Susan Terebey

A protostar is a young star in its early stages of formation. During this time, it is collecting gas and dust, which will accrete and contract to eventually provide the conditions for fusing hydrogen: characterizing it as a fully formed star. To investigate the structure of protostars—including their disks, envelopes, and outflow regions—high resolution spectral data is needed, such as that provided by the Atacama Large Millimeter/submillimeter Array (ALMA) located in Chile. Using this data, one can analyze the chemistry of these regions and gain a clearer picture of the processes leading to planet formation, and consequently, the origins of life itself. In this study, we zoom in on one particular protostar, L1527, a younger (Class 0/I)

Last Year's Cal State LA Statewide Competition Delegates
CSU Student Research Competition,
San Francisco State University, San Francisco, April 29-30, 2022

Monique Swaby
M.S. in Forensic Psychology
Differences in Racial Identity Predict Same-Race Leniency in Mock Jurors
Faculty Mentor: Dr. Mitchell Eisen

Michael Baum
M.A. Psychology
Religiosity Predicts Negative Personality Attributes: Links with Dogmatism, Social Dominance Orientation, and Right-Wing Authoritarianism
Faculty Mentor: Dr. Heidi Riggio

Nouneh Boodaghian
M.S. Biological Sciences
Investigating the roles for essential genes in the regulation of the circadian clock in Synechococcus elongatus using CRISPR interference
Faculty Mentor: Dr. Susan E. Cohen

Stephanie Varghese, Session 16, Biological and Agricultural Sciences – Undergraduate #1, 2nd Place (tie)
B.S. Biological Sciences
Drought and warming shift primary production in grasslands disproportionately by plant species
Faculty Mentors: Maggie Anderson (UMN), Dr. Amber Churchill (UMN), and Dr. Alexandra Wright (CSULA)

Nikita O. Mishra, Session 6, Engineering and Computer Science – Mixed, 1st Place
B.S. Biochemistry, Minor in Bioinformatics & Computational Biology
Computational characterizations of binding affinity in SARS-CoV-2 variants to the human ACE2 receptor
Faculty Mentor: Dr. Negin Forouzesh

Michelle Carballo
M.A. Latin American Studies
An early modern American story: Is there only one way to be a winner?
Faculty Mentor: Dr. Kittiya Lee

Hazel Carias-Urbina
B.A. History, Minor in Latin American Studies
Parade para el pueblo: Community Collaboration in the COFECA Independence Day Parade and Festival
Faculty Mentor: Dr. Camille Suarez

Genesis Barzallo, Hung Gieng, and Estella Luu
B.S. Biochemistry and B.S. Chemistry
Quantitative Analysis of Olefins in Petroleum Fractions by Comprehensive Two-Dimensional Gas Chromatography
Faculty Mentor: Dr. Petr Vozka

Alisa Quon and Anna Nguyen, Session 3, Physical and Mathematical Sciences – Undergraduate, 2nd Place (tie)
B.S. Biochemistry; B.S. Biochemistry
Porphyrinic Metal-Organic Frameworks for the Photocatalytic Detoxification of a Mustard Gas Simulant via Selective Oxidation
Faculty Mentor: Dr. Yangyang Liu

Vincente Lossada
M.S. Mathematics
Phase Transition in the Erdos-Renyi Random Graph
Faculty Mentor: Dr. Daphne Liu

University-Student Union 3rd Floor Plan