# 2022 Convocation Participants

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<td>Andrew Alday</td>
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<td>Megan Bradley</td>
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<td>Andrew Brands</td>
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<td>Maywand Hatamy</td>
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<td>Zane Landin</td>
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<td>Amy Luong</td>
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<td>Emma Medina</td>
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<td>Samantha Miranda</td>
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<td>Elizabeth Monteith</td>
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<td>Mir Mouawad</td>
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<td>Noor Naji</td>
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<td>Harita Neervannan</td>
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<td>Sarah Ragle</td>
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<td>April Rice</td>
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<td>Maya Santos</td>
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<td>Zoe Walker</td>
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<td>Aiko Yamada</td>
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2022 Capstone Project Mentors

The Kellogg Honors College gratefully acknowledges the Capstone project mentors:

Dr. Zekeriya Aliyazicioglu
Dr. Gregory Barding
Dr. Paul Beardsley*
Dr. James Blair
Dr. Jorge Botana-Alcalde
Dr. Jen Bright
Dr. Nancy Buckley
Dr. Frank Chandler
Dr. Douglas Durrant
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Dr. Henry Xue
Dr. Wei Yu
Dr. Yongping Zhang

*Mentored Multiple Projects

About the Capstone Project

The Honors Capstone Project is the culminating academic experience for students in the Kellogg Honors College. Honors students, under the supervision of faculty mentors, complete an in-depth project which demonstrates research, scholarship, and creativity in a topic of their choosing. Capstone projects are formally presented in a poster session at the Kellogg Honors College Convocation every spring semester. The following pages contain project abstracts with links to posters.
2022 Capstone Project Abstracts
In alphabetical order by students’ last name. Click the project title to view the research poster (PDF).
Preliminary Design of a Centrifugal Pump for a Turbopump-fed Liquid Rocket Engine

Authors: Andrew Alday
Faculty Mentor(s): Dr. Frank Chandler, Dept. of Aerospace Engineering

State of the art industry rocket engine architectures use turbomachinery to power orbital launch vehicles. Many undergraduate level rocketry teams utilize liquid rockets with a simple pressure-fed system. However, a more complex turbopump-fed system was designed to propel the Z-1 liquid rocket engine of Cal Poly Pomona's Liquid Rocket Lab (LRL). A major component of a turbopump system is the impeller, which generates the required pressure to the thrust chamber of the rocket. Typical turbopumps consist of a centrifugal pump that utilizes the conventional radial impeller design with backward curved vanes, which has been widely accepted in the liquid rocket propulsion industry. On the other hand, there exists literature that suggests that some applications are better suited for the employment of a Barske impeller, a radial impeller with straight vanes. Aspects to consider when comparing the two impeller designs are efficiency, axial thrust, radial thrust, and impeller diameter. Using the data leveraged from pump performance parameters and pump geometry calculated in MATLAB, a trade study was conducted to determine that a conventional radial impeller was best suited for the design.

The Impact of Teaching About Patterns of Human Variation on Nonbiology Major Students' Views of Human Races

Authors: Christian Aquino
Faculty Mentor(s): Dr. Paul Beardsley, Dept. of Biological Sciences

Many Americans hold misconceptions that people from different socially constructed races have large genetic and phenotypic differences. In this study we assessed the impact of a scientific curriculum on patterns of human diversity on undergraduate non-biology majors' understanding of the biological aspects of race and genetics. The subjects were enrolled in a virtual non-majors Life Science general education course during Fall semester 2021. Working with 3 faculty professors, subjects were assigned to a treatment (3 sections) or a control group (2 sections). Students in the treatment group completed a short human diversity interactive activity that used patterns of human diversity to address specific misconceptions. Students in a control section learned genetics as it is typically taught. All students in the study completed a pre-test (n=199) and an identical posttest which included questions to assess participants' confidence. Initial analysis of the pre-test data shows no significant baseline differences between the treatment group and control group. Data from the pre-test suggests that a higher percentage of students in this course hold misconceptions about patterns of human diversity than in other published work. For instance, 51% of students responded that
there are individual traits that can be used to define a racial group (compared to 24%) and 70% (as opposed to 27%) think that there are more biological differences between racial groups than between individuals within a race. We will report the impact of the teaching intervention on students' understanding of human diversity at the time of the conference.

Garlic's Effects on Lipopolysaccharide and Lipoteichoic Acid Induced Cytokine Secretion in J774A.1 Cells

Authors: Megan Bradley  
Faculty Mentor(s): Dr. Nancy Buckley, Dept. of Biological Sciences

The purpose of this project is to compare the effects of garlic on the secretion of tumor necrosis factor-alpha (TNF-α) from macrophages challenged with either lipopolysaccharide (LPS) or lipoteichoic acid (LTA). TNF-α is a pro-inflammatory cytokine and the major cytokine produced by macrophages. LPS is a component of the cell membrane in gram-negative bacteria, while LTA is a component of the cell wall in gram-positive bacteria. To investigate how garlic affects TNF-α secretion from LPS challenged macrophages vs those challenged with LTA, J774A.1 murine macrophages were plated at 1.25*10^5 cells/mL. After incubating the cells for 24h at 37°C with 5% CO2, the conditioned media was replaced with fresh media and the cells were treated with LPS (1 μg/mL) or LTA (0.1-1 μg/mL) in the absence or presence of varying concentrations of garlic. After another 24h incubation, we collected cell supernatant and did an enzyme linked immunosorbent assay (ELISA) to measure the TNF-α secretion. To normalize the data, we also performed a cell protein assay. Our initial results using LPS indicate that garlic increases TNF-α secretion in J774A.1 cells in the presence of LPS. We are now investigating if garlic has a similar effect on the macrophages when they are treated with LTA instead of LPS. The importance of our findings is that they could have relevance to emerging research in phytomedicine regarding the potential therapeutic effects of garlic in the prevention and treatment of diseases.

Financial Literacy and Borrowing Behavior in Different Age Groups

Authors: Andrew Brands  
Faculty Mentor(s): Dr. Wei Yu, Dept. of Finance, Real Estate, and Law

Financial literacy for younger American adults declined sharply in recent years. Using the 2018 National Financial Capability Study (NFCS) survey data, we examine the differences in financial literacy among various age groups, as well as the gender and race gaps. We find that younger groups have much lower level of financial literacy than older groups, with apparent gender and race gaps present in all age groups. Our results also suggest that financial literacy affects borrowing behavior. Specifically, higher level of financial literacy is
Data Study of the Effect of Biochar Application on Greenhouse Gas Emissions from Agricultural Soils

Authors: Celeste Chan
Faculty Mentor(s): Dr. Simeng Li, Dept. of Civil Engineering

A substantial amount of greenhouse gas emissions is from agriculture practices. With the increasing popularity of using biochar as a soil amendment, the question arises as to whether the application of biochar will mitigate greenhouse gas emissions in agricultural fields. This ongoing study aims to synthesize recent research data on biochar's effects on soil greenhouse gas (GHG) emissions, particularly CO2, CH4 and N2O. Data were extracted from independent individual studies and then statistically processed for analysis. This synthesis focuses on biochar made from woody and herbaceous feedstocks through fast pyrolysis. Possible impacting factors such as biochar feedstock type, residence time and temperature for biochar pyrolysis, biochar application rate, soil type and soil properties were considered for comparisons. To exclude influences of fertilizer nutrients (e.g., N and P), research that applied fertilizers during the observation periods were not selected. All the emission data collected from different sources were converted into their respective cumulative emissions over 30 days, and the percentage changes in GHG emissions were calculated between the control and experimental values. Our preliminary results indicate that biochar application in most agricultural fields is likely to reduce GHG emissions (particularly N2O emission), but the data from a small group of studies suggest differently. It also has been found that biochar products made from herbaceous feedstock tended to stimulate CO2 and CH4 emission, while those from woody materials exhibited little effects. Understanding biochar's impact on GHG emissions would greatly contribute to building a more resilient agricultural ecosystem against the changing climate.

Do It For The Gram: Results from the Physical Activity and Social Media Support (PASS) Study

Authors: Shalis Danayan
Faculty Mentor(s): Dr. Zakkoyya Lewis-Trammell, Dept. of Kinesiology

Physical inactivity are prevalent global public health issues. Internet-based interventions may offer the most potential due to the opportunity for widespread community outreach, large-scale physical activity promotion, and active user engagement. Instagram is of particular interest because of the various methods of interaction with options but with the rise of misinformation on the Internet user's trust and engagement with the platform for
physical activity promotion is unknown. PURPOSE: The primary purpose of the current study is to determine the level of trust that participants place in account holders and if users do further verification regarding provided educational content. METHODS: The PASS study was a three-arm randomized intervention that took place through Instagram. The three accounts consisted of the control group, student group, and scientist group. The two intervention groups posted identical, daily content and were led by a student and a scientist to determine if account holder had an impact on user trust and acceptance of content. Participants were asked to complete weekly questionnaires for a period of four weeks and complete follow-up questionnaires at two and three months through Qualtrics (Qualtrics XM, Qualtrics, Drive Provo, UT USA). Study outcomes included self-reported trust in the content presented, enjoyment of the Instagram account, learning something new, doing any further research, and overall satisfaction.

**Exploring Peer Pressure and Behavior During the COVID-19 Pandemic**

**Authors:** Jasmine Enriquez  
**Faculty Mentor(s):** Dr. Claudia Garcia-Des Lauriers, Dept. of Geography and Anthropology

The COVID-19 Pandemic caused various changes to our society, ranging from severe to minimal. Among these changes, the COVID-19 pandemic has provided a new perspective towards behavior, and decision-making throughout the population. One aspect that was found in various forms throughout the pandemic was the social influence of peer pressure. As the pandemic rose, various emerging adults faced continuous forms of peer pressure, such as neglecting stay-at-home orders or refusing to wear masks. However, positive peer pressure can create the possibility of beneficial decisions, such as influencing the betterment of others. The purpose of this study is to examine the occurrences and origins of negative and positive peer pressure throughout the COVID-19 Pandemic. In a virtual survey conducted through Qualtrics, 56 (25 women, 12 men, 2 non-binary, and 1 other) anonymous participants were recruited via social media sites. Participants' ages ranged from 18 to 25, to examine the population of emerging adulthood. Throughout the survey, participants provided information about their experience with negative and positive peer pressure during the pandemic, and the effects these phenomena had on their behaviors. Likert scales were utilized to provide likeability towards performing actions with negative or positive pressure, and without. Data supported participants of the sample did experience forms of positive peer pressure during the pandemic, increasing the likeability of performing pandemic-safe behaviors. Participants' data showed that prevention measures, such as wearing masks and getting the COVID-19 vaccine, received the highest amounts of positive peer pressure in comparison to other behaviors. This data supports the idea that peer pressure can produce positive and safe activities among emerging adults. Among the limitations of this survey, sample size and recruitment process added constraints to the research. Future research should aim to be conducted with a larger sample size, and recruiting participants in less
biased websites. Social influence has continued to navigate behaviors among adolescents and emerging adults at a rapid rate. With growing research of the pandemic and peer pressure, there is an importance in examining the growing effects positive pressure can have on guiding adolescents and emerging adults towards safer behavior paths and patterns.

**An Examination of Climate Concerns and Intention to Eat Less Meat Explored Through the Application of The Theory of Planned Behavior: The Moderating Effects of Age and Online Community Engagement**

**Authors:** Vivian Graft  
**Faculty Mentor(s):** Dr. Elif Ozkaya, Dept. of International Business and Marketing

The recent trend in meat alternatives and the adoption of plant-based diets (vegetarianism, veganism, flexitarianism, etc.) has led to an increase in research that explores the reasons an individual might choose to reduce their meat consumption, since there are numerous reasons one might choose to do so. However, there are still avenues to be explored in this realm of research. Ethical, moral, and environmental concerns have been researched as factors that may influence a reduction in meat consumption. With climate change concerns rising and consumers adopting more environmentally friendly purchase behaviors, the choice to buy less meat has also become an increasingly popular way to lessen one's impact on the environment. This study will examine how climate change concerns will influence an individual's decision to eat less meat. Icek Ajzen's Theory of Planned Behavior will be applied as the conceptual design of the study so that the behaviors of these individuals and the factors that lead to their choices can be thoroughly considered. The current study will examine the subjective norm, attitude, and perceived behavioral control of individuals and how these factors influence their purchase intentions and overall purchase behaviors. As well, participants will be examined by generational cohorts and their level of online community engagement. Age and online community engagement will be explored as moderating factors toward the development of individuals' subjective norm, attitudes, and perceived behavioral control.

**SARS-CoV-2: An Analysis on Pathogenesis, Therapeutics, and Long-Term Impacts**

**Authors:** Maywand Hatamy  
**Faculty Mentor(s):** Dr. Douglas Durrant, Dept. of Biological Sciences

The coronavirus family consists of relatively large, crown-shaped virions that cause upper-respiratory illness, with symptoms similar to the common cold. There are hundreds of different coronaviruses, but the most notable are the SARS coronavirus (SARS-CoV) and the MERS coronavirus (MERS-CoV), both of which have resulted in severe respiratory disease. The
spread of the novel coronavirus, SARS-CoV-2 from Wuhan, China in December 2019 has led to a lengthy pandemic with heavy losses sustained in the general population. The narrow focus of this project is to outline the pathogenesis, potential treatments, and future complications of the COVID-19 disease. Ultimately, the goal is to foster understanding of viral pandemics to adequately prepare and effectively respond to inevitable novel virus outbreaks in the future.

Preliminary Design of a Non-Destructive IV Tube Measurement

Authors: Janet Marie Hernandez
Faculty Mentor(s): Dr. Henry Xue, Dept. of Mechanical Engineering

Different types of non-destructive testing (NDT) were researched and explored: optical measuring, ultrasonic testing, radiographic testing, and liquid penetrant testing. The purpose of this research is to explore a preliminary design for a non-destructive IV tube measurement method based on research of different types of non-destructive testing (NDT). At least one NDT method would be implemented into the design, after considering which design would be most suitable. It was chosen that a system of two different NDT methods would be chosen: optical measuring and radiographic testing. Optical measuring would be used to measure the outer diameter, ovality, and eccentricity while radiographic testing would be used to measure the inner diameter accurately.

Presidents' Effects on Opposing Party Coordination

Authors: Nicolas Hernandez Florez
Faculty Mentor(s): Dr. Mario Guerrero, Dept. of Political Science

Attempting to bridge differing perspectives between candidate and elite-driven theories of post-reform presidential nomination contests, this paper studies factors that may affect party coordination. Specifically, it examines the proportion of a party's sitting governors and senators who endorsed any candidate before the Iowa caucuses and the share of those endorsements received by the leading endorsement-getter as tandem measures of party coordination akin to those outlined by Cohen et. al (2008; 2016). Guided by literature suggesting a role for negative partisanship and ideological extremism to influence strategic voting, this paper investigates whether those factors also impact elite coordination. This paper first hypothesizes that an incumbent president viewed more unfavorably by the opposing party's voters will correlate positively with an increase in the dual coordination measures for the opposing party. Secondly, this study hypothesizes that an incumbent president viewed as more ideologically extreme will similarly correlate with the dual party coordination measures. Multivariate regressions were run to test both hypotheses, controlling for the number of major candidates vying for the nomination. The results do not support the hypotheses proposed and therefore this paper does not find evidence that these
evaluations influence elite-level coordination. However, this study does find that disapproval of the incumbent president positively correlates with the ideological extremism of the opposing party’s ultimate nominee albeit at the less stringent 90% confidence interval. This may suggest that while party leaders are not influenced by these evaluations, voters may be. This study recommends further research to evaluate that supposition.

**Screening of Magnetic Nanoparticles for Magnetic Hyperthermia Application by Finite Element Method**

**Authors:** Jose Hernandez-Romero  
**Faculty Mentor(s):** Dr. Huseyin Ucar, Dept. of Chemical and Materials Engineering

In this study, several intrinsic and extrinsic factors were analyzed to determine the heating efficacy of a magnetic fluid by developing a computational model using COMSOL Multiphysics which utilizes the Finite Element Method (FEM) to solve the problem numerically. A 3D thermal model was generated to analyze the temperature distribution and cell damage in a liver tumor and surrounding healthy tissue by supplying a heating source. Six different magnetic nanoparticle (MNP) compounds were investigated: maghemite (γ-Fe2O3), magnetite (FeO·Fe2O3), cobalt ferrite (CoO·Fe2O3), barium ferrite (BaO·6Fe2O3), iron platinum (FePt), and Fe9Ti3. In order to achieve the highest degree of heating efficacy of the magnetic fluid, the appropriate choice of particle dosage, magnetic field parameters, and nanoparticle magnetic and physical characteristics need to be optimized. By taking these parameters into account, the desired temperature range between 42-46°C within a specified region inside the body can be achieved; thus, inducing apoptosis in cancer cells. Maghemite, magnetite, and iron platinum attained maximum temperatures of 42.43°C, 42.76°C, and 44.44°C, respectively. In contrast, cobalt ferrite, barium ferrite, and Fe9Ti3 achieved slightly lower maximum temperatures of 39.71°C, 38.75°C, and 39.23°C, respectively. The slight difference in temperatures is likely attributed to the differences in the nanoparticles’ specific loss powers. As the particle dosage was increased, the fraction of tumor damage increased as well. Administering maghemite, magnetite, and iron platinum over cobalt ferrite, barium ferrite, or Fe9Ti3 would be optimal to achieve greater heat dissipation, a larger fraction of tumor damage, and a shorter treatment duration.

**The Real Estate Picture in Los Angeles**

**Authors:** Kyle Jackson  
**Faculty Mentor(s):** Dr. Roman Gulagian, Dept. of Finance, Real Estate, and Law

In this project, I research and discuss the state of the Real Estate market in Los Angeles. I begin by looking at the overall market health and trajectory as it has major impacts
on Real Estate. Another aspect I looked at is the effect of COVID-19 and how it can change the future trends of land use and needs in the near future. Lastly, I used Google trends as a research tool to gauge local trends that show these new trends are manifesting in a very new and exciting market.

**A SIFT-based Partial Processing Algorithm for Real Time Image Search**

**Authors:** Neha Jayan  
**Faculty Mentor(s):** Dr. John Korah, Dept. of Computer Science

Today's digital age can be defined by the massive amount of data and information readily accessible in various forms of media. While images have become a popular medium of information, current methods for relevant information search and retrieval face significant challenges. Due to rapidly growing data ingestion rates, current image retrieval methods have led to increased lag time as well as the demand for massive and expensive computational resources. Therefore, the need for an efficient process of searching data for immediate use has become critical. This research project emphasizes the partial processing paradigm for the design and implementation of algorithms for real time image search. Specifically, we will be focusing on content-based image retrieval methods, where the images are analyzed by their features such as color, texture, and shape. Scale Invariant Feature Transform (SIFT), is one of the more robust feature detection algorithms that we have chosen to work with due to its ability to extract features amidst scaling, orientation, and illumination changes. We provide initial exploration of the aspects of SIFT based image search algorithms that can successfully leverage partial processing and can be successfully deployed on one or more parallel/distributed platforms.

**Topology Driven Prediction of Virality in Malicious Cascades**

**Authors:** Dhanush Karthikeyan  
**Faculty Mentor(s):** Dr. Ericsson Marin, Dept. of Computer Science

When malicious information is posted online, one fundamental question arises: can it spread to viral proportions? The emergence of the Dark Web has enabled the industrialization of the offensive hacker community. Through anonymous communities on secure sites and forums, there is now an unprecedented flow of ideas, malware, and exploits. This study uses social network analysis to analyze online communities and anticipate mass-adoptions of malware. This is accomplished by leveraging machine learning to identify virality in online forums, thus detecting a viral cascade in its early stages to alert defenders. We devise several measurements based on the structural diversity of the cascade to trace the propagation of influence in hacker communities. The viability of these metrics as machine learning features is then demonstrated by training various classifiers, which are deployed on different Dark Web forums.
Modeling of Transdermal Drug Delivery in Randomly Rough Skin

Authors: Dustin Kelso
Faculty Mentor(s): Dr. Jonathan Puthoff, Dept. of Chemicals and Materials Engineering

Transdermal drug delivery requires transport of a drug from the drug-bearing material into the epidermis. This process depends on factors such as the epidermal texture, the deformability of the medicated material, and the interface between the two. A randomly rough surface \( f(x, y) \) with dimensions \( L \times L \) was simulated using Gaussian statistics, and an element mesh was created on this domain. Fick's 2nd Law (with diffusivity \( D = 1.08 \times 10^{-6} \text{ cm}^2/\text{hr} \)) was solved to obtain the drug concentration \( C(x, y, z, t) \). Initially, \( C(x, y, z, 0) = 0 \). A Dirichlet condition \( C(x, y, 0, t) = 0 \) was imposed as a sink to eliminate the drug from the skin into the blood. A Robin condition was used to describe the flux of the drug into the skin with a partition coefficient \( K \) between 0.15 and 0.60. The average concentration \( C_{avg} \) was determined at intervals from \( t = 0 \) to \( t = 72 \text{ hr} \). The results indicate that higher \( K \) values give higher the peak concentration in the skin and faster elimination of the drug. This parameter is important to monitor the possible toxicity level of the drug depending on the solubility/absorption of drug molecules into the skin. As \( L \) increased, the surface area increased parabolically and the volume increased linearly. Larger \( L \) gives a lower peak of \( C_{avg} \). Higher surface area allows the diffusion of the drug to be more spread out, a shorter absorption phase, and lower total dosage of exposure to the drug.

The Role of Disability Cultural Centers in Creating a Supportive and Transformational Experience for Students with Disabilities

Authors: Zane Landin
Faculty Mentor(s): Dr. Pavitra Kavya, Dept. of Communications

Students with disabilities (SWD) encounter several barriers which prevent them from a fair learning experience. These barriers make it difficult for SWDs to graduate as well as feel a sense of belonging. University systems should provide support and resources for SWDs as they do for other student populations to help resolve systematic and interpersonal challenges. The disabled identity is not a barrier and must be treated equally with other cultural groups. Furthermore, the establishment of cultural centers is integral to validating this marginalized identity. A disability cultural center (DCC) would be an essential resource to help university leadership build a healthy, inclusive conversation around disabilities. At present, there are roughly 10 centers on university campuses across the United States. My research uses a qualitative approach to establish the value of DCCs for students, faculty, staff, and university culture. Through my research, I am advocating for the establishment of additional centers. Universities, by law, have had a space for SWDs to be academically
accommodated, but it is time to consider how students are supported beyond academic requirements and culturally impacted. Research and narrative testimonials show when SWDs engage in inclusive activities, they begin to experience an enhanced sense of belonging. A DCC is needed for universities to cultivate a community for SWDs, allies, and all students. I will also be creating a resource guide to support and help university leadership with establishing DCCs on college campuses.

**Roadway to Failure: Challenges and Solutions to Sustain the Municipal and Utility Lines Within the Growing Infrastructure System in the United States**

**Authors:** Alice Long  
**Faculty Mentor(s):** Dr. Claudia Garcia-Des Lauriers, Dept. of Geography and Anthropology

Infrastructure is the blueprint for how society can work as it consists of buildings, roads, power supplies, and municipal water utility lines. In the United States, the state of the overall infrastructure system has not been modified to accommodate a growing society that uses more water, more electricity, and more cars to get to where they need to go. Under each home and business, there are several utility lines such as electrical, gas, and water that connect to an outer power source under roads. Due to the lifetime expectancy of the roadway building material, strong roads are now cracked roadways with added pressure on the utility lines. With the growing population and the failing lifetime expectancy of the roads, engineers have to find ways to accommodate the challenges of fixing the infrastructure to prevent future environmental and unsafe disasters from happening. Some solutions engineers can take to prevent the further deterioration of utility lines and roadways is to be more on the public servant side of informing the public rather than just the engineering side. By using popular social media apps along with their own communication skills, engineers can help to educate the public on the importance of infrastructure maintenance and its impact on their livelihoods.

**Diagnosis and Management of Autoimmune Hemolytic Anemia (AIHA) in Canines and Humans**

**Authors:** Amy Luong  
**Faculty Mentor(s):** Dr. Andrea Watson, Dept. of Animal and Veterinary Science

Autoimmune hemolytic anemia (AIHA) is an autoimmune disease that affects humans and animals. Although AIHA is found in both humans and animals, it is a more common disorder affecting all breeds of canine when compared to humans. The hallmark of AIHA is
autoantibodies targeting red blood cells, and classification is based on pathophysiology of AIHA. Predisposing causes of AIHA are more identifiable in canines than humans, but idiopathic AIHA is the most common in both. The initial therapies for AIHA in both humans and canines are blood transfusions, but additional therapies such as splenectomies and immunosuppressive drugs, like Rituximab, are needed to treat AIHA. While some patients can be in remission for several years or even throughout the rest of their lives, many patients suffer from recurring AIHA.

**Oxidative Stress and the Pathophysiology of Nitric Oxide due to Increased Diesel Emissions and Industrialization in the Inland Empire**

**Authors:** Jairus Martinez  
**Faculty Mentor(s):** Dr. James Blair, Dept. of Geography and Anthropology

With the large industrialization of the Inland Empire, there has been an exponential increase in housing developments alongside the increase in the logistics industry. This development includes the need for infrastructure to support the needs of the local economy. Because of this, more land, warehouses, diesel trucks, and their associated pollutants have increased as well. While these developments have occurred for the good of local business, the local economy, and even the global economy, the conversation of the detrimental effects of the chemicals being emitted in the air has not been discussed enough. Without the necessary dialogue, many residents of the Inland Empire do not see the dangers that these chemicals in the air have on their health. Without awareness and understanding of the issues at hand, environmental groups and the legislation they push have a much harder time in backing and successfully achieving their goals. With ground-level community outreach (through the use of educational media) that can open a conversation pertaining to foundational knowledge on why/how certain chemicals harm the human body, more urgency within the community may arise. With more urgency, the voices of those harmed by the pollution will be amplified in order to catalyze the proper dialogue that may lead to better support for future legislation.

**Purification of the Enzyme BaiK for Structural and Mechanistic Studies**

**Authors:** Carolina Mata  
**Faculty Mentor(s):** Dr. Kathryn McCulloch, Dept. of Chemistry and Biochemistry

Primary bile acids play a major role in digestion by assisting in the absorption of fats and oils entering the body. Once in the gastrointestinal tract, naturally occurring gut bacteria such as Clostridium scindens convert primary bile acids into secondary bile acids via a pathway encoded by the bile acid inducible operon which includes BaiK, a putative coenzyme A transferase enzyme. A recombinant approach using E. coli was chosen to characterize BaiK.
First, the E. coli Tuner expression line was transformed using a plasmid containing the baiK gene for overexpression. BaiK overexpression resulted in the production of large quantities of protein, and the resulting cell pellet was collected for purification via column chromatography. The purification process utilized both affinity chromatography and size exclusion to purify BaiK. This sample was then concentrated and aliquoted for use in crystallization screenings. Current efforts are focused on optimizing the buffers used in size exclusion chromatography for the continuation of crystallization trials. BaiK was also explored through bioinformatic and homology modeling investigations with web-based tools such as BLAST, SWISS model, EXPASY, and Xtalpred. These servers were used to convert the genomic sequence to a protein sequence, remove the histidine tag using enterokinase, and align the sequence with published structures of known proteins. Multiple proteins were identified as templates for BaiK's homology model. The model was prepared using SWISS model, which generated a homo dimer of BaiK.

**Effect of Arabian Mare and Foal Factors on IgG Concentration**

**Authors:** Emma Medina

**Faculty Mentor(s):** Dr. Juanita Jellyman, Dept. of Biological Sciences

Antibodies, such as immunoglobulin G (IgG), are part of the immune system that help identify and destroy bacteria and viruses. In horses, antibodies are not transferred across the placenta from the mare to the fetus, and foals are born without IgG in their blood. In the first 24-36 hours of life, foals acquire immunity by passive transfer from the mare when the foal nurses on IgG-rich colostrum. Antibodies are absorbed into the blood across the cells of the small intestine. A serum IgG concentration of >400 mg/dL is considered adequate passive transfer. Failure of passive transfer in foals is associated with increased risk of infection and death. The objective of the current study was to determine factors associated with effects on IgG levels in Arabian foals. Data was collected from records between 2010 and 2021 that were obtained from Cal Poly Pomona's Arabian Horse Center. Breeding date, stallion name, milk calcium, foaling date and time, sex, height, weight, standing time, suckling time, placenta passing time, and IgG levels were recorded. We obtained 38 foaling records. A total of 38 foals (21 fillies and 17 colts) were born to 14 different mares. IgG data was available for 11/21 fillies and 9/17 colts. In 10/11 fillies and 8/9 colts the serum concentrations of IgG were > 400 mg/dL. We will present preliminary data examining the relationship between mare age and parity, foal sex, month of birth and the plasma concentration of IgG in the foals.
**Going on Defense: The Pro-Abortion Movement after Roe and the Rise of the Anti-Abortion Movement**

**Authors:** Samantha Miranda  
**Faculty Mentor(s):** Dr. John Lloyd, Dept. of History

This poster presentation is based on a historical research paper covering the topic of Post Roe Reproductive Rights Activism with a focus on abortion rights. The title is "Going on Defense: The Pro-Abortion Movement after Roe and the Rise of the Anti-Abortion Movement." This paper highlights women's activism in the period after Roe V. Wade. Today, the country is watching Roe being challenged in the courts which could bring significant rollback. The study of history is essential as it recognizes past actions and relates to the present. This is a fight that is not new. Due to the rise of the anti-abortion movement after the Roe ruling, pro-abortion organizations have been defending the fight for abortion rights. With the help of the media, anti-abortion supporters used the years between Roe and Casey to create and grow their argument and movement. Two pro-abortion organizations, NOW and Planned Parenthood, responded in specific ways to the anti-abortion movement. The research includes diving into secondary sources during the fall semester to learn and understand the history and the scholarly works surrounding the topic. During the spring semester, primary sources will be researched and consulted to draw results for the conclusion of this paper. The expected result will show how pro-abortion groups reacted to the rise of the anti-abortion movement with the help of the media. The conclusions will be drawn at the end of Spring 2022. With these conclusions, the public can reflect and learn about an issue still relevant today.

**Stability of Iron Compounds with Uranium Impurities in the Earth's Core**

**Authors:** Cameron Moffett-Smith  
**Faculty Mentor(s):** Dr. Jorge Botana-Alcalde, Dept. of Physics and Astronomy

The composition of Earth's core is not fully understood. Specifically, it is unanswered whether or not Iron compounds are stable at various pressures. In our project, we are investigating the stability of Iron compounds of differing geometries with Uranium impurities at a range of pressures found in the Earth's core. Specifically, we are applying software, VASP, to perform relaxation calculations in which the geometries are slightly changed and the total enthalpy of the system is calculated using density functional theory. VASP wants to minimize this enthalpy, telling us what the most probable compound is. With the lowest enthalpy at hand, we can deduce the overall spontaneity of a compound forming, and we can create a convex hull that tells us the stability of such a compound. When an Iron Uranium compound forms, the convex hull tells us if it will stay a compound or dissociate into a more stable
compound, such as pure Iron. With this information, we will learn more about the relative abundance of compounds in the Earth's core. Such predictions can be tested through data acquired by seismic waves. Furthermore, it can provide further insight into the formation of Earth by comparing results with what is present in meteorite samples. The project is currently still running, but is well underway.

**The Influence of Cough Airflows on Aerosol Transmission**

**Authors:** Elizabeth Monteith  
**Faculty Mentor(s):** Dr. Mingheng Li, Dept. of Chemical and Material Engineering

With the COVID-19 pandemic still impacting all aspects of life across the globe, air velocity fields—especially those generated by coughs—must be considered in ongoing research as they have a significant impact on aerosol transmission. In this study, 100-micron, 20-micron, and 0.1-micron particles were studied. Using MATLAB, the aerosol transmission was simulated in the presence of air flow fields generated by an unobstructed cough. The results of the MATLAB simulation showed that as particle size decreases, the more significantly these particles were influenced by the flow fields of air. The cough was assumed to have a triangular profile, with a duration of 0.5 seconds and a maximum velocity of 10 m/s. All three particles traveled the distance the air from the cough traveled, which was 2.5 meters, or approximately eight feet; this is two feet over the CDC’s social distancing recommendation. Moreover, the smaller the particle, the longer it stayed in the air. The 20-micron particle was in the air for at least two minutes, while the 0.1-micron was still in the air an hour after the initial cough. If these particles carry COVID-19 and are influenced by the air’s flow fields, then they have great potential to infect other individuals. Thus, air flow fields are significant in magnifying aerosol transport and must be considered in public policy for the safety and health of the community.

**Flow Reversal Reverse Osmosis Spatiotemporal Model**

**Authors:** Mir Mouawad  
**Faculty Mentor(s):** Dr. Mingheng Li, Dept. of Chemical and Materials Engineering

A mathematical model was created to analyze and predict the effects of flow reversal reverse osmosis or FRRO. Correlations of salt concentration, pressure, and flowrate were established between position and time across the RO stage. The model was created by using COMSOL to solve simultaneous PDE’s. The data was plotted into three-dimensional graphs for all the dependent variables. The transient to steady state operation was analyzed for a normal RO process and the FRRO. The resulting flow reversal caused an overshoot in concentration within one unit of dimensionless time while pressure and flowrate had minimal changes.
The Pandemic's Impact on California's Farmworkers

Authors: Jillian Munoz  
Faculty Mentor(s): Dr. Sara Langford, Dept. of Psychology

The United States' agricultural sector is characterized by interdependent hierarchies of nationality, race, labor, and illness. In the last century, several notable figures (e.g. Dolores Huerta, Cesar Chavez, and Larry Itliong) organized in California to establish unions which were essential in winning civil rights and higher wages for American farm laborers. As of May 2020, California employs over 230,000 (48%) workers in the 'Farming, Fishing, and Forestry' occupations group. Of those jobs, 86% are farmworkers and laborers that work directly with crops, nurseries, and greenhouses. Although these essential workers uphold California's $50 billion agriculture industry, they are excluded from labor relation protections such as the Fair Labor Standards Act and the National Labor Relation Laws. Before the COVID-19 Pandemic, these workers were already dealing with pesticide poisoning, exposure to extreme heat, widespread discrimination, subpar living conditions in labor camps, and heightened vulnerability to natural disasters. The pandemic has not only introduced a highly contagious virus to this population, but also additional workplace hazards, decreased access to medical treatment, and increased economic and financial burdens. This exploratory study of existing literature and research is important to those interested in immigration, foodways and food justice, environmental studies, and labor rights. California has the highest levels of COVID-19 infections and deaths while continuing its role as the nation's #1 producer of agricultural products. Therefore, it is crucial to all of us to understand this historically disenfranchised group of essential workers, especially in the context of the pandemic.

Determining the Enantiomeric Composition of the Dipeptide Alanylglycine with Marfey's Reagent

Authors: Noor Naji  
Faculty Mentor(s): Dr. Gregory Barding, Dept. of Chemistry and Biochemistry

Historically, D-amino acids were thought to be present at very low amounts with limited and specific functions in plants. For example, some studies have demonstrated that D-amino acids may be involved in ethylene production, nitrogen uptake, aminotransferase activity, etc. However, the dipeptide alanylglycine is present at significant amounts and previous research has suggested that alanylglycine is exclusively present as the D-enantiomer. At such a high concentration of a D-amino acid, it is important to quantify the concentration to help determine function. This project focused on confirming and quantifying the enantiomeric composition of alanylglycine in rice shoot tissue. To carry this out, the sample was first derivatized using Marfey's reagent, and the enantiomers were subsequently separated via HPLC and detected with a UV detector operated at 340 nm. Using
standards, we developed a method that resulted in a well-resolved separation between the enantiomers, with retention times two minutes apart and the D-enantiomer eluting later. As for the rice tissue, D-Alanylglycine was the only enantiomer detected in the mixture and confirmed after spiking with each D- and L-alanylglycine. Next, we will conduct submergence and recovery experiments on rice plants to determine the fate of D-alanine in the peptide to help determine the function of the dipeptide.

**Differences Between Canine Demodicosis and Human Demodicosis**

**Authors:** Harita Neervannan  
**Faculty Mentor(s):** Dr. Melody Wallace, Dept. of Animal and Veterinary Science

Demodicosis is caused by an infestation of demodex mites in dogs and humans. However, the species of demodex mites and the manifestation of demodicosis is different between humans and dogs. In dogs, the demodex species are Demodex canis, Demodex injai, and Demodex cornei. Canine demodicosis causes inflammation of the skin and manifests symptoms including alopecia and crusts on the skin. There are different types of demodicosis in dogs - localized demodicosis which is mostly seen in younger puppies and is limited to a couple hairless spots usually on the face, and generalized demodicosis which is usually seen in older dogs and affects the whole body. In humans, the demodex species commonly found are Demodex folliculorum and Demodex brevis. D. folliculorum is more common and causes inflammation in the face (eyelashes) while D. brevis causes inflammation of the neck and chest. Treatment of demodicosis in dogs includes antibiotics and antimiticidal treatments. The treatment for generalized demodicosis differs from that of localized demodicosis. The treatment of generalized demodicosis includes amitraz, ivermectin and moxidectin to get rid of the mites, while the treatment for localized demodicosis includes benozyl peroxide and ethyl lactate shampoos to soothe the irritation and avoid additional bacterial infections. The treatment of human demodicosis includes permethrin, lindane and sulfur. There is now a new class of drugs, isoxazolines, are now being introduced as a treatment for demodicosis. This paper goes deep into the many factors of demodex infestation in canines and humans, and explores the different treatments that are currently available.

**The VirtuSim Glove: a Haptic Feedback Device for Virtual Simulation**

**Authors:** Laura Niedringhaus  
**Faculty Mentor(s):** Dr. Nolan Tsuchiya, Dept. of Mechanical Engineering

The VirtuSim Glove utilizes haptics to simulate a realistic feeling when picking up an object in virtual space. Haptics is the use of added senses of touch to transmit and understand given information. The glove's haptic feedback is achieved through the use of vibration motors, a motor pulley system, and sensors to create a sense of shape, weight, and grip force on the object. The glove communicates with a virtual reality simulator where a
hand and an object are seen on the screen when in use. This project focuses on the vibrational mechanisms that have been tested to create the most realistic result possible when grabbing the object in space. In addition, a model has been proposed to simulate different objects with different vibration levels in order to achieve lifelike sensations for each scenario. The glove is proposed to be a viable option in the entertainment industry with practical applications in video games and ride systems to immerse users more fully into virtual spaces.

**The Impact of Cultural Values on Chinese Accounting Standards and Its Practice**

**Authors:** Manyun Qin  
**Faculty Mentor(s):** Dr. Magdy Farag, Dept. of Accounting

In today's world, the idea of multiculturalism is essential for business corporations going global. By hiring people from different cultural backgrounds, it brings the corporations unique ideas and feedback. At the same time, multiculturalism helps businesses open a broader market worldwide. Customers in local countries are able to speak with someone who understands their language and knows their expectations. Not only it benefits the corporations themselves, but job seekers also see diversity as an important factor when considering employment opportunities. As accountants, following ethical standards is critical for business and the reputation of a corporation since it requires accounting professionals to comply with the laws and regulations that govern their jurisdictions and their bodies of work. However, people make decisions based on their culture and personal values. Different cultural backgrounds may shape an individual's definition of right or wrong. Because of the increasing globalization of the accounting profession, Ethics issues are receiving growing attention. This research will focus on how culture affects accounting ethics and working environments in China, compare the difference between working in Chinese and the US accounting industry, what are the factors that influence people's financial decision making, and solutions for potential ethical issues in multicultural corporations.

**Haptic Feedback Device for Virtual Simulation and Medical Applications**

**Authors:** Sarah Ragle  
**Faculty Mentor(s):** Dr. Nolan Tsuchiya, Dept. of Mechanical Engineering

In this project, a device called the "VirtuSim Glove" is created, which attempts to simulate the feeling of picking up an object through use of haptics and a virtual reality simulation. The research focus of this project is to examine how the proposed device is applicable in the medical field. The final result of the project includes a wearable glove device
designed to provide haptic feedback to the user, all of which connects to a VR simulation setup. As the user moves their hand and fingers, the VR modeled hand will mirror it by receiving information from sensors on the glove. The user will have the goal of picking up objects in the VR space, and as they do so, will receive haptic feedback via small vibrating motors and a weight-simulating small scale pulley system. The individual contributions of this project include designing a way to gain and transmit positional data from the glove to the VR system via sensors. Research is conducted to examine possible types of sensors and methods of gathering data to design a system that had as little error and drift as possible, creating a smooth user experience. Another aspect of the project is to research potential applications in the medical industry, such as teleoperations, and determine whether the proposed device in concept would serve a practical purpose, or if it is comparable to technologies already in use.

**Restoring Rights to the Deceased: Repatriation of the Disinterred through Amendments of Legislation**

**Authors:** April Rice  
**Faculty Mentor(s):** Dr. Claudia Garcia-Des Lauriers, Dept. of Geography and Anthropology

Most disinterred remains lack proper respect due to the absence of effective legislation and education purposed with protecting the deceased. This is because federal law is limited in its implementation coupled with its deficient enforcement for the regulations they do have in place. As well as this, supplementary committees or governing bodies that can be utilized to further support returning rights to the disinterred are either unwilling or ignorant on the topic of repatriation. Not only will people groups benefit from the educational value and humanity expressed through repatriation, but it will also improve fields of science such as anthropology and osteology. This paper, in response to this moral dilemma, discusses current legislation, what legislation is lacking, how legislation can be improved, how these changes will bolster the related sciences, and ultimately why it is important to restore rights to deceased individuals. The overall aim of this paper is therefore to realize why what is currently being done is not enough and that the best thing for the fields of anthropology and osteology will be to decolonize the repatriation process by mending legislation and working with the kin or communities related to the disinterred.
Air Quality Evaluation on I-210 Freeway Before-and-After Safer-at-Home Order during the COVID-19 Pandemic

Authors: Daniel Romero, Xuqing Liang
Faculty Mentor(s): Dr. Yongping Zhang, Dept. of Civil Engineering

The California Safer-at-Home (i.e. Safer@Home) Order issued on March 19th, 2020 due to the COVID-19 pandemic created a major change in traffic, which was not often seen in modern history in California. The Safer@Home Order greatly reduced the amount of traffic in a very short amount of time; at the same time, the drop of traffic also caused the variation of air quality. To evaluate the impact of the Safer@Home Order on traffic and air pollutants, this study investigates the two weeks' traffic and air quality data, a week before (2/24/2020 - 2/28/2020) and a week after (3/30/2020 - 4/3/2020) the Safer@Home Order. The traffic data (including passenger car flow, speed, and truck flow) and air quality data (including carbon dioxide, carbon monoxide, nitrogen monoxide, nitrogen dioxide, ground-level ozone, and particulate matter as well as meteorological data of temperature was collected in a section of the I-210 freeway in Los Angeles County. Statistics methods including time plots, box plots, and correlation analysis were applied in this study to analyze this data. The Safer@Home order created a unique opportunity to observe a major change in traffic and how it affects air pollutants. The results of this study provide potential relationships between air pollutants and traffic parameters.

Sensor Fusion using IMU Data for 3D Orientation

Authors: Samuel Salerno
Faculty Mentor(s): Dr. Zekeriya Aliyazicioglu, Dept. of Electrical and Computer Engineering

This study investigates the use of sensor fusion algorithms to obtain three-dimensional orientation using data from an IMU. Data was collected from an iPhone's accelerometer, gyroscope, and magnetometer. MATLAB was used to calculate and run the data through a sensor fusion algorithm. A Kalman filter was used to create an estimation for pitch, roll, and yaw. With this sensor fusion, Euler angles can no longer lose a degree of freedom thus preventing gimbal lock. The filter was 10 times more accurate at creating an orientation of the phone than just an accelerometer and gyroscope by themselves. This method also solved the issue of magnetic jamming by using the Earth’s magnetic field as a constant. It also accounts for manmade magnetic fields like electrical motors near the IMU by filtering out magnetic disturbance noise. This study found fusing the measurements of an accelerometer and gyroscope combined with a magnetometer creates an optimal three-dimensional orientation of the system in real-time.
The Resident Advisor Role at Cal Poly Pomona

Authors: Maya Santos  
Faculty Mentor(s): Dr. Pinar Tremblay, Dept. of Political Science

Acquiring skills in leadership is imperative for young adults. While in college there is a plethora of opportunities to gain experience in working alone and on team settings. Student leader roles present the chance to grow in personal and professional areas of one’s life. These positions of power present the possibility to expand leadership skills, build strong relationships beyond the workplace, and strengthen communication abilities, just to name a few. There is one student leader role offered on campus that is unlike any other and that is the Resident Advisor. Resident Advisors are full-time students that live in on-campus housing amongst students that live there as residents. They are trained for peer advising, policy enforcement, programming, and much more.

Effects of Δ9-Tetrahydrocannabinol on Cardiovascular Function in Chick Embryos

Authors: Maya Shattuck, Kenneth Paredes, Diana Truong  
Faculty Mentor(s): Dr. Juanita Jellyman, Dept. of Biological Sciences

The recent legalization of Marijuana for recreational and medicinal use has led to an increase in usage, including by pregnant women. The long-term goal of this study is to use a chick embryo model to determine the effects of Δ9-THC on an embryo, independent of maternal and placental physiology. To establish a method for measuring cardiovascular function in chick embryos, ten fertilized chicken eggs were injected with saline (50 ml), which is the vehicle that will be used to administer Δ9-THC. Eggs were injected on alternating days from day 2 until day 20. Starting day 12, basal heart rate was measured every two days using the Buddy Mk2 Digital Egg monitor. Heart rate was measured at 37°C every 30 seconds for 10 minutes and the mean value was recorded. The heart rate response to decreased ambient temperature was measured on day 16 by placing the Buddy monitor at room temperature (23°C) and recording heart rate every 30 seconds for 10 minutes. Mean basal heart rate was 243 ± 7 beats/minute and the mean change in heart rate after 10 min at 23°C was a decrease of 18 ± 6 beats/minute. We have established a technique to measure resting heart rate and the change in heart rate in response to decreased ambient temperature in chicken embryos. The long-term goal of the project is to use the chick embryo model to determine the effects of exposure to environmental and other chemicals on cardiovascular function in ovo.
Computer Assisted Education: A Survey of the Algorithms and Consequences behind Automated Teaching and Learning

Authors: Emily Villalba
Faculty Mentor(s): Dr. Markus Eger, Dept. of Computer Science

This project discusses how personalization in Computer Assisted Education allows students to learn in a new and effective learning environment as compared to standard set curriculum and progression in a traditional classroom setting. The benefits of computer based learning and teaching will be highlighted, as well as some limitations and less than ideal effects caused by the digitization of education. The main objective is to provide a survey of different algorithms and systems used to achieve personalized education for every student. Presented is a particular focus on Microsoft's proposed Counter Example Guided Inducted Synthesis algorithm for automated feedback generation which provides students with instant corrections through an educational computer software, and Trace-based Framework for automated problem generation which creates a progression of questions based on the student's understanding. We must also consider trade-offs and analyze how emotional and social development for K-12 students are influenced by depriving them of interaction with teachers and peers. Additionally, it is important to explore accessibility issues and potential inequities that an education system that relies on advanced technologies may cause for students of different communities. As this instructional technology becomes a staple in classrooms, we must consider what might be taken away from the educational setting if computers begin to tread on the toes of human instructors. Can a more digitized scholarly experience detract from the development of our youth, or can an intellectually, emotionally, and socially balanced citizen still be produced if human teachers are not part of the equation?

Diabetes Prevention Through Lifestyle Changes in African American Women

Authors: Zoe Walker
Faculty Mentor(s): Dr. Juanita Jellyman, Dept. of Biological Sciences

Type 2 Diabetes is a metabolic disorder in which the body does not produce enough insulin, or cells do not respond to insulin, resulting in chronic hyperglycemia. Individuals with prediabetes are at risk of developing type 2 diabetes. Diabetes increases an individual's risk of health conditions including heart attack, stroke, kidney disease, and vision loss. In the United States, approximately 26.9 million adults have type 2 diabetes, and 88 million adults are prediabetic. Additionally, ~$327 billion is spent on diabetes-related medical costs annually in the United States. The National Diabetes Prevention Program (DPP) was a large, multicenter clinical research study that showed that lifestyle intervention reduced the
incidence of diabetes. The study showed that a 5-7% decrease in body weight, through calorie reduction and incorporation of at least 150 minutes of physical activity each week, delayed the onset of type 2 diabetes by 58% in high-risk adults. Moreover, lifestyle intervention was more effective at delaying the onset of type 2 diabetes than the anti-diabetic drug metformin. The objective of the current study is to determine the effectiveness of the DPP in a group of African American women in Maryland who are going through one of the CDC-recognized programs together in their community. Body weight and activity minutes will be measured weekly. The percentage of glycated hemoglobin (HbA1C), an indicator of blood glucose regulation, will be measured at the start, at 6 months, and at 12 months. We hypothesize that the DPP will reduce diabetes risk in African American women.

**A Morphological Phylogeny of the Genus, Hemichaena**

**Authors:** Aiko Yamada  
**Faculty Mentor(s):** Dr. Paul Beardsley, Dept. of Biological Sciences

The genus Hemichaena encompasses 5 unique species. Via herbaria specimen data collected online, the morphological traits of each species were recorded. Though still in progress, the information collected will be used to create a phylogeny of the genus. Hemichaena has historically been associated with the genus Mimulus, which is widely investigated in the field of systematics. Recent phylogenetic studies have utilized molecular data to determine classification analysis. Through a morphological study of the Hemichaena species, basic field recognition techniques can be refined. Focusing on the physical traits of plant specimens is useful to apply in floristic studies and beyond. The project also employs herbaria specimens which are an important asset to plant systematists.