Undergraduate Research and Creative Work

3 May 2024 – 8:45am to 1:15pm
Kuykendall Hall and via Zoom
Honolulu, Hawai‘i

SCHEDULE

TIME	ACTIVITY	LOCATION
8:45-9:15	Continental Breakfast	Kuykendall Courtyard
9:15-9:25a	Welcome	Kuykendall Courtyard
9:30-10:20a	Showcase Oral Sessions I	Kuykendall Breakout Rooms
10:20-10:30	Break	
10:30-11:20a	Showcase Oral Sessions II	Kuykendall Breakout Rooms
11:20-11:30a	Break	
11:30a-12:30p	Showcase Oral Sessions III	Kuykendall Breakout Rooms
12:30-1:15p	Poster Session & Lunch	Kuykendall 101 & Courtyard

LOCATION

Kuykendall Rooms

Oral Presentations Session One	9:30a - 10:20a
Oral Presentations Session Two	10:30a - 11:20a
Oral Presentations Session Three	11:30a - 12:30p

Koa	Kuykendall 301
Olonā	Kuykendall 302
Peʻahi	Kuykendall 303
Māhoe	Kuykendall 304
Makaloa	Kuykendall 305
ʻIlima	Kuykendall 306
Loulu	Kuykendall 307
Limu Kohu	Kuykendall 308
ʻUlu	Kuykendall 309
Kukui	Kuykendall 310
ʻAwa	Kuykendall 406
ʻĀweoweo	Kuykendall 407
Pua Kala	Kuykendall 408

Kuykendall Courtyard

Lunch & Poster Session	12:30p - 1:15p

Oral Presentations Session One
9:30 - 10:20a

Koa	**Kuykendall 301**
Haley Taylor	What Are the Relationship Characteristics of Small Businesses Instagram Posts to Create Viral Content: A Case Study in Hawai'i
Emma Kelly	Feasability of Microfinance Programs to Empower Women's Entrepreneurship
Christian P Hermoso	The Socioeconomic Impact of Covid-19 on Ilokano Americans

Olonā	**Kuykendall 302**
Min Ji Cha	16779 WWSE: Removal of Nutrients in the Primary Effluent of Individual Wastewater Systems
Melissa Zakala-Downs	Optimizing Analytical Methods for Intracellular Microbial Polymers in Environmental Applications
Michael Kawasaki	Development of a Multiplexed Low-Cost Microfluidic Bioreactor to Study Cell Physiology

Oral Presentations Session One
9:30 - 10:20a

Pe‘ahi	**Kuykendall 303**
Jaeden Chang, Dylan Sodetani	Applying and Optimizing Machine Learning Methods for Classification and Anomaly Detection
Joseph Carmelo Averion	Automation of Test Names Based on the Arrange-Act-Assert Pattern
Rocky Huang	An Exploratory Study Investigating Identifier Naming Practices in Data Science Code

Māhoe	**Kuykendall 304**
Shek Hong Perseus Chan	Investigating the Superintegrability of a Family of Hamiltonian Systems
Chelsea Nguyen	Escape Response of Copepods around a Translating Sphere
Nils Melbourne	Application of Computational Chemistry Methods to Weather Routing

Oral Presentations Session One
9:30 - 10:20a

Makaloa	**Kuykendall 305**
Emilia Lubet	The Challenges Latino Migrants Face in Accessing Resources in Kailua-Kona, Hawai‘i
Yejun Kweon	Exploring Gender Perspectives in North Korean Science Fiction: Tracing Ecofeminist Themes Since the Emergence of Ecocriticism
Clarissa Dixon, Allyson Pooler	Contaminated Indigenous History: The Colonial and Environmental Impact of the Boston Tea Party on Northeastern Indigenous Communities

‘Ilima	**Kuykendall 306**
Abigail Hawkins	Paranoia in the Pseudo-public: The Aesthetics of Kaka'ako's Redevelopment
Anna Kalabukhova	Medea, Uninterrupted
Brendon Kawabata	The Enunciations of Silence

Oral Presentations Session One
9:30 - 10:20a

Loulu	**Kuykendall 307**
Shelby Hom	Cultivating a Sense of Place Among Students in Hawaiʻi
Adam Joseph Parrilla	Hoʻokupu VR
Pearl (Momi) Bachiller	Toward an Aloha ʻĀina Praxis for Biomedical Science: I Haku ʻIa E Momi Bachiller, By Pearl Bachiller

Limu Kohu	**Kuykendall 308**
Mariko Quinn	Comparison of Reproductive Success of *Tripneustes gratilla* Around Oʻahu
Samantha Nagtalon, Grace Roberts	Ocean Warming Effects on *Octopus cyanea* Embryonic Development
Kennedy Logan	Understanding the Environmental Effects on the Morphology of Hawaiian Rice Coral (*Montipora capitata*)

Oral Presentations Session One
9:30 - 10:20a

ʻUlu	**Kuykendall 309**
Skye Inn	Microbial Metabolism of Diesel Fuel in a Tropical Island Aquifer
Rebecca Koeroessy, Makenzy Tamura	Chemical and Isotopic Analysis of a Catchment in Manoa, Hawaii
Arianna Corry, Kyra Dyer, Emily Harris, Grace McCoy	A Low-Cost Ionosonde Receiver to Provide Freely Accessible Data in Hawai'i

Kukui	**Kuykendall 310**
Haley Churchill	The Influence of Proficiency in Hawaiʻi Creole on the Identification of Polar Questions in Hawaiian
Daniel Baon	Native Hawaiian and Pacific Islanders' Perceived Access to Mental Health Facilities
Kalea Lou Bullan Borja	Religion's Effects on the Intensity of Continued Bonds

Oral Presentations Session One
9:30 - 10:20a

‘Awa	Kuykendall 406
Cade Kane	Identifying Biomarkers of Colorectal Cancer
Mona Hirose	The Role of Iron-Dependent Cell Death on Fibrotic Regions in Cardiac Hypertrophy
Lauren Grigat	Lineage Tracing Tcf21 Visceral Smooth Muscle Across the Alimentary and Female Genitourinary Systems

‘Āweoweo	Kuykendall 407
Alexander R. Nguyen	Genetic Identifications of Pond-raised Tilapia Using Fin Clippings and Microsatellite DNA Genotyping
Luisa Brehmer	Variability in Blubber Histology Metrics and Stress Hormones in the Striped Dolphin, *Stenella coeruleoalba*
Greta Gardner, Sarah Uyeda	Bioswales: Water Conservation Through Landscape Techniques

Oral Presentations Session One
9:30 - 10:20a

Pua Kala	**Kuykendall 408**
Ju-Ling Chen	Investigating the Regulation of Tight Junction Pores for Enhancing Paracellular Permeation of Small Molecule Therapeutics at the Blood-Brain Barrier
Samantha Yamamoto	Quantification of Ribosomes and Zinc in Mycobacterium smegmatis Grown in Zinc Limitation
Yuri J.H. Ah-Tye	Benzaza- and Benzoxaphosphole-Based Phosphenium Ions (PR_2^+)

Oral Presentations Session Two
10:30 - 11:20a

Koa	**Kuykendall 301**
Abigail Vanblaricom-Nutt	ESG Management Across Cultures: A Study of American & Japanese Firms
Megan Ibara	Impacts of the Tourism Industry on the Hakka in Taiwan
Quentin Lee	Harnessing Design Thinking for Sustainable Entrepreneurship: A Portfolio Study

Olonā	**Kuykendall 302**
Carl Domingo, Connor Quist, Jason Kanemoto, Leo Liang, Logan "Makana" Onzuka	Automated Aerial Search and Rescue Platform with Payload System
Jonathan Cai	Saving Our Land
Katelyn Amoroso	Economical Aeroponics System for Accelerating Butterhead Lettuce Growth Through Optimizing Temperature and Spray Frequency

Oral Presentations Session Two
10:30 - 11:20a

Peʻahi	**Kuykendall 303**
Joel Curtis Nicolow	FogVision: A Machine Learning Method for Detecting Fog in Mountain Trail Camera Images
Ashlyn Uehara	Specialized ChatGPT for PFAS Research

Māhoe	**Kuykendall 304**
Stephen J.D. Gulley	Timescale of Collapse of Cosmologically Coupled Particles
Erika Matsui	Improving the Quantum Efficiency of Photoelectric Devices with Various Patterns
Sierra Morales	Enhancing Supernova Detection Using Convolutional Neural Networks in Hubble Space Telescope Images

Makaloa	**Kuykendall 305**
Paige J Yuen	East Asian Settler Colonialism: Statehood and Land Legislation of the 1959 Hawaiʻi Territorial Legislature
Amanda Spincola	The Power of Clothes: Material Culture Exchange During the Kingdom of Hawaiʻi
Nicole Hamamura	He Lei Hulu Kaʻapuni Hōnua: A Historical Analysis of a Hawaiian Feather Lei at the Pitt Rivers Museum (Oxford)

Oral Presentations Session Two
10:30 - 11:20a

ʻIlima	**Kuykendall 306**
Ofeinahelotu Filikitonga, Marcus Goh	Beyond The Inferno
Flynn Hamlin	Rally For Our Reefs
Damien Zimmermann	Write, Direct, Shoot, Edit: Manifesting Emotion from Notebook to Big Screen

Limu Kohu	**Kuykendall 308**
Michael Yamada	ZooScanning the CCZ
Nicole Celine Sulla Mathews	Developing and Assessing a Diverse Plankton Imagery Training Set for Machine-Learning Plankton Classification in the North Pacific Subtropical Region
Cali Falkenstein	Quantifying Kāneʻohe Coral Bleaching Conditions through Color Card Analysis

Oral Presentations Session Two
10:30 - 11:20a

‘Ulu	**Kuykendall 309**
Akili Ligons	Development of a Density Separation Device (DSD) for Microplastics in Hawaiian Coral Substrates
Carlo Auke van Dijken	Iron and Cobalt Limitation in Atlantic *Prochlorococcus* MIT9301
Quinn Leggett	Facultative NItrogen Fixation in Sugarcane

Kukui	**Kuykendall 310**
Emma Seidfathi	(Relationship and Morality) R.A.M Lab
Gabriel Custodio	Environmental Complexity on Cognitive Load and Simulator Sickness in Head-Mounted Virtual Reality
Jenny Brown	Ethical Considerations and Technological Solutions in Healthcare Research: Protocol Building of a Systematic Literature Review

Oral Presentations Session Two
10:30 - 11:20a

‘Awa	Kuykendall 406
Yuewen Ding	Production and Characterization of Pre Fusion Ebola Virus GP2 Expressed in Drosophila S2 Cells for Analysis of Vaccine-Induced Immune Responses.
Swasthita Sadagopan	Generating New Molecular Tools to Study Amyloid Neuronal Trafficking in Alzheimer's Disease
Mary-Magdalene Kim	Cytokine/Chemokine Expression and Kinetics of Human Coronavirus Antibody Response Following COVID-19 Vaccination and/or SARS-CoV-2 Breakthrough Infection

‘Āweoweo	Kuykendall 407
Kelly Cousens	Long-term Memory Formation without Short-term Memory Formation in the Mexican tetra
Kaylah Politan	Effects of Pparγ Inhibition on Sociability in the Asocial Mexican cavefish
Christina Tong	CRISPR-Based Genotyping of Surface Fish to Investigate Genetic Factors Influencing Social Behavior

Oral Presentations Session Two
10:30 - 11:20a

Pua Kala	**Kuykendall 408**
Madison Olson	Human Leptin Aggregation and the Potential Role in Obesity
Princess Jena Dalit Santiago	The Characterization of Mice Lacking the Gene for Selenocysteine Lyase in Brown Adipocytes
Jared Sloan	Sequence Adaptation in Various Environment across Organisms; Similar yet Different Superoxide Dismutase

Oral Presentations Session Three
11:30a - 12:30p

Koa	**Kuykendall 301**
Cara Tan	Estimating the Impact of School Shootings on Fertility Rates in the United States
Amanda Nitta	From Aspiration to Realization: A Comparative Study of Salary Expectations and Real-world Experiences among Alumni and Current Students in Hawai'i
Jameil Clarke	Why do Bubbles Persist in Asset Markets? Trading Types, Trading Patterns, and Financial Bubbles
Rie Tsuchida, Komaki Kakinuma	Regenerative Tourism: Conscious survey on Japanese tourists' awareness and Perception of "Malama"

Olonā	**Kuykendall 302**
Justin Do, Howin Ma	Optimization of High Resolution 3D Printed Molds for Soft Lithography
Rachel Haynes	Developing an Additive Manufacturing Process for Fabricating Wearable Biochemical Sensors
Kylah Lau	Automated Nutrient Feeder for Optimization of Cell Growth in Fed-Batch Bioreactors
Jason Shimoko	Sustainable Biofuel Synthesis from Food and Agriculture Residues Through the Utilization of *Mortierella alpina*

Oral Presentations Session Three
11:30a - 12:30p

Pe‘ahi	**Kuykendall 303**
Jing Ting Zheng	Gamification of Web Application for Diverse Facial Emotion Data Collection
Jeremiah Keith Averia Dy	Machine Learning Approaches to Breast Cancer Classification with *All of Us* Data

Māhoe	**Kuykendall 304**
Aleczander Paul	Optimizing Sensitivity to Quantum Decoherence Measurements at the Belle II Experiment
Hershel Weiner	Searches for Decoherence in A Two-Particle Quantum Entangled System at the Belle II Experiment
Cody Driver	Gas Mixing System for Time Projection Chamber
Jasmine Carpena	Exploring the Maximum Likelihood Threshold of Gaussian Graphical Models

Oral Presentations Session Three
11:30a - 12:30p

Makaloa	**Kuykendall 305**
Kayla Anandia	"Remapping Governance in the South China Sea: China's New "10-Dash Line" and Responses from ASEAN States"
Maile McCall	The Domestication of Blue and White Porcelain as a Representation of China: A Study of Blue and White Porcelain as an Export Ware
Kyaw Hsan Hlaing	Myanmar's Political Crossroads: Understanding the Failures of Reform
Rhealyn Letada	Voices of the Unaffiliated: How Tarot and Astrology are Influencing Public Opinion

ʻIlima	**Kuykendall 306**
Cinthia Albers-Wilson	Maui Live Poets' Society-Creating Peace One Poem at a Time
Annika Daisy Mendoza	Lost in Translation: *He Kumulipo*
Auliʻi Ludington	E hoʻi i ka piko: Returning to land, genealogy, and self
Tierra Monique Sydnor	*Let The World Stand Still*

Oral Presentations Session Three
11:30a - 12:30p

Loulu	**Kuykendall 307**
Kylah Slane	Extended Reality Case Presentation for Online Case-Based Learning with Emphasis on Biochemical and Molecular Biology Concepts of Disease Pathogenesis
Tassia Corcoran, Cara Olson, Rondell Torres	Information literacy: A Foundational Approach to Generative AI Competency
You-Fan Chai, Xin Lin	Beyond the Classroom: Fostering Student Development Through Learning Emporium Strategies
Kaitlynn Weiss	Mindfulness meditation and Perceptual Load in Performance on a Visual Capture Task

Limu Kohu	**Kuykendall 308**
Kirsten Montpetit	Marine Biofouling Community Dynamics on Biodegradable vs. Non-degradable Plastics
Maya Singh	High Density Polyethelene Microplastic Effects on Sea Urchin Fertilization

Oral Presentations Session Three
11:30a - 12:30p

‘Ulu	**Kuykendall 309**
Alena Albertson	The Role of IRE1 in Unfolded Protein Response (UPR) and the Impact of PDI9 in Heat-Stressed Plants
Brooke Crose	Simultaneous Salinity and Drought Stress Tolerance in Native Coastal Dune Plants
Kailee Ishikawa	Characterizing the Function of Gene Editing Components in Tropical Maize
Jesse Viernes	Ethnobotanical Investigations into the Chemical Composition of Medical Preparations of Banana Leaves

Kukui	**Kuykendall 310**
Nicolette Choi	Holding Space: The Intersectionality of Doula Care, Multicultural Needs of Birthing Mothers in Hawaii, and Perceived Obstetric Violence
Faye Blackman	The Impact of Diet on Fertility in Women with Polycystic Ovarian Syndrome
Jolon Clinton	Association Between the Gut Microbiome and Antidepressant Treatment Response: A Systematic Review
Gina Gobel	COVID-19 Social Isolation and Generalized Anxiety Disorder in Young Adults

Oral Presentations Session Three
11:30a - 12:30p

‘Awa	Kuykendall 406
Beniamin Rutkowski	Trophoblast Derived Small Extracellular Vesicles as a Vehicle for Placenta-Specific Gene Therapy
Sophie Mya Wong	Nickase Mechanism for CFTR1 Gene Targeting and Engineering

‘Āweoweo	Kuykendall 407
Magnolia Basoc	To Hide or Seek: Investigating Boldness in Non-Native Gold Dust Day Gecko
Justin Chan	Potential for Intraguild Predation to Drive Species Interactions in a Novel Lizard Community
Cielo Anne Carnate	Investigating the Genetic-Morphological Relationship of Cave-adapted Cricket: Caconemobius Populations in Hawai’i Island Lava Flows
Joseph Romero	Schrankia Living on the Island of Hawai'i

Oral Presentations Session Three
11:30a - 12:30p

Pua Kala	**Kuykendall 408**
Kalista Kahoekapu	Immobilizing Antibodies on a Solid Surface and Visualizing with Surface Plasmon Resonance
Wesley Simko	Longitudinal Dynamics of SARS-CoV-2 Breakthrough Infections in Hawai‘i
Christian Fernando-Alonzo	The Role of Phosphoglucomutase 5 in Embryonic Development
Stryder Williams	Stabilizing Kavalactone Dispersions Utilizing Common Emulsifiers

Poster Presentations
12:30 - 1:15p – Kuykendall 101

Abigail Michelle Cummings	Relationship between Social Media Usage and ADHD Symptoms in College Students
Ava Dalton	Gender and Attention & Working Memory Task Performance as Predictors of Mental Health Functioning in Adults with ADHD
Jasmine Imhoff	ADHD Symptoms Across Social Media Site Usage in College Students
Jaine Lynn Macias	How Immigration Status Impacts Identity Related Experiences: A Quantitative Investigation
Malia Martin	Effects of Artificial Illumination on Behavior of the Hawai‘i Deep 7 Bottomfish Species
Kyle Matsunaka	Comparing Sluggish Cognitive Tempo Across ADHD and Depression Presentations
Lana Mitchell	The Endurance of Algae-Fungi Symbionts Under Various Environmental Stressors
Gabriella Nakamaru	How Immigration Status Impacts Identity Related Experiences: A Qualitative Investigation
Madison Olson	Human Leptin Aggregation and the Potential Role in Obesity

ABSTRACTS

Abstracts of oral and poster presentations are listed in alphabetical order of presenter's last name. Information below the name includes the student's major, the category of their presentation, and time/location of presentation. The faculty mentor, if appropriate, is listed below the abstract.

Group abstracts are listed alphabetically by the Last Name of the group member whose name occurs in this list:

You-fan Chai, Xin Lin
Jaeden Chang, Dylan Sodetani
Tassia Corcoran, Cara Olson, Rondell Torres
Arianna Corry, Kyra Dyer, Emily Harris, Grace McCoy
Clarissa Dixon, Allyson Pooler
Carl Domingo, Connor Quist, Jason Kanemoto, Leo Liang, Logan "Makana" Onzuka
'Ofeinahelotu Filikitonga, Marcus Goh
Greta Gardner, Sarah Uyeda
Rebecca Koeroessy, Makenzy Tamura
Samantha Nagtalon, Grace Roberts

Yuri J.H. Ah-Tye
Biochemistry
Natural Sciences
UROP
Oral Presentation: Session 1 (9:30-10:20a) in KUY 408 (Zoom: Pua Kala)

Benzaza- and Benzoxaphosphole-Based Phosphenium Ions (PR_2^+)

Transition metal (TM) catalysts based on Rhodium, Iridium, Palladium, Platinum, and Ruthenium are responsible for many critical chemical processes conducted by the pharmaceutical, agricultural, and fine chemical industries. However, use of such expensive, rare, and toxic TMs is extremely environmentally detrimental, and therefore, fundamental research aimed at targeting more sustainable alternatives based on earth abundant Main Group (MG) elements like phosphorus is valuable. To date, we have generated a small library of functionalized benzaza- and benzoxaphospholes, which due to their strained nature, are "spring loaded" and poised to facilitate bond activation in a manner similar to TM complexes. Currently, three avenues, all beginning with chlorophosphine **1** are being pursued: 1. Generation of reactive phosphenium ions (**2**, PR_2^+), 2. Synthesis of P–H functionalized **3** and its insertion chemistry with electron-deficient carbonyls, and 3. Synthesis of P–CF_3 analogue **4** and its link to a P(III)/Pd(II) – P(V)/Pd(0) redox couple. The up-to-date progress of these three reactions will be presented.

Mentor: Dr. Matthew F. Cain

Cinthia Albers-Wilson
Interdisciplinary Studies Human Relations in Organizations
Arts & Humanities - Creative
Honors
Oral Presentation: Session 3 (11:30a-12:30p) in KUY 306 (Zoom: ‘Ilima)

Maui Live Poets' Society-Creating Peace One Poem at a Time

This portfolio project documents the Maui Live Poets’ Society, the Martin Luther King Jr. Peace Poem Project, and the International Peace Poem.

Maui Live Poets’ Society is a group of poets that has made a safe place for poetic expression by hosting events across the island of Maui. It has also created, and continues to curate, the International Peace Poem with the goal of assembling the longest-ever multi-authored poem dedicated to the cause of nonviolence. To that end, the society established its Martin Luther King Jr. Peace Poem Awards, which not only cultivate the International Peace Poem but also encourages children to experience the creation of their own original poems.

This portfolio project includes interviews with two of the Society’s founders, Melinda Gohn and Wide Garcia (aka Frank Rich). It further includes interviews with poets in roundtable formats and individually. This is supported by roundtable interviews in which teachers talk about poetry-writing in the classroom, and about the value of the Martin Luther King Jr. Peace Poem project.

As public education has become increasingly focused on STEM, many school administrations have chosen to stop participating in projects such as the Martin Luther King Jr. Peace Poem. In most cases schools no longer teach creative writing, and specifically poetry, at all. That’s why this portfolio project includes research about the value of teaching and writing poetry, which benefits learning, mental health, and the ability to cope with catastrophic illness.

This endeavor demonstrates the value of expression and connection to create change.

Mentors: Paul Wood, Dr. Melissa Kirkendall

Alena Albertson
Molecular Biosciences & Biotechnology
Natural Sciences
UROP, Also presenting for the CTAHR Showcase and Research Symposium
Oral Presentation: Session 3 (11:30a-12:30p) in KUY 309 (Zoom: ‘Ulu)

The Role of IRE1 in Unfolded Protein Response (UPR) and the Impact of PDI9 in Heat-Stressed Plants

Global warming induces heat stress in plants, leading to diminished crop yields. This stress triggers protein unfolding, activating the unfolded protein response (UPR) in the endoplasmic reticulum (ER). The UPR aims to restore protein function by upregulating specific proteins, notably protein disulfide isomerase 9 (PDI9), which aids protein folding by catalyzing intramolecular cystine bonds. This investigation explores the impact of IRE1A and IRE1B knockout mutants on the UPR and defines PDI9's role in the heat rescue response.

Genomic PCR confirmed the *ire1A/ire1B* knockout mutants, validated by comparing PCR products to controls: single mutant *IRE1A*, single mutant *IRE1B*, and wild-type (WT) Arabidopsis plants. PDI9 overexpression (OE) was confirmed via immunoblot analysis, revealing a fourfold increase in PDI9 concentration in the OE lines vs. WT samples. The UPR in Arabidopsis protoplasts is assessed using laser scanning confocal microscopy of GFP fluorescence from the bZIP60-intron-GFP-bioreporter, with appropriate WT controls. The influence of PDI9 on the UPR will be deduced by reintroducing PDI9 (mCherry-PDI9 fusion) into the double mutant, *pdi9/pdi10*, with and without UPR induction, visualized through confocal microscopy of the bZIP60-intron:GFP-bioreporter to measure UPR.

This study successfully validated *ire1a/ire1b* knockout mutants, affirmed PDI9 overexpression in mutant lines, and has begun to unravel the effects of PDI9 on the URP—via laser scanning confocal microscopy of protoplasts inoculated with the bZIP60-intron-GFP-bioreporter. This research furthers our understanding of the UPR and protein folding during plant heat stress, contributing to our comprehension of plant responses, and aiding in mitigating climate change's impact on food security.

Mentors: Dr. David Christopher, Rina Carrillo, Ph.D. candidate

Katelyn Amoroso
Biological Engineering
Engineering & Computer Sciences - Product Design/Development
UROP, Also presenting for the CTAHR Showcase and Research Symposium
Oral Presentation: Session 2 (10:30-11:20a) in KUY 302 (Zoom: Olonā)

Economical Aeroponics System for Accelerating Butterhead Lettuce Growth Through Optimizing Temperature and Spray Frequency

Climate change presents risks to the quality and success of cultivating crops through traditional farming methods, with increasing air temperatures and decreasing amounts of rainfall. To combat these challenges, the idea of an autonomously controlled aeroponics system was proposed to optimize temperature and spraying to accelerate the growth of butterhead lettuce. To enhance the system's economic viability, strategies were employed to minimize heat fluctuations, monitor water usage to prevent overwatering, and maintain optimal growth temperatures to avoid unnecessary cooling. The research methodology involved a series of preliminary tests aimed at refining the aeroponics system's design, focusing on the spraying mechanism and temperature control. To evaluate the spraying mechanism’s effectiveness plant mass was recorded over time, utilizing load cells, to observe how much solution would adhere to the plant's roots while undergoing various spray treatments. The temperature control unit utilized a cold plate heat exchanger, a Peltier module, and thermocouples to initiate the thermo-cooling process and measure the solution’s temperature at different points in the system. The thermal efficiency and operating costs of the temperature controller were evaluated by measuring the temperature of the cold plate, water at the cold plate’s inlet and outlet, spray at the nozzle, and energy consumption. To reduce energy consumption, the cold plate as well as the tubing between the cold plate and nozzles were insulated to minimize heat transfer to the water. Experiments are still ongoing but if successful this project would enable growers to become more climate-resilient and increase yields.

Mentor: Ryan Kurasaki

Kayla Anandia
Political Science and Peace Conflict Resolution
Social Sciences
UROP
Oral Presentation: Session 3 (11:30a-12:30p) in KUY 305 (Zoom: Makaloa)

Remapping Governance in the South China Sea: China's New "10-Dash Line" and Responses from ASEAN States

On August 28, 2023, the People's Republic of China (PRC) published a map updating its territorial claims in the South China Sea (SCS), sparking tensions with neighboring Southeast Asian countries. Drawing on academic literature, media reports, and government documents, this article examines the PRC's recent shift from its 9-dash line policy to the 10-dash line policy and the implications for the territorial disputes in the South China Sea. Then, the article evaluates the perspectives and responses of two Southeast Asian claimant states, the Philippines and Indonesia. Indonesia was the chair of the Association of Southeast Asian Nations (ASEAN) when the announcement was made and has a relatively close relationship with China, while the Philippines is a military ally of the United States. The analysis sheds light on the internal vulnerabilities within ASEAN, which are rooted in economic ties and regional polarization due to global power competition. It concludes by discussing broader implications for the South China Sea disputes.

Mentor: Dr. Kristi Govella

Joseph Carmelo Averion
Computer Science
Engineering & Computer Sciences - Research
UROP
Oral Presentation: Session 1 (9:30-10:20a) in KUY 303 (Zoom: Pe‘ahi)

Automation of Test Names Based on the Arrange-Act-Assert Pattern

Unit testing is a crucial component of ensuring code can be maintained and debugged. Clear unit tests help developers understand their purpose and diagnose what’s wrong in the codebase. Not only is the clarity of a unit test body is important, but the clarity of a unit test name is too. I researched how automation of unit test naming can be done with the Arrange-Act-Assert (AAA) pattern approach. It does this by generating 3 parts for a unit test name where each part is associated with the Arrange, Act, and Assert part of the unit test body. Through an examination of how developers write unit tests and how students name given unit tests, I found patterns and keywords that can be incorporated into the automation mechanism. The patterns and keywords found were grouped into how they influence the Act, Assert, or Arrange part of the unit test body. A plugin of this nature will allow developers to name their tests easily or give suggestions to developers on what test names should be. The focus of the proposed automation mechanism is on generating names that reflect the variables and methods within the test method. Future work may explore the automation’s capability to analyze project-wide behavior to further refine test naming suggestions.

Mentor: Dr. Anthony Peruma

Pearl (Momi) Bachiller
Molecular Cell Biology (B.S.), ʻŌlelo Hawaiʻi (B.A.), Hawaiian Studies Kūkulu Aupuni (B.A.), Women, Gender, and Sexuality Studies (B.A.)
Arts & Humanities - Creative
UROP
Oral Presentation: Session 1 (9:30-10:20a) in KUY 307 (Zoom: Loulu)

Toward an Aloha ʻĀina Praxis for Biomedical Science
I Haku ʻIa E Momi Bachiller, By Pearl Bachiller

My project investigates the historical foundations and role of Western science in Hawaiʻi to expose the imperial, racial, gendered, and national dynamics of scientific knowledge production. I will provide a Kanaka ʻŌiwi lens to this analysis that will arrive at the necessity for an Aloha ʻĀina theory and praxis for biomedical science. Central to this praxis is moʻokūʻauhau, knowing the genealogy of people, knowledge, and institutions will identify the positionality one shares with Hawaiʻi and Kānaka ʻŌiwi, and from positionality comes kuleana. This praxis surpasses critical conscientization by employing an ethic of incommensurability (Tuck and Yang, 2012) to decolonization in biomedical science, ultimately, striving for the repatriation of indigenous life and land. I argue this ethic creates necessary space and protections for ʻōiwi knowledge in higher education by issuing legitimation and bypassing settler-oriented standards. There is a remarkable need for decolonization in research that many indigenous scholars have iterated for decades (Tuhiwai-Smith, 1999). Freedom within and power over the means of producing knowledge is paramount for indigenous people to author own stories, mālama our own ʻike, and combat the centuries of research that objectifies us as specimens, erasing our ancestral role as scientists. I argue that science, especially biomedical science, must aloha ʻāina. It must position systems like white supremacy and U.S. occupation as public health issues. As another attempt toward ʻōiwi futurity, I will present my first endeavor at creating ʻōiwi methodologies for molecular biology ma ka ʻŌlelo Hawaiʻi, drawing from my research on alveologenesis in murine organoid models.

Mentor: Dr. Michelle Tallquist

Daniel Baon
Psychology
Social Sciences
Honors
Oral Presentation: Session 1 (9:30-10:20a) in KUY 310 (Zoom: Kukui)

Native Hawaiian and Pacific Islanders' Perceived Access to Mental Health Facilities

Homelessness is a pervasive issue in the state of Hawai'i. Native Hawaiians and other Pacific Islanders (NHPI) comprise 35 percent of homeless individuals. According to a survey taken by the unsheltered population of the Partners In Care Point In Time Count, the most common self-reported factors leading to homelessness included financial problems, health-related reasons, family-related reasons, COVID-19-related reasons, and being unable to pay rent (2023 Point in Time Count – Hawai'i Health Data Warehouse, 2023). NHPI are also less likely to receive mental health services including prescription medications for mental health treatment as compared to non-Hispanic whites. This study aims to determine the barriers and perceived access that homeless NHPI have when accessing mental health facilities. Previously collected data from a local housing service organization will be analyzed using multivariable methods. Interviews will also be conducted with homeless NHPI through community organizations to determine perceptions of access to mental health services. Results reveal that when comparing mental health among homeless individuals, there are no significant differences between NHPI and other racial groups. Also, while the need for mental health services doesn't differ significantly between NHPI and other racial groups, there is a significant variation in their utilization of these services. Lastly, it was discovered that social support is linked to improved mental health outcomes among homeless individuals. Culturally competent and accessible mental health services tailored to NHPI needs are crucial, along with addressing underlying socioeconomic factors driving homelessness. Efforts to address structural inequalities and cultural barriers in mental health care delivery are essential for supporting NHPI individuals experiencing homelessness in Hawai'i effectively.

Mentors: Dr. John (Jack) Barile, Dr. Anna Pruitt

Magnolia Basoc
Biology
Natural Sciences
Honors
Oral Presentation: Session 3 (11:30a-12:30p) in KUY 407 (Zoom: ʻĀweoweo)

To Hide or Seek: Investigating Boldness in Non-Native Gold Dust Day Gecko

Boldness has been consistently observed in many non-native animals—a behavioral trait that could significantly contribute to their successful dispersal. The consistent, limited flexibility to respond to multiple contexts is called behavioral syndrome, or in this case, boldness syndrome. To evaluate whether the level of individual boldness influences dispersal success, we investigated a ubiquitous non-native lizard in O'ahu, Hawai'i called the gold dust day gecko, *Phelsuma laticauda*. Within outdoor enclosures, I measured the closest distance I could approach a lizard, also known as the flight initiation distance (FID), and the time taken before a lizard approached a novel food. We compared models with and without lizard ID to determine how much of the variation is explained by the individual. We also calculated the correlation between the mean assay responses to measure between-assay consistency. Individual boldness depended on contexts, such as perch height, in FID trials. Meanwhile, boldness was unchanged during the food trials, potentially due to previous experiences with novel food. Compared to *Anolis sagrei*, an O'ahu non-native lizard with boldness syndrome, *P. laticauda* may actually be bolder within the contexts investigated, contrary to expectations. While no boldness syndrome was found between the two contexts examined, we found boldness consistency in food trials, indicating there may be other related contexts supporting boldness syndrome in *P. laticauda*. Our findings highlight the nuances in behavioral strategies, the importance of enclosure-based studies, and the need for increased individual trial replications.

Mentor: Dr. Amber Wright

Faye Blackman
Public Health
Arts & Humanities - Research
Honors
Oral Presentation: Session 3 (11:30a-12:30p) in KUY 310 (Zoom: Kukui)

The Impact of Diet on Fertility in Women with Polycystic Ovarian Syndrome

Polycystic ovarian syndrome (PCOS) is the most common endocrinological disorder affecting women. The heterogeneous disorder, through the imbalance of hormones, causes a variety of symptoms such as weight gain, acne, facial hair, and abnormal menstrual cycles. This hormonal imbalance also increases a woman's probability of developing diseases such as insulin resistance, type two diabetes, and obesity. However, the largest risk factor for women with PCOS is the probability of infertility during the childbearing years. Currently, there is no cure for women with PCOS and the cause of the disease is unknown. Recent studies have suggested dietary therapy as a new method of treatment. This study assesses the research on dietary behavior to increase fertility among women with PCOS. A systematic literature review was conducted; results suggest that diets including low-carb, vitamin D supplementation, and low glycemic index foods showed a positive effect on hormone levels. However, due to the disease's comorbidity and other confounding variables, it is impossible to directly link increasing fertility rates to higher consumption of those specific foods.

Mentor: Dr. Opal Buchthal

Kalea Lou Bullan Borja
Psychology (B.S.)
Minor in Tagalog Language and Literature
Natural Sciences
Honors
Oral Presentation: Session 1 (9:30-10:20a) in KUY 310 (Zoom: Kukui)

Religion's Effects on the Intensity of Continued Bonds

The purpose of this secondary data analysis was to examine how religion intersects with continued bonds (the degree a person feels that that continue to be connected with a deceased loved one) to affect grief severity. Religion plays a significant role in shaping individuals' experiences of grief and their ways of maintaining connections with deceased loved ones. Within the context of bereavement, religious beliefs, practices, and rituals often serve as powerful sources of comfort, significance, and resilience. In addition, this paper aims to provide guidance for therapeutic approaches and bereavement support plans for members of various faith communities. Bereavement care providers can better meet the many needs and beliefs of bereaved individuals by incorporating religious and cultural viewpoints into their work. This will ultimately promote healing, resilience, and overall well-being. By exploring the intersection of religion, grief, and continued bonds, researchers seek to deepen the understanding of how individuals draw upon their religious frameworks to cope with loss and navigate the complexities of mourning. In the current study, the spiritual connection fostered by religious beliefs significantly influences the intensity and prevalence of continued bonds among individuals coping with grief, with Catholics showing the highest percentage of continued bonds with approximately 13% in comparison to the other religions surveyed. Through religious practices and beliefs, individuals may perceive their ongoing connection with the deceased as spiritually meaningful and enduring, providing solace and emotional resilience throughout the grieving process.

Mentors: Dr. Anthony Papa, Dr. Kentaro Hayashi

Luisa Brehmer
Interdisciplinary Studies
Natural Sciences
UROP
Oral Presentation: Session 1 (9:30-10:20a) in KUY 407 (Zoom: ʻĀweoweo)

Variability in Blubber Histology Metrics and Stress Hormones in the Striped Dolphin, *Stenella coeruleoalba*

Striped dolphins (*Stenella coeruleoalba*) serve as ecosystem indicator species, and their health could reflect the overall health of the ecosystem in Hawaiʻi. The research done is part of a larger effort to understand the health of striped dolphins and their role as ecosystem indicators. The data collected was combined with previously generated data for more accurate results, contributing to the ongoing study of marine ecosystem health in Hawaiʻi. The striped dolphin samples in the study had varying life histories and body conditions to provide a range of samples. We used histological methods to determine the distribution of blubber across each dolphin's body and determined a correlation with body condition and nutritional status. Using hormone extraction methods and quantification methods, the distribution of blubber was compared with levels of cortisol, and its concentrations in the blubber of striped dolphins. Findings indicated a correlation between the amounts of blubber and cortisol present in blubber. Higher levels of cortisol were found in emaciated dolphins and lower levels of cortisol were found in nutritionally healthy dolphins. Our results can be used for future health assessments of live striped dolphins and shed light on the role of stress in their nutritional status. The findings of the research conducted in our study could inform future health assessments of live striped dolphins and shed light on the role of stress in their nutritional status.

Mentor: Dr. Kristi West

Jenny Brown
Electrical Engineering
Engineering & Computer Sciences - Research
UROP
Oral Presentation: Session 2 (10:30-11:20a) in KUY 310 (Zoom: Kukui)

Ethical Considerations and Technological Solutions in Healthcare Research: Protocol Building of a Systematic Literature Review

The project focused on developing a protocol for a systematic review that explores ethical challenges and technological solutions in healthcare research. We also plan to reflect particularly within the context of Hawai'i's healthcare disparities among Native Hawaiians and underserved populations. Following PRISMA guidelines, we registered the prospective systematic review at protocols.io. The review plans explores open-source databases such as PubMed, IEEE, and PsychInfo, using the keywords “healthcare disparities”, “cultural sensitivity”, “privacy concerns”, “accessibility”, “technology-related obstacles”, “patient experiences”, “equity considerations”, “cultural contexts”, “patient perspectives”, and “healthcare accessibility”. Inclusion criteria comprised English literature from 2019 to 2024, including reviews, meta-analyses, and ethical analyses. The information was extracted and assessed using an Excel spreadsheet, considering the Newcastle-Ottawa Scale for risk of bias, John Hopkin’s hierarchy of evidence for the level of evidence, and the GRADE approach (Grading of Recommendations, Assessment, Development, and Evaluations) for quality of evidence assessment. Data was compiled using Zotero. From 1808 studies, 25 studies were included in the review. Initial findings suggest that healthcare technologies such as artificial intelligence (AI), machine learning, smart sensors and robots, big data analytics, and Internet of Things (IoT) would contribute to improve quality of care and operational efficiency. However, autonomy emerges as a significant ethical concern, with potential data misuse for discriminatory practice. In teleoncology studies, Native Hawaiians valued nonverbal communication and the patient-physician relationship. This review highlighted the importance of testing the AI performance across different demographic groups during each step of algorithm development in future projects.

Mentor: Samia Dutra

Jonathan Cai
Civil and Environmental Engineering
Engineering & Computer Sciences - Research
UROP
Oral Presentation: Session 2 (10:30-11:20a) in KUY 302 (Zoom: Olonā)

Saving Our Land

In the context of the ocean, sand savers typically refer to structures or other natural features that trap or accumulate sand to aid in preventing coastal erosion. These characteristics serve as barriers, slowing the flow of sand and keeping waves and currents from carrying it away. In this study, we present a photogrammetric imaging application called structure from motion (SfM) that uses geometry and computer vision to build three-dimensional (3D) models from a collection of two-dimensional (2D) photos. A complete 3D model of the beach profile can be recreated by taking a series of overlapping photos of the shoreline and applying SfM algorithms. This model provides a dynamic representation of the shoreline, dunes, ripples, and other features, allowing for precise slope measurements, elevation changes, and erosion identification. The results are contrasted with another method of measuring sand slope that uses a standard point gauge. A transect was taken out of the 3D models and contrasted with data that was collected by hand. Based on the measured beach, it was evident from the results that sand savers had a significant effect in reducing sand flow and preventing waves from shifting it away. We investigated the potential applications of this method to evaluate dynamic alterations in the beach profile within a small wave flume.

Mentor: Dr. Zhenhua Huang

Cielo Anne Carnate
Biology (B.S.), Women, Gender, and Sexuality Studies (B.A.)
Natural Sciences
UROP
Oral Presentation: Session 3 (11:30a-12:30p) in KUY 407 (Zoom: ʻĀweoweo)

Investigating the Genetic-Morphological Relationship of Cave-adapted Cricket: *Caconemobius* Populations in Hawai'i Island Lava Flows

Hawai'i is one of the most biologically diverse regions in the world due to its geographical isolation. The young age of the island of Hawai'i provides an evolutionary timeline for exploring speciation and species dispersal. The Pahoehoe lava tubes in Hawai'i provide a unique opportunity for study of species and ecology in order to fully understand the extent of biodiversity in Hawaii. The lava tubes are home to an understudied group of cave-adapted arthropods, including the cave cricket genus *Caconemobius.* Among the first species to colonize lava flows, crickets provide the anchor that allows other species to inhabit lava flows. Previous studies have revealed morphological differences between cave crickets and their surface counterparts (Gurney and Rentz 1978). Studying both genetic diversity and morphological characteristics in *Caconemobius* populations will provide insights into their evolutionary variation. Therefore, the main focus of this proposed research is to address the relationship between genetics and morphology within the *Caconemobius* populations. This study aims to explore variations in cricket morphology and assess whether these variations are correlated with the geography or age of lava flows. It also seeks to determine whether crickets from older lava flows exhibit higher levels of cave-adaptiveness and whether there are morphological similarities among genetically related cricket populations. This can provide information on the interplay between genetics, physical characteristics, and the process of evolution in these crickets.

Mentor: Dr. Rebecca Chong

Jasmine Carpena
Mathematics
Natural Sciences
UROP
Oral Presentation: Session 3 (11:30a-12:30p) in KUY 304 (Zoom: Māhoe)

Exploring the Maximum Likelihood Threshold of Gaussian Graphical Models

[abstract forthcoming]

Mentor: Dr. Elizabeth Gross

Min Ji Cha
Biological Engineering
Engineering & Computer Sciences - Product Design/Development
UROP
Oral Presentation: Session 1 (9:30-10:20a) in KUY 302 (Zoom: Olonā)

16779 WWSE: Removal of Nutrients in the Primary Effluent of Individual Wastewater Systems

The main focus of this project is on further treatment of the primary effluent of wastewater from wastewater systems in Hawaii, which targets the audience of household residents. The primary effluent of wastewater refers to wastewater that has undergone primary treatment, which focuses on reducing the Total Suspended Solids (TSS) and Biochemical Oxygen Demand (BOD). However, each wastewater system conducts treatment to different degrees, and many Individual Wastewater Systems (IWS) in Hawaii, such as cesspools and septic tanks, release primary effluent into the environment that contains harmful nutrients. These nutrients can cause eutrophication as well as the spread of pathogenic microbes that can cause diseases. Therefore, in order to prevent these environmental and health concerns, my project proposes a solution to removing these nutrients by further treatment via growing macroalgae in a raceway system, which will consume and convert the nutrients to biomass, and supplying oxygen aeration alongside natural sunlight and circulation via a paddle wheel to mimic natural conditions for optimal algal growth. Algae was incorporated due to its applicability in sustainability through bioproducts, which can be used in a wide variety of fields. For this project, primary effluent from the Sand Island Wastewater Treatment Plant (WWTP) was used, though it did have similar numbers for solids removal efficiency found at a secondary plant due to the addition of chemicals along with UV treatment. Preliminary experiments have shown a substantial reduction in both nitrogen and phosphorus, specifically 86.78% and 46.09%, respectively, therefore hinting at a promising field.

Mentor: Dr. Samir Kumar Khanal

You-Fan Chai, Xin Lin
Finance/MIS, Accounting
Engineering & Computer Sciences - Research
UROP
Oral Presentation: Session 3 (11:30a-12:30p) in KUY 307 (Zoom: Loulu)

Beyond the Classroom: Fostering Student Development Through Learning Emporium Strategies

Introductory Computer Science courses include students from a wide range of backgrounds which results in diverse learning styles. We are studying learning support systems and the best practices in implementation methods to improve student development.

The project includes reviewing factors that encourage students to utilize additional resources, more specifically on-line and in-person support hours at various times. ICS 101, ICS 111, ICS 141, ICS 211, and ICS 241 all have these support hours during an “open lab,” which includes teaching assistants (TA) and lab assistants (LA) who are able to give one-to-one and one-to-many support for students. This study is split into two parts, which are the non-computer science majors (ICS 101) and the computer science majors (ICS 111, 141, 211, and 241) respectively.

In terms of the methods, we look at the student sign-in sheets (mostly quantitative) for support hours and conduct interviews (mostly qualitative) with the TAs/LAs of each ICS course, in order to determine trends that are indicators of the motivators behind student usage of additional resources. Through the project, we hope to conclude with the factors that affect non-computer science and computer science majors respectively, while also finding the bigger picture between the two. The implications behind the research will help with structuring additional resources (support hours in this case) to improve student learning and motivation.

Mentors: Dr. Michael Brian Ogawa, Branden Ogata

Justin Chan
Biology
Natural Sciences
UROP
Oral Presentation: Session 3 (11:30a-12:30p) in KUY 407 (Zoom: ʻĀweoweo)

Potential for Intraguild Predation to Drive Species Interactions in a Novel Lizard Community

Hawaii has no native lizards, and the recent introduction of several lizards from around the globe has created the opportunity to study species interactions within a novel community. The gold dust day gecko, *Phelsuma laticauda*, hereafter day gecko, is one of the lizard species introduced to Hawaii. Typically, members from this genus have a relatively herbivorous diet. Therefore, it was surprising that a recent study in Hawaii using stable isotopes found that day geckos had the highest trophic position compared to other introduced lizards. One possible explanation is that day geckos may be predating other lizards. Anecdotal observations suggest that day geckos may predate mourning geckos, *Lepidodactylus lugubris*, whose population is in apparent decline. Here, we report the presence or absence of mourning gecko DNA from 177 wild-day gecko fecal samples. To do so, we designed primers targeting the COI region of the mitochondria and tested them against the DNA of Hawaii's introduced lizards to ensure only mourning gecko DNA would be amplified. Then, we tested the ability of a NucleoSpin Soil Kit to extract reptile DNA from a fecal sample and whether the COI primers would work with the soil kit. If mourning gecko DNA is detected, this would be evidence of intraguild predation (IGP), which could explain both the high trophic position of day geckos and the continuing decline of mourning geckos in Hawaii. This will provide insight into community change over time in Hawaii and may generalize to communities elsewhere experiencing waves of species introductions.

Mentor: Dr. Amber Wright, Dr. Robert Thomson

Shek Hong Perseus Chan
Mathematics
Minor in Physics
Engineering & Computer Sciences - Product Design/Development
UROP
Oral Presentation: Session 1 (9:30-10:20a) in KUY 304 (Zoom: Māhoe)

Investigating the Superintegrability of a Family of Hamiltonian Systems

The idea of conservation laws is an important tool in physics and chemistry, such as the conservation of energy or electric charge. In the case of Hamiltonian systems, we can find such conserved quantities by looking for integrals of motion. They provide an alternative way to know more about the systems without finding analytic solutions of its differential equations. The number of integrals of motion that a system possesses plays an important role in classical and quantum mechanics. If a Hamiltonian system has the same number of integrals of motion, then it is integrable and if the system has even more integrals, then it is superintegrable.

In this project, we found integrals of motion for two special cases of a family of Hamiltonian systems. We found that one of them is at least integrable, and the other one is superintegrable. Then, we looked at numerical solutions using Euler's method due to the difficulty of solving them analytically. Using the integrals of motion, we were able to analyze the error of the numerical solutions. Our ultimate goal is to show the whole family of systems under consideration are all superintegrable.

Mentors: Dr. Sarah Post, Dr. Sebastien Bertrand

Jaeden Chang, Computer Engineering
Dylan Sodetani, Electrical Engineering
Engineering & Computer Sciences - Product Design/Development
Honors
Oral Presentation: Session 1 (9:30-10:20a) in KUY 303 (Zoom: Pe‘ahi)

Applying and Optimizing Machine Learning Methods for Classification and Anomaly Detection

Machine learning focuses on the development of statistical algorithms that learn and predict trends in data, and it is a growing field within engineering as data becomes more readily available. One type of machine learning problem is known as classification, and the goal is to be able to analyze certain features within the data to correctly label the data into distinct classes. Anomaly detection is a form of classification where the machine learning algorithm identifies outliers in the data since these points differ greatly from the standard pattern of other data points.

This project focuses on testing supervised learning methods against unsupervised learning methods to observe if unsupervised methods are more robust. These tests were performed on a publicly-available heart failure dataset with different traits about each patient, each data point being labeled if heart failure occurred or not. Supervised learning methods learned off of both healthy heart data and unhealthy heart data and learned to distinguish between the two. Unsupervised learning methods learned only from what healthy heart data looked like and classified any data that did not fit this classification was labeled as unhealthy. Adding noise to the data, it is observed that most unsupervised methods utilized had better performance in the presence of increasing noise in the data. These results support the claim that unsupervised learning is more robust for anomaly detection problems.

Mentor: Dr. Anthony Kuh

Ju-Ling Chen
Biochemistry
Natural Sciences
UROP
Oral Presentation: Session 1 (9:30-10:20a) in KUY 408 (Zoom: Pua Kala)

Investigating the Regulation of Tight Junction Pores for Enhancing Paracellular Permeation of Small Molecule Therapeutics at the Blood-Brain Barrier

Organ and blood vessel surfaces are protected by sheets of closely joined cells, where cell-cell adhesion points are sealed by tight junctions (TJs) placed apically in the intercellular space. TJs are protein complexes that inhibit the free diffusion of molecules, preventing leakage between cell compartments. The TJ barrier is primarily composed of claudins, which are a family of proteins that polymerize in the membrane to create a continuous network of pores called TJ strands. The blood-brain barrier (BBB) uses TJ proteins to maintain the integrity of the endothelial cell lining of brain blood vessels, with claudin-5 being the most enriched TJ protein in the BBB, and its dysfunction has given rise to various neurodegenerative disorders. Furthermore, claudin-9 is essential for nervous system development and expressed in the cerebellum and cells in the cochlea.

TJ models thus far have focused on claudin assembly and ion permeation but has yet to address drug delivery strategies along the paracellular pathway. In this study, an all-atom model of TJs was developed to understand the mechanisms of paracellular permeation. The crystal structure of claudin-9 and claudin-5 were used to computationally model triple-pore arrangements between two lipid bilayers solvated under physiological conditions. The stability of these systems was observed over 1 μs long simulations, and the free energy of the permeation and the local diffusivity were computed with umbrella sampling calculations. This research will lay the groundwork for future steps in assessing the free energy change in the presence of chemical permeation enhancers.

Mentors: Dr. Rui Sun, Mabel Bernaldez, Christopher Kang

Nicolette Choi
Interdisciplinary Studies of Oceania
Social Sciences
Honors
Oral Presentation: Session 3 (11:30a-12:30p) in KUY 310 (Zoom: Kukui)

Holding Space: The Intersectionality of Doula Care, Multicultural Needs of Birthing Mothers in Hawaii, and Perceived Obstetric Violence

Historically, women have been tended to throughout pregnancy and the postpartum period by other women in the community. However, the introduction of hospital births, and the medicalization of labor and delivery has changed this. Self-autonomy and shared decision making in healthcare, especially in maternal care, is fundamental in satisfactory outcomes for the patient. This study was conducted to see if doula care and cultural competence were factors in satisfactory birth outcomes for Hawai‘i born women, and if this type of care could help reduce obstetric violence. A phenomenological approach was used to analyze interviews with 11 Hawai‘i-born women who had at least one live birth within the past five years. Most of the interviewees were primiparous mothers that had given birth during the Covid-19 pandemic. Of the women who had employed a doula, they reported having extremely satisfying experiences, and among the women who did not they all stated that having a knowledgeable, competent, experienced, advocate is valuable and could have been improved their personal experiences. Health care providers and policymakers in Hawai‘i need to acknowledge that Hawai‘i women want to be active and informed decision-makers throughout their birthing process, and doulas can help bridge the gap between medical professionals and patients. Access to doula care can help provide non-normative medical, emotional, spiritual, mental, and culturally sensitive care which can minimize unwanted birth interventions and obstetric violence, as well as provide continuous support throughout pregnancy and the postpartum period.

Mentor: Dr. Rebecca Stotzer

Haley Churchill
Psychology
Certificate in Women, Gender, and Sexuality Studies Certificate
Social Sciences
Honors
Oral Presentation: Session 1 (9:30-10:20a) in KUY 310 (Zoom: Kukui)

The Influence of Proficiency in Hawai‘i Creole on the Identification of Polar Questions in Hawaiian

Hawai‘i Creole (HC), commonly known as Pidgin, has a similar polar (yes/no) question intonation pattern to Hawaiian. Based on this information, this study examines how a person's ability to identify the Hawaiian polar question intonation is influenced by their familiarity with HC and Hawaiian. Participants are divided into three groups based on their language experience: students learning Hawaiian as an additional language, students with experience in HC, and students with no significant experience in either Hawaiian or HC. Each participant listens to 12 polar question and 12 statement recordings in Hawaiian and English. In a forced choice identification task, participants choose if the recording is a question or statement. The results show that the group familiar with HC has higher accuracy for identifying intonation in Hawaiian than the Inexperienced Group but not as high as the Hawaiian Learners Group. The Inexperienced Group has the lowest identification accuracy for Hawaiian Intonation out of the three Participant Groups, but they still have a tendency to respond “statement” for statement intonation and “question” for question intonation. This shows that inexperienced listeners can use intonation cues to identify Hawaiian intonation patterns to some extent. In acoustic analyses of the stimuli, the average F0 is significantly higher for polar questions compared to statements in both English and Hawaiian. This study provides evidence that intonation facilitates identification for languages with similar intonation patterns and that HC can be a valuable learning tool for Hawaiian language acquisition.

Mentor: Dr. Amy Schafer

Jameil Clarke
Economics
Natural Sciences
UROP
Oral Presentation: Session 3 (11:30a-12:30p) in KUY 301 (Zoom: Koa)

Why do Bubbles Persist in Asset Markets? Trading Types, Trading Patterns, and Financial Bubbles

Experimental Economics concerns the study of market institutions in a controlled environment. Such environments allow the systematic analysis of market successes and market failures, nurture the design and development of efficient markets, and provide intuition into individual decision-making. Our study investigates the longstanding phenomena of speculative price bubbles. We analyze market behavior across a spectrum between two distinct markets. The first, a double auction commodity market, is an efficient market that supports the theoretical assumptions of rational expectation. The second, a double auction spot asset market, is inefficient and features large price deviations inconsistent with economic theory. This unique experimental design (Sherstyuk and Lumsdaine, 2024) consists of two intermediate markets that systematically replace one feature of the commodity market with a feature of the asset market until the two markets are bridged. This appoach allows us to examine which of the distinguishing assets market features have an effect on the formation and persistence of speculative price bubbles. Results show that as the life of an asset increases, the price of the asset will move further away from competitive levels, resulting in a speculative price bubble.

Mentor: Dr. Ekaterina Sherstyuk

Jolon Clinton
Nursing
Natural Sciences
Honors
Oral Presentation: Session 3 (11:30a-12:30p) in KUY 310 (Zoom: Kukui)

Association Between the Gut Microbiome and Antidepressant Treatment Response: A Systematic Review

Objective: Appraise existing literature regarding the association between the gut microbiome and depression treatment response.

Method: This prospective systematic review identified relevant experimental or observational studies from PubMed, Cochrane, APA PsycNet, Web of Science, and ScienceDirect, focusing on the gut microbiome's role in depression treatment outcomes for adults or mice. Included articles, published in English between 2010-2024, adhered to standard depression treatment protocols. Non-research publications and studies lacking gut microbial analysis or utilizing alternative depression therapies were excluded. This review followed PRISMA guidelines and applied John Hopkins criteria to assess evidence quality.

Results: 3 mice studies and 9 human studies encompassing 600 individuals with major depressive disorder (MDD) were included. Differences between the gut microbiome by measure of diversity and/or taxonomic findings of individuals responsive (R) and nonresponsive (NR) to treatment were noted across all included literature. Genera *Coprococcus, Turicibacter, Collinsella,* and *Faecalibacterium* were found to be associated with R by multiple sources while the genus *Enterobacter* and its related taxa were more frequently associated with NR. There were inconsistent findings regarding most other taxa, possibly due to the high heterogeneity in study design and methodology. Gut microbial changes correlated with alterations in neurotransmitter levels, neurogenesis, and metabolic pathways such as tryptophan metabolism and short chain fatty acid (SCFA) production.

Conclusion: The gut microbiome influences drug efficacy and treatment outcomes and has the potential to enhance or interfere with treatment response. Further well-controlled longitudinal studies are needed to uncover additional taxa and their biological mechanisms that interact with treatment.

Mentors: Dr. Samia Valeria Ozorio Dutra, Dr. Alice Tse

Tassia Corcoran, MIS
Cara Olson, Biology Secondary Education
Rondell Torres, Business Administration and International Business, Minor in Filipino
Engineering & Computer Sciences - Research
UROP
Oral Presentation: Session 3 (11:30a-12:30p) in KUY 307 (Zoom: Loulu)

Information Literacy: A Foundational Approach to Generative AI Competency

This research project is comprised of 3 components: first, identifying the efficacy of the current lectures pertaining to generative AI, second, an examination of students' proficiency in utilizing generative AI tools; and third, an investigation into students' perceptions and disposition regarding the aforementioned instructional content and tools.

The effectiveness of lecture materials was analyzed through interviews with teaching assistants (TAs). These interviews consisted of a series of questions regarding student submissions for the associated assignments. The students' assignments submissions were collected from TA's, analyzed, and graded using a rubric based on ACRL guidelines, with all identifying information treated as confidential. Students then completed a survey about whether their generative AI abilities improved after a lecture video. Students were finally presented with a series of scenarios and asked to rate their relevance on a one to seven scale with an explanation of their rating.

TAs observed students asking and verifying informational questions in generative AI, but struggled with content-generation based questions. The assignments analyzed mirrored the same results, with many students able to ask informational questions, but struggling with the content-generation portion. Results from the survey determined students believe their understanding was improved after watching the lecture video. Analyzed results of student disposition determined that students found it unnecessary, unethical, or unreliable at the lower level. Responses at the median would be used occasionally for idea, content, and information generation. The highest-rated responses stated that generative AI is useful for homework, resumes, and informational support.

Mentor: Dr.Michael-Brian Ogawa

Arianna Corry, Atmospheric Sciences
Kyra Dyer, Global Environmental Sciences
Emily Harris, Global Environmental Sciences
Grace McCoy, Atmospheric Sciences
Natural Sciences
UROP
Oral Presentation: Session 1 (9:30-10:20a) in KUY 309 (Zoom: ‘Ulu)

A Low-Cost Ionosonde Receiver to Provide Freely Accessible Data in Hawai'i

This research project focuses on constructing a low-cost oblique ionosonde receiver in Hawai'i to provide freely accessible data on the Earth's ionosphere, particularly over the Pacific region. The ionosphere, an upper atmospheric layer critical for long-range communication and navigation, is prone to fluctuations, such as scintillation events, which can disrupt the Global Positioning System and communication systems, especially in aviation. The proposed ionosonde receiver aims to improve ionospheric monitoring, aiding in the prediction and preparation for such events, ultimately enhancing safety.

Our receiver will be installed at the Lyon Arboretum, strategically located for data collection. Methodology closely follows the design by Floer (2020), employing open-source software and hardware components. We will utilize Dr. Juha Vierinen's Chirpsounder software to join his established network, enabling passive reception of ionospheric soundings from other transmitters worldwide.

The significance of this project lies in providing long-term, publicly accessible ionospheric data, especially in subtropical regions where such observations are limited. Through this research, we aim to contribute to understanding and mitigating the impact of ionospheric fluctuations on aviation and communication systems.

Mentor: Dr. Giuseppe Torri

Kelly Cousens
Biology
Natural Sciences
UROP
Oral Presentation: Session 2 (10:30-11:20a) in KUY 407 (Zoom: ʻĀweoweo)

Long-term Memory Formation without Short-term Memory Formation in the Mexican tetra

Memory formation is known to consist of two phases: short-term (SM) and long-term (LM). However, forming long-term memories usually follows short-term memory, and is unclear if SM formation is needed prior to LM. Also, there is a significant knowledge gap connecting SM and LM (*in vivo*) to the phenomenon of the short-term (STP) and long-term potentiation (LTP) (seen in the *in vitro* cell culture). The Mexican tetra or *Astyanax mexicanus*, chosen as an experimental platform in this study, consists of two forms: the surface-dwelling sighted (surface fish) and cave-dwelling blind forms (cavefish). Cavefish seem to form LM without forming SM from our preliminary result. In contrast, surface fish typically formed these memories (SM → LM). A foraging behavior, vibrational attractive behavior (VAB), is largely prevalent in cavefish, and its decrease against an inedible vibrating glass rod was used as the readout of memory formation. The STP inhibitor (UBP-145) and LTP inhibitor (NVP-AAM077) was first carefully tested its toxicity in different concentration, then addressed these inhibitor effects on the memory formation. Our result indicated that the NVP (LTP inhibitor) treatment disrupted LM formation in cavefish, which supports that cavefish's LM is based on LTP. The UBP (STP inhibitor) treatment prevented the SM but not LM formation in surface fish, that is, a phenocopy of cavefish's memory formation. We concluded that the cavefish LM is likely based on LTP and revealed a striking possibility of LM formation without SM in a vertebrate model.

Mentors: Dr. Masato Yoshizawa , Dr. Motoko Iwashita

Brooke Crose
Botany
Natural Sciences
UROP
Oral Presentation: Session 3 (11:30a-12:30p) in KUY 309 (Zoom: ‘Ulu)

Simultaneous Salinity and Drought Stress Tolerance in Native Coastal Dune Plants

Coastal ecosystems face escalating threats from climate change, including sea-level rise, increased salinity, and prolonged drought. While studies have examined the individual effects of drought and elevated salinity on coastal dune plants, there are few tests of their simultaneous effects, despite their common co-occurrence under climate change. Understanding how plants may respond to these stressors is crucial for conservation efforts. This greenhouse study examines the combined effects of salinity and drought stress on three common coastal dune plant species in Hawaii: *Chenopodium oahuense*, *Vigna marina*, and *Vitex rotundifolia*. Seeds were germinated under salinity stress by watering with artificial seawater, to mimic possible conditions following seed dispersal, or freshwater control conditions. Following germination, seedlings continued to be watered according to their salinity treatment (seawater or control) until they reached the 3-4 leaf stage, at which time, drought was imposed. Plant responses were monitored to determine how combined salinity and drought stress affect plant fitness (i.e. survival and growth) as well as ecophysiological function (i.e. photosynthetic rates). Both fitness and function were negatively affected by drought and salinity, and responses differed among species. These results indicate low tolerance to these combined stressors, indicating likely declines in coastal dune plants under future climate change.

Mentor: Dr. Kasey Barton

Abigail Michelle Cummings
Psychology
Certificate in Women, Gender, and Sexuality studies
Social Sciences
Course requirement
Poster Presentation: Poster Session (12:30-1:15p) in KUY 101 Auditorium

Relation between Social Media Use and ADHD Symptom Severity in College Students

Over the past 10 years, young adults are using social media at an increased rate which is contributing to impairments in productivity, attention span, and social connectivity. Prior work suggests a positive relationship between college students' social media use (SMU) and attention-deficit/hyperactivity disorder (ADHD) symptoms. However, there is limited research examining the relation between young adults' SMU and severity of ADHD symptoms. Therefore, the current study aims to do this in a sample of young adults, and it was hypothesized that as SMU increases, ADHD symptom severity will increase. The study sample consisted of 401 college students recruited via a research data pool in exchange for course credit (M_{age}=19.5, 79% female, 34% non-Hispanic Asian, 33% non-Hispanic White, 21% non-Hispanic other, 10% Hispanic/LatinX, 1% non-Hispanic Black). Results from a linear regression analysis suggested that SMU significantly predicted ADHD symptom severity [$F(1, 399)=9.98$, $p<.01$]. That is, for every one unit increase in SMU, there is a .27 increase in ADHD symptom severity. Therefore, young adults with increased utilization of social media may experience more severe ADHD symptoms. These findings suggest that SMU may be a risk marker for ADHD, which may help to strengthen efforts in assessment and treatment. Additional research is necessary to clarify the relation between social media use and ADHD symptoms while considering gender and sociodemographic differences.

Mentors: Ashlyn Wong, Dr. Patrick Goh

Gabriel Custodio
Psychology
Natural Sciences
UROP
Oral Presentation: Session 2 (10:30-11:20a) in KUY 310 (Zoom: Kukui)

Environmental Complexity on Cognitive Load and Simulator Sickness in Head-Mounted Virtual Reality

Interest in virtual reality (VR) has exploded across many sectors, including recreation, education, professional training, and research, driven by advancements in head-mounted display technologies. However, concerns persist regarding factors such as simulator sickness and demands on cognitive load, which may limit the effectiveness of VR when compared to non-VR alternatives. Simulator sickness, attributed to a disparity between visual and vestibular motion cues, can induce unpleasant symptoms such as nausea and oculomotor discomfort. Cognitive load theory posits that the brain has limited resources when actively processing information, which can be imposed upon by multiple sources, and can have an effect on learning outcomes. While both of these factors have been researched thoroughly, there are few studies that compare outcomes across different virtual environments. This study does so by examining the effect of a virtual environment's complexity on cognitive load through the use of an n-back paradigm. Severity of simulator sickness symptoms are evaluated through the use of the simulator sickness questionnaire, which are administered both before and after 20 minutes of VR immersion. Results from this pilot study will be immediately useful to UH Manoa's VR laboratory, as it will assist us in designing virtual environments optimized for conducting future cognitive research, and it will be crucial in the long term as we work to identify the many minute factors that prevent VR's effective use as a growing technology.

Mentor: Dr. Jonas Vibell

Ava Dalton
Psychology
Social Sciences
Course requirement
Poster Presentation: Poster Session (12:30-1:15p) in KUY 101 Auditorium

Gender and Attention & Working Memory Task Performance as Predictors of Mental Health Functioning in Adults with ADHD

Attention Deficit Hyperactivity Disorder (ADHD) is a neurodevelopmental disorder characterized by clinical impairments in attention, hyperactivity, and impulsivity. Recent research has suggested a correlation between gender and mental health outcomes in ADHD, particularly in personal relationship dysfunction (Faheem et al., 2022; Hinshaw et al., 2022). However, there are research gaps on gender as a predictor of ADHD mental health outcomes and the role of symptom severity. This study aims to fill in this gap and analyze gender and ADHD severity as predictive factors for mental health and perceived executive functioning outcomes.

A linear regression analysis was utilized to determine if gender was a predictor for task performance and mental health outcomes. Data was collected from 415 participants (331 females, 84 males) through a combination of self-report measures and scores on computerized tasks. Gender was not found to be a statistically significant predictor of ADHD symptom severity, task performance, or mental health outcomes. However, t-tests demonstrated statistically significant differences between males and females, with female participants reporting higher scores than males on the PHQ-9 questionnaire ($p<0.001$) and self-report ADHD symptom severity measures ($p=.002$). Males and females did not have significant performance differences on n-back or stop signal tasks (attention and working memory tests). The findings indicate that females may report poorer mental health outcomes and increased ADHD symptom severity compared to males, despite gender appearing to not be a predictive factor. This implies females may perceive greater difficulties with ADHD symptoms, adversely impacting their mental health outcomes.

Mentor: Dr. Patrick Goh
Co-Author: Dawn Suh

Yuewen Ding
Molecular Cell Biology
Natural Sciences
UROP
Oral Presentation: Session 2 (10:30-11:20a) in KUY 406 (Zoom: ‘Awa)

Production and Characterization of Pre-Fusion Ebola Virus GP2 Expressed in Drosophila S2 Cells for Analysis of Vaccine-Induced Immune Responses

Introduction: The Ebola virus (EBOV) causes hemorrhagic fever with high mortality rates in humans. The EBOV’s glycoprotein (GP) contains two subunits (GP1 and GP2). GP1 is responsible for receptor binding. Upon receptor binding, pre-fusion GP2 undergoes conformational changes, facilitating membrane fusion to release viral RNA. Our lab has developed a recombinant Ebola GP subunit vaccine which has shown high protective efficacy in non-human primates (NHPs). However, the mechanism by which GP-specific antibodies confer protection requires further investigation. Our research focuses on defining the role of GP2-specific antibody binding in vaccine-induced protection.

Methods: The EBOV GP2 gene was designed as a synthetic gene with stabilizing mutations and ligated into pUHM plasmid with a C-tag on the C-terminal end. Generated plasmids were amplified in E. Coli and transfected into *Drosophila* S2 cells. Stably transformed Drosophila S2 cell lines were selected by adding hygromycin. Protein expression was induced by adding CuSO4 and purified using affinity chromatography before characterization by SDS-PAGE and Western blot.

Results: The EBOV GP2 gene was cloned into the pUHM vector, and Sanger sequencing showed the presence of targeted mutations and the C-tag. Double-digest and gel electrophoresis confirmed the correct gene size. GP2 was successfully purified using affinity chromatography and characterized by SDS-PAGE and Western Blot.

Discussion: Stable pre-fusion EBOV GP2 can be used to characterize serum antibody response from NHPs immunized with an EBOV subunit vaccine. We will investigate whether pre-fusion GP2 is more effective than the prior GP2 lacking stabilizing mutations at detecting antibodies in immunized NHP sera.

Mentor: Dr. Lehrer

Clarissa Dixon, Anthropology
Allyson Pooler, Psychology, Political Science
Social Sciences
Completing UROP project this semester
Oral Presentation: Session 1 (9:30-10:20a) in KUY 305 (Zoom: Makaloa)

Contaminated Indigenous History: The Colonial and Environmental Impact of the Boston Tea Party on Northeastern Indigenous Communities

This project seeks to understand the social, political, and environmental effects of the Boston Tea Party and investigate the lasting impacts this event had on Native Indigenous communities in this region. The Boston Tea Party was a political protest that took place in 1773 in Boston, Massachusetts, where American colonists, dressed as Mohawk Indians, dumped 342 chests of British tea into the Boston Harbor to protest against the British Parliament's Tea Act. Upon conducting comparative analysis of contemporary and historical accounts, the researchers investigate the influence of dressing up as Mohawk Indians in American culture, and highlighting the use of Indigenous identity and imagery in the Boston Tea Party as a form of civil disobedience. This research develops the understanding of how Native identities were manipulated and appropriated for political and cultural purposes. Americans used Native American clothing, language, and customs as a form of performance and identity play. This furthermore contributed to the ongoing influence of Americans adopting and performing Native American identities and how it perpetuates stereotypes about Indigenous people. The archival research concluded there was no significant evidence of water contamination directly resulting from the tea dumping. However, colonial trade and settlement, evidenced by the Boston Tea Party contributed significant negative environmental impacts such as deforestation, soil erosion, and alteration of the ecosystem. In conclusion, this research deduced a holistic understanding of the Boston Tea Party's influence in the lives of Northeastern Indigenous tribes and peoples.

Mentors: Dr. Jamaica Heolimeleikalani Osorio, Ha'åni Lucia Falo San Nicolas

Carl Domingo, Computer Engineering
Connor Quist, Mechanical Engineering
Jason Kanemoto, Mechanical Engineering
Leo Liang, Computer Engineering
Logan "Makana" Onzuka, Mechanical Engineering
Engineering & Computer Sciences - Research
UROP
Oral Presentation: Session 2 (10:30-11:20a) in KUY 302 (Zoom: Olonā)

UHM Autonomous Unmanned Aerial System Platform

The University of Hawai‘i Drone Technologies (UHDT) is a group of engineering students focused on developing an autonomous Unmanned Aerial System (UAS), Air Delivery System, and Autonomous Image Processing System for the 2024 Student Unmanned Aerial System (SUAS) RoboNation competition at the St. Mary's County Regional Airport on June 25-27, 2024. This year's competition requires the UAS to fly autonomously, identify targets, and deliver the corresponding payload to the correct target to simulate UAS package delivery operations.

The team's subsystems, each with a distinct focus, contribute to package delivery. The Mission Operations subsystem handles coordinates and flight planning. The Image Processing subsystem wrote computer programs for classifying targets to determine where to deliver packages with an AI neural network that identifies and classifies the color and shape of a target with an average accuracy of 86%. The Air Delivery subsystem designed and tested the payload drop mechanism, which has a 95% package survival rate upon landing. The Electrical subsystem manages power and wiring, while the Mechanical subsystem designed a safe airframe for package delivery with a payload capacity of 34 lbs and can reach a top speed of 65 mph.

UHDT not only represents the University of Hawai‘i but also embodies the potential of future engineering talent. With a robust quadcopter design, advanced image processing capabilities, and a reliable payload delivery mechanism, UHDT stands poised to excel in the challenge ahead. Conducting more flight tests provides UHDT with the best opportunity to compete in the international SUAS RoboNation competition.

Mentor: Dr. Wayne Shiroma

Cody Driver
Physics
Natural Sciences
UROP
Oral Presentation: Session 3 (11:30a-12:30p) in KUY 304 (Zoom: Māhoe)

Gas Mixing System for Time Projection Chamber

Dark matter is one of the greatest open mysteries in physics. There is overwhelming evidence that dark matter constitutes approximately 85% of the matter in the universe. Yet, despite decades of searches, direct evidence of the existence of dark matter has not been found. To make matters worse, current detection experiments are threatened by a fast-approaching obstacle. Detector technology is becoming so sensitive that detectors will be unable to differentiate between the potential signs of dark matter and apparent dark matter signals caused by neutrino particles emitted from the sun.

Directional gas time projection chambers (TPCs) may solve this problem and could become critical for further progress in the field of dark matter detection. The currently world-leading dark matter detection experiments utilize TPCs containing liquid target materials. These detectors maximize dark matter sensitivity, but they are not directional. Gas TPCs can achieve directionality, but need larger volumes and more advanced technologies than their liquid counterparts. Therefore, their performance needs to be optimized before being employed in a large-scale experiment. To function properly, gas TPCs must be continuously filled with a mixture of gases, and research on the optimal gas mixture has been lacking. The purpose of this project is to design a gas-mixing system that can reliably supply TPCs with a desired gas mixture. Such a system would allow the Vahsen Group at UH Mānoa to finally be able to conduct gas optimization studies, which could significantly improve the performance of gas TPCs used in dark matter searches.

Mentor: Dr. Sven Vahsen

Jeremiah Keith Averia Dy
Information & Computer Sciences
Engineering & Computer Sciences - Research
Honors, UROP
Oral Presentation: Session 3 (11:30a-12:30p) in KUY 303 (Zoom: Peʻahi)

Machine Learning Approaches to Breast Cancer Classification with *All of Us* Data

Cancer diagnosis is a lengthy process and can contribute to the fatigue of medical staff. Additionally, breast cancer is one of the leading causes of cancer-related deaths amongst women. Therefore, it is imperative to research new, safe ways to expedite patient diagnosis to improve patient outcomes. This study aims to apply machine learning techniques to the field of medical science for the purpose of creating a proof-of-concept diagnostic tool which can help expedite breast cancer diagnosis. Machine learning models were imported from the *scikit-learn* library and trained on two different sets of cardiovascular health and quantitative liquid biopsy data from the *All of Us* database to predict breast cancer malignancy. The first dataset contained a higher volume of data with a small number of predictive features, while the second dataset contained a smaller volume of data with a relatively larger number of predictive features. Models were evaluated using a test dataset containing all features used in either dataset. All models performed poorly in correctly classifying the test data, regardless of what dataset was used for training. However, models trained on the dataset with more features tended to display a recall score of 1.00 on the test data, which indicates that the models are likely to correctly identify all malignant cases in unseen data. As such, instead of using these models as diagnostic tools, they could instead be further developed into screening tools that help identify patients with a higher risk of malignant cancer.

Mentors: Dr. Peter Yiğitcan Washington, Dr. Mahdi Belcaid
Co-Author: Zain Jabbar

Cali Falkenstein
Marine Biology
Natural Sciences
UROP
Oral Presentation: Session 2 (10:30-11:20a) in KUY 308 (Zoom: Limu Kohu)

Quantifying Kāneʻohe Coral Bleaching Conditions through Color Card Analysis

The Nutrient Addition Experiment underscores the importance of monitoring coral reef health in the face of global climate change, focusing on how nutrient enrichment influences mass coral mortality during thermal stress events. Previous research from Palmyra Atoll demonstrates that nutrient-rich seabird guano contributes to coral resilience to thermal stress. Contrastingly, wastewater effluent, an anthropogenic nutrient source, has been found to be detrimental to coral health and thermal tolerance. This study, utilizing seabird guano and wastewater effluent, aimed to understand the coral color responses, a proxy of symbiont density, of coral fragments to these different nutrient treatments.. The study involved collecting 288 *Porites compressa (P. compressa)* and *Montipora capitata (M. capitata)* fragments from Kaneohe Bay, Oahu, and conducting a three-week experiment with stable temperature conditions, randomized tank placements, and consistent nutrient dosing concentrations of 6 μmol/L. Nutrient treatments included seabird guano, wastewater effluent, inorganic nitrogen and phosphorus, and an ambient control. The Hawaiian Koʻa Coral Color Card was used for coral color assessment using photographs analyzed in imageJ. Results revealed an overall decrease in color values for *P. compressa* and an increase for *M. capitata* over the experimental period. Red Green Blue values of *P. compressa* showed an inconsistent trend across treatments, while *M. capitata* exhibited significant increases, except for effluent-treated corals, which experienced a decline from week 1 to week 2. The study suggests further experiments exploring symbiont diversity, photosynthetic material, and temperature stressors for a comprehensive understanding of coral health in diverse nutrient conditions.

Mentor: Dr. Megan Donahue
Co-Authors: Jessica Glazner, Claire Moreland-Ochoa, Justin Berg

Christian Fernando-Alonzo
Biology (B.S.) and Psychology
Natural Sciences
MARC (Maximizing Access to Research Careers) Scholar
Oral Presentation: Session 3 (11:30a-12:30p) in KUY 408 (Zoom: Pua Kala)

The Role of Phosphoglucomutase 5 in Embryonic Development

The phosphoglucomutase (PGM) family of proteins is composed of five members that have a similar predicted structure containing four distinct domains. In humans and mice, this protein family includes PGM1, PMG2, PGM2L1, PGM3, and PGM5, many of which have been implicated in catalyzing reactions involved in glycogenesis. PGM5 is most closely related to PGM1 in terms of amino acid sequence. However, PGM5 appears to lack enzymatic activity and instead has been shown to localize to cytoskeletal structural complexes. A PGM5 knockout (KO) mouse model was developed to determine the biological role of this protein, and we found that mice developed similar to wild-type (WT) controls with no apparent phenotype. A western blot of different tissues showed particularly high levels of PGM5 in cardiac and smooth muscle and a confirmed absence of protein in KO tissues. Given the high expression in these muscle tissues, we subjected the KO and WT control mice to a treadmill test to evaluate potential differences in exhaustion-like behavior. We found that KO mice exhibit a significantly lower critical speed compared to age matched WT mice, suggesting an impairment in exercise tolerance. The PGM5 heterozygote mice appear to exhibit a critical speed closer to the WT mice than that of the KO mice, suggesting that one functional *PGM5* allele was sufficient for mice. These experiments suggest that PGM5 expression is not required for embryogenesis in mice, but may impair muscle tissue in heart and blood vessels for optimal physical activity.

Mentor: Dr. Peter Hoffmann
Co-Authors: Lance GA Nunes, Ryan Wright

Greta Gardner, Tropical Agriculture in the Environment
Sarah Uyeda, Environmental Design
Arts & Humanities - Research
UROP
Oral Presentation: Session 1 (9:30-10:20a) in KUY 407 (Zoom: ʻĀweoweo)

Bioswales: Water Conservation Through Landscape Techniques

Hawai'i struggles with water scarcity from factors, like increasing household consumption. Our research explores the potential of bioswales to ease this crisis by enhancing water retention and filtration in urban areas like Oahu.

We interviewed representatives from the board of water supply on our current and historical water levels. We researched aquifer data levels in Hawaii and engaged with landscape professionals on bioswale benefits. We also observed results of previous water conservation projects on Oahu. We've proposed a design for a bioswale on campus and aim to install it either before the UROP deadline or during the summer. The design integrates principles of xeriscaping and intentional wetland landscaping, utilizing native Hawaiian and noninvasive plants to absorb and filter water. Collaborating with skilled landscape architects, maintenance staff, and conservationists, our goal is to establish a bioswale that utilizes landscape techniques for water conservation.

We may only have 60 years of water left at the rate we are using. Bioswales not only address water scarcity but also contribute to wastewater treatment and reuse initiatives, supporting the state's goal of doubling treated wastewater by 2030. The goal is aimed to increase freshwater capacity by 100 million gallons per day.

Incorporating bioswales into urban landscapes presents a multifaceted approach to addressing Hawaii's water crisis. By using indigenous flora and innovative design, bioswales offer a holistic solution that aligns with broader conservation efforts. Implementation of bioswales not only safeguards water resources but also fosters resilience and sustainability in the face of escalating challenges.

Mentor: Dr. Andrew Kaufman

Gina Gobel
Psychology (B.A.)
Arts & Humanities - Research
Honors
Oral Presentation: Session 3 (11:30a-12:30p) in KUY 310 (Zoom: Kukui)

COVID-19 Social Isolation and Generalized Anxiety Disorder in Young Adults

Social isolation is an issue that can emerge in a multitude of situations and is especially prevalent today, due to a dramatic rise in technology use and accommodations post-pandemic. Research shows that in the past five years, there has been an increase in homeschooling, remote work, and smartphone usage (Bureau of Labor Statistics, 2022). The fields of psychology and neuroscience indicate that there could be correlations between these factors and psychological problems. COVID-19 regulations are a unique opportunity to study the effects of social isolation on developmental processes. This research specifically investigates the correlation between social isolation and Generalized Anxiety Disorder (GAD) in young adults. Researchers hypothesized that social isolation from COVID-19 permanently increased GAD symptoms in young adults.

To conduct this research, a sample was taken of University of Hawai'i at Mānoa (UHM) students, aged 18-24 years. This sample included individuals who were diagnosed with GAD pre-pandemic, individuals diagnosed post-COVID, "self-diagnosed" individuals with no access to psychiatric care, and individuals with no GAD. An online, anonymous survey was administered, to evaluate how social isolation may have impacted individuals with GAD, and GAD symptoms. The findings compared GAD symptoms both pre- and post-COVID-19. Both qualitative and quantitative data was collected, to thoroughly examine any correlation as well as confounding variables. Results indicated that social isolation from COVID-19 did permanently increase GAD symptoms in young adults.

Mentor: Dr. Ashley Maynard

Ofeinahelotu Filikitonga, Marcus Goh
Cinematic Arts
Arts & Humanities - Creative
UROP
Oral Presentation: Session 2 (10:30-11:20a) in KUY 306 (Zoom: ʻIlima)

Beyond The Inferno

In the aftermath of the destructive August 2023 wildfires in Lahaina, *Beyond The Inferno* follows the experiences of 19-year-old college student Avery Dagupion and his grandparents. Avery's search for stability after enduring seven relocations contrasts with his grandparents' unwavering resilience. Through a blend of poetic and observational documentary techniques, the film underscores the urgent need for permanent housing solutions and urges viewers to contribute to Lahaina's ongoing recovery.

This documentary was crafted using firsthand accounts from survivors of the fire. It is the brainchild of Singaporean producer Marcus Goh and Lāhainā-grown director ʻOfeinahelotu Filikitonga. The filmmakers believe in the importance of continuing discussions on crucial matters and aspire to instigate change within the communities we inhabit. The film aims to convey that genuine concern for a community transcends geographical boundaries and that one can deeply empathize with its people regardless of their origins.

Mentor: Professor Lisette Flanary

Lauren Grigat
Molecular and Cell Biology
Natural Sciences
UROP
Oral Presentation: Session 1 (9:30-10:20a) in KUY 406 (Zoom: ‘Awa)

Lineage Tracing Tcf21 Visceral Smooth Muscle Across the Alimentary and Female Genitourinary Systems

[abstract forthcoming]

Mentor: Dr. Michelle D. Tallquist

Stephen J.D. Gulley
Astrophysics and Mathematics
Natural Sciences
UROP
Oral Presentation: Session 2 (10:30-11:20a) in KUY 304 (Zoom: Māhoe)

Timescale of Collapse of Cosmologically Coupled Particles

Recent studies have shown that there could be a dark energy core located inside of black holes. This leads to ‘cosmological coupling’ of dark holes with the expansion rate of the universe. As the universe expands, black holes gain mass. A consequence of an increase in mass, is an increase in the gravitational force of the object. This would lead to objects orbiting the black hole to have a condensed orbit. Another consequence of these cores is that cosmologically coupled objects should act like dark energy. A known effect of dark energy is the accelerated condensation of dark energy orbits if a perturbation is applied to them. Simulations of black holes in orbits that are cosmologically coupled are being run to compare the condensation of black holes to the condensation of dark energy. The results of and comparisons will be compared to discover any relations between the two.

Mentor: Dr. Kevin Croker

Nicole Hamamura
History
Arts & Humanities - Research
UROP
Oral Presentation: Session 2 (10:30-11:20a) in KUY 305 (Zoom: Makaloa)

He Lei Hulu Kaʻapuni Hōnua: A Historical Analysis of a Hawaiian Feather Lei at the Pitt Rivers Museum (Oxford)

This research project focuses on the specific lei hulu, or Hawaiian feather lei, that is currently displayed at the Pitt Rivers Museum in Oxford. In addition to focusing on the significance of lei hulu through its historical context, this project highlights the unique history of the artifact itself.

While lei were frequently worn by Hawaiian women, due to the material that it was made from, the lei hulu in particular signified the wearer to be one of chiefly status. Lei hulu were typically made from the vibrant feathers of birds such as yellow feathers of the Hawaiʻi ʻōʻō or the *Moho nobilis.* During the nineteenth century, the lei hulu bore even more significance as featherwork grew less common with the decline in native birds and Hawaiian culture overall.

The lei hulu at the Pitt Rivers Museum was thought to have been given to a woman named Lady Wiseman by Princess Kaʻiulani during the late nineteenth century, for having provided hospitality to the princess while abroad in England. As such, this lei hulu illustrates the connections between Hawaiian material culture and the larger international politics during the time of major political change in the Hawaiian kingdom.

This project presents an opportunity to revise the way that Hawaiian historical artifacts are being presented and labeled overseas. In conducting research on artifacts such as the lei hulu, I will be able to contribute to the accurate and ethical representation of Native Hawaiian culture.

Mentor: Dr. Noah Dolim

Flynn Hamlin
Journalism
Minor in Spanish
Arts & Humanities - Creative
UROP
Oral Presentation: Session 2 (10:30-11:20a) in KUY 306 (Zoom: ʻIlima)

Rally For Our Reefs

For my project, I am creating a mini documentary-style video on the health of coral reefs here on Oahu. I am a journalism major so I have been following basic journalistic procedures and practices throughout the process. After completing background research and educating myself on the topic I have conducted a number of interviews with professionals in the field including, scholars and researchers, officials at DAR, and executives of non-profit organizations. I have filmed and recorded these interviews, along with the exciting work that many of these sources are doing to protect and understand our reefs. I have done extensive work to film all of the shots I will need to share the information I have gathered. The most exciting of which has been my freediving underwater film sessions capturing footage of reefs and other marine organisms around the island. In the coming weeks, I will be bringing together all of this information and content and editing it down into a concise, compelling, educational, and impactful video using my skills as a journalist and premier pro video and audio editing software. Coral reefs are the beating heart of Hawaii. They feed its people, uphold its tourism industry, and protect its shorelines. I hope my project helps to share the importance of coral reefs with the public and motivates everyone on Oahu to get involved to help protect and restore our reefs.

Mentor: Patricia A. Buskirk

Abigail Hawkins
Geography and Environment
Arts & Humanities - Creative
UROP
Oral Presentation: Session 1 (9:30-10:20a) in KUY 306 (Zoom: ʻIlima)

Paranoia in the Pseudo-public: The Aesthetics of Kaka'ako's Redevelopment

A zine about the artist's struggles with alienation, guilt, shame, and 'local' identity inspired by time spent in Kakaʻako throughout their life. A relation to and reflection on the neighborhood's redeveloped urban environment and how Hawaiʻi can be a hotbed of class stratification and racial strife not only for a certain type of person, but for all its residents and tourists in one way or another. A marginalized person's attempt to reclaim their voice and experiences of identity paranoia; an experiment in emotion and a disruption to the idea of this place as 'paradise.'

Mentor: Dr. Dan Milz

Rachel Haynes
Mechanical Engineering
Engineering & Computer Sciences - Research
MARC program
Oral Presentation: Session 3 (11:30a-12:30p) in KUY 302 (Zoom: Olonā)

Developing an Additive Manufacturing Process for Fabricating Wearable Biochemical Sensors

Additive manufacturing, commonly known as 3D printing, has paved the way for precise, customizable, and straightforward fabrication of material which can contribute toward technological advancements in patient healthcare. The development of electrochemical sensors through the process of additive manufacturing can enable local manufacturing of point-of-need testing, promoting cost-effectiveness, accessibility, and environmentally sustainable manufacturing methods. Utilizing the VolteraNova, an additive manufacturing machine capable of printing flexible electronic components using carbon and silver inks, the production of electrochemical sensors is readily achievable and can be deployed as needed. Carbon ink-based sensors have demonstrated beneficial conductive properties and biocompatibility that can play a pivotal role in enhancing the sensor's response characteristics and sensitivity. To study the conductive properties of carbon ink, a variety of sensors were created using three different carbon inks: carbon filled flexible conductive trace ink (FE3203), single-walled carbon nanotube solvent-based conductive ink (SWCNT) and Intexar™ stretchable, washable carbon ink (PE672). Sensors were produced using each of the inks and tested using a potentiostat. The test results from the cyclic voltammetry analysis showed that carbon ink alone is not conductive enough to produce a sufficient response. To combat this issue, graphite was mixed into the different carbon inks which were then printed and tested. Graphite possesses highly electrocatalytic characteristics, and the addition to the carbon ink helped to significantly improve the electrochemical properties of the mixture. Future plans include incorporating the electrochemical sensors into wearable devices to facilitate real-time monitoring and evaluation of a wide variety of health parameters. The subsequent devices will be further tested for the production of wearable electronics.

Mentors: Dr. Tyler Ray, Kaylee Clark

Christian P Hermoso
Philippine Lang and Culture: Ilokano and Economics
Minor in Political Science
Certificate in Law and Society
Arts & Humanities - Research
Honors
Oral Presentation: Session 1 (9:30-10:20a) in KUY 301 (Zoom: Koa)

The Socioeconomic Impact of Covid-19 on Ilokano Americans

[abstract forthcoming]

Mentors: Dr. Aurelio Agcaoili, Dean Domingo

Mona Hirose
Molecular Cell Biology
Minor in Psychology
Natural Sciences
UROP
Oral Presentation: Session 1 (9:30-10:20a) in KUY 406 (Zoom: ‘Awa)

The Role of Iron-Dependent Cell Death on Fibrotic Regions in Cardiac Hypertrophy

Sudden death in cardiac hypertrophy is caused by arrhythmia, and fibrosis in cardiac hypertrophy is a key pathological feature to be a locus of arrhythmia. Studies using contrast MRI demonstrated that fibrosis detected by delayed contract is observed in the septal insertion. The architectural structure of the small conduit for blood – capillary vessels – where a single red blood cell (RBC) passes is complex in the area. In the septal insertion, particularly in the basal inferoseptal area, there is a unique structure characterized by myofibers changing directions abruptly. We hypothesized that in cardiac hypertrophy, the septal insertion may have increased fibrosis levels due to the complex structure of myofibers. Here we obtained 7 female and 2 male hearts ages 55 to 84 years old from the Willed Body Program at JABSOM to represent non-hypertrophic (<350g) (n=5) vs hypertrophic hearts (>350g) (n=4). We identified fibrosis in the anterolateral and inferoseptal areas using a combination of Masson’s Trichrome staining and quantified its area by image processing. We observed that fibrosis levels of the basal inferoseptal were significantly higher than those of the free wall in hypertrophic hearts ($p<0.05$) but not in non-hypertrophic hearts. The area with increased fibrosis was consistent with the lesion of the complex structure of myofibers in cardiac hypertrophy. Further experiments will be needed to confirm whether the morphology of the heart contributes to increased fibrosis and whether this fibrosis is attributed to iron accumulation.

Mentors: Dr. Takashi Matsui, Nicholas Kawasaki

Kyaw Hsan Hlaing
Asian Studies
Minor in Political Science
Social Sciences
UROP
Oral Presentation: Session 3 (11:30a-12:30p) in KUY 305 (Zoom: Makaloa)

Myanmar's Political Crossroads: Understanding the Failures of Reform

Myanmar's political landscape has been characterized by a turbulent struggle between democratic aspirations and entrenched military rule. The abrupt halt to the country's decade-long political transition following the February 2021 coup underscores the complexities inherent in this journey. This paper delves into the root causes behind Myanmar's failed political transitions, particularly during the period of 2010-2020, focusing on two key factors: the exclusionary nature of the National Peace Process, notably the Nationwide Ceasefire Agreement (NCA), and the enduring influence of the military over civilian governance. The NCA, initiated in 2011, aimed to pave the way for peace and federal democracy. However, under the leadership of Aung San Suu Kyi's National League for Democracy (NLD) government, criticisms arose regarding its lack of inclusivity, marginalizing key ethnic groups and armed factions. This paper found out that the exclusion not only hindered national reconciliation efforts but also undermined the legitimacy of the peace process. Moreover, the military's pervasive influence over civilian governance, enshrined in the constitution, has posed a formidable obstacle to democratic transition. Despite electoral victories by the NLD, the military retained significant control over decision-making processes, culminating in the contested 2020 election results and subsequent coup. This underscores the military's continued dominance and its role in derailing Myanmar's path to democracy. Therefore, this paper concludes that the failure of Myanmar's democratic reforms was driven by the exclusion of the National Peace Process and the influence of the military over civilian governance, culminating in the coup in February 2021.

Mentor: Dr. Anna Stirr

Shelby Hom
Exceptional Students & Elementary Education
Arts & Humanities - Creative
Honors
Oral Presentation: Session 1 (9:30-10:20a) in KUY 307 (Zoom: Loulu)

Cultivating a Sense of Place Among Students in Hawai‘i

Place-based learning (PBL) is an instructional approach that integrates the community and environment into teaching academic subjects. PBL has been shown to increase student achievement and boost community vitality. The purpose of this portfolio was to explore how PBL can be implemented in Hawai‘i public schools. Although the Department of Education adopted a statewide framework for the inclusion of Native Hawaiian culture and values in classrooms, there is no comprehensive resource that organizes lesson plans by schools or specific areas.

My goal was to create a unit of place-based lessons for first-grade students at Haha‘ione Elementary School that focused on living things in Hawai‘i. The lessons incorporated hands-on learning experiences where students observe and interact with their environment. The unit opened with activating students’ background knowledge of living things and culminated in a workday at a wetland near the school.

This work served as a documentation of how I planned place-based lessons aligned with my school’s curriculum and blended multiple academic subjects. Local educators may use this portfolio as a model for planning place-based lessons designed for their school’s geographical area.

Mentor: Dr. Stacy George

Rocky Huang
Computer Science
Minor in Japanese
Engineering & Computer Sciences - Research
UROP
Oral Presentation: Session 1 (9:30-10:20a) in KUY 303 (Zoom: Pe‘ahi)

An Exploratory Study Investigating Identifier Naming Practices in Data Science Code

[abstract forthcoming]

Mentor: Dr. Anthony Peruma

Megan Ibara
Travel Industry Management
Arts & Humanities - Research
Honors
Oral Presentation: Session 2 (10:30-11:20a) in KUY 301 (Zoom: Koa)

Impacts of the Tourism Industry on the Hakka in Taiwan

The tourism industry can play a major role in revitalizing a culture. In Taiwan, the Hakka people face cultural loss as they modernize. Traditional culture and language are declining as the Hakka youth are more interested in modern culture. This research is focused on how tourism can help the Hakka revitalize their culture.

The research that was conducted was through a survey. This survey aimed to understand the impacts of tourism along with various stereotypes that Taiwanese and foreigners had on the Hakka. Finding these results will allow for better suggestions on how the Hakka can better interact with the tourism industry and utilize it to their advantage. The survey was given out to students, faculty, and staff of the University of Hawaii at Manoa and in Taiwan. There were 41 voluntary respondents.

The research found that Taiwanese and foreigners were aware of the Hakka culture, where they resided, and revealed major stereotypes. Some suggestions based on the results were that the Hakka should better promote their attractions in Hakka-dominated areas and also take advantage of their well-known cuisine and better market their food (and culture) to foreigners.

The project showed that it is possible to use tourism to help the Hakka revitalize their culture while also improving their economy. Tourism can be used to better interest the Hakka youth so that they can take pride in their culture and continue to practice their traditions.

Mentor: Dr. Daniel Spencer

Jasmine Imhoff
Psychology
Social Sciences
Course requirement
Poster Presentation: Poster Session (12:30-1:15p) in KUY 101 Auditorium

ADHD Symptoms Across Social Media Site Usage in College Students

Previous research has indicated that increases in social media use (SMU) are associated with increases in attention-deficit hyperactive disorder (ADHD) symptoms among college-aged adults. The current study aims to examine the relationship between SMU and ADHD symptom severity across different social media sites, including Facebook, Snapchat, Instagram, TikTok, and Twitter. Given that current studies indicate that general SMU is associated with ADHD symptoms, it was hypothesized that the positive relationship between SMU and ADHD symptom severity would replicate in more stimulating sites and not in less stimulating sites. Participants in this study included 89 college students recruited via a research data pool in exchange for course credit (M_{age}=19.4, 65% female, 38% non-Hispanic White, 27% non-Hispanic Asian, 26% non-Hispanic other, 9% Hispanic/LatinX). SMU was measured by asking participants to indicate the daily number of minutes they spent on each social media site for 28 days, and their responses were averaged into a mean score. Results indicated that the relation between SMU and ADHD symptom severity was not significant across Instagram (p=.18), Tik Tok (p=.26), Facebook (p=.27), Twitter (p=.47), and Snapchat (p=.65). Although the relations between SMU and ADHD symptoms across the different sites were nonsignificant, there are several limitations that may have affected the current study's findings. This includes the use of solely self-reported data. Future research should attempt to source data directly from the device the participants use to access these social media sites to obtain more accurate data.

Mentor: Dr. Patrick Goh

Skye Inn
Global Environmental Science
Minor in English
Natural Sciences
UROP, Also presenting for Tester's, GES Thesis
Oral Presentation: Session 1 (9:30-10:20a) in KUY 309 (Zoom: ʻUlu)

Microbial Metabolism of Diesel Fuel in a Tropical Island Aquifer

Petroleum hydrocarbon (PH) contamination, has been a significant global environmental issue for decades. While PH degradation has been well studied in surface environments, we know little about the microbial ecology of PH degradation in subsurface aquatic ecosystems. In November of 2021, the Red Hill Bulk Fuel Storage Facility on Oʻahu spilled 19,000 gallons of diesel jet fuel (JP-5) into the Red Hill Shaft, potentially contaminating the aquifer it draws from. However, due to limited knowledge of PH contamination in Oʻahu's aquifers, it is unknown how microbial communities in groundwater ecosystems can facilitate refined fuel degradation. Therefore, we performed an experiment focused on quantifying the changes of microbial communities in the presence of JP-5 and their ability to transform or remove refined PH.

Groundwater was incubated with JP-5 for 28 days. Throughout the experiment, samples for fluorescence spectroscopy, flow cytometry, Total Organic Carbon (TOC), and microbial community profiling were collected. Fluorescence spectroscopy and TOC allowed us to analyze dissolved organic matter compositional changes and JP-5 consumption, while flow cytometry and DNA tracked microbial growth and community compositional changes. Results demonstrated that diesel fuel addition induced a significant and rapid growth of microbes as well as the enrichment of *Novosphingobium* (Class Alphaproteobacteria, Family Sphingomonadaceae), which came to dominate the community. Throughout the experiment, TOC decreased along with Total Nitrogen, indicating that the microbes were metabolizing JP-5. From this experiment, we can infer that our aquifers on Oʻahu can be a valuable source of bacterial bioremediation for future PH contamination events.

Mentor: Dr. Craig Nelson

Kailee Ishikawa
Molecular & Cell Biology (B.S.)
Natural Sciences
Honors, UROP
Oral Presentation: Session 3 (11:30a-12:30p) in KUY 309 (Zoom: ‘Ulu)

Characterizing the Function of Gene Editing Components in Tropical Maize

Gene editing technology has revolutionized our ability to make precise genetic changes to fix diseases and improve traits, but the efficiency of this technology has not been tested in important grain crops like tropical maize. My project aimed to use various molecular techniques to analyze the inheritance and function of different gene editing components transformed into tropical maize. For my Honor’s research project, I analyzed individual first generation transgenic (T1) tropical maize plants that were genetically transformed with different molecular elements including but not limited to gene editing reagents, herbicide resistance genes, antibiotic resistance genes, and colored fluorescent proteins. My objectives were to determine if all the genetic components that were used for the initial transformation segregated in the T1 generation and if those components were functional. To test for the presence and inheritance of specific genetic elements, I extracted total genomic DNA, used the genomic DNA as a template to amplify each genetic element using the polymerase chain reaction (PCR), and analyzed the amplification products using agarose gel electrophoresis. My functional assays included testing the plants for herbicide or antibiotic resistance and visualizing colored fluorescence in leaf tissue. For plants that carried the CRISPR/Cas9 gene editing components, I tested their function by verifying the presence and identity of edits made in the targeted genes using PCR subcloning and Sanger sequencing. Through observational and molecular analysis, I determined the inheritance and function of the different elements used for gene editing in tropical maize.

Mentor: Dr. Michael Muszynski

Kalista Kahoekapu
Biology
Minor in Public Health
Natural Sciences
Honors, MARC (Maximizing Access to Research Careers) Scholar
Oral Presentation: Session 3 (11:30a-12:30p) in KUY 408 (Zoom: Pua Kala)

Immobilizing Antibodies on a Solid Surface and Visualizing with Surface Plasmon Resonance

The human immunodeficiency virus is responsible for millions of deaths. There were 1.3 million new infections in 2022. This statistic can be directly impacted by an effective vaccine for preventing the spread of HIV. Broadly neutralizing antibodies that were isolated from chronically infected patients target conserved regions on the virus. The VRC01 antibody targets the CD4 binding site of HIV. 97% of humans naturally create VRC01 antibodies, however the naïve b-cell requires a long evolutionary process to acquire the wildtype phenotype.

The objective of this project is to use surface plasmon resonance (SPR) to determine the binding kinetics of a previously constructed immunogen to VRC01 antibodies. We hypothesize that our engineered immunogen will bind with high affinity to help elicit a response from VRC01-class B-cells.

We are testing the Strep-tag system for antibody immobilization on the SPR sensor. Strep-tag sequences were added to VRC01 using a cloning method, and the constructs were expressed in ExpiCHO cells. As an intermediate step, we confirmed that the system works for attachment of VRC01 by using a pull-down assay with biotin-coated beads.

Our immobilization strategy involved layering multiple proteins on the sensor with corresponding response units (RU): 1) streptavidin (3500 RU), 2) biotinylated Strep-Tag (detectable), 3) Strep-tacin®XT (2500 RU), and 4) Strep-tagged VRC01 (400 RU) or A32 (50-900 RU depending on ligand concentration). We observed 200-300 RU when measuring our immunogen binding to the antibodies. Results from these experiments justify future mouse immunogenicity studies to determine the immune focusing potential of the engineered immunogen.

Mentors: Dr. Iain MacPherson, Ryan Bailey

Komaki Kakinuma
Rie Tsuchida
UROP
Oral Presentation: Session 3 (11:30a-12:30p) in KUY 301 (Zoom: Koa)

Regenerative Tourism: Conscious survey on Japanese tourists' awareness and Perception of "Malama"

[abstract forthcoming]

Mentor:

Anna Kalabukhova
English
Minor in Pre-health
Arts & Humanities - Creative
Honors
Oral Presentation: Session 1 (9:30-10:20a) in KUY 306 (Zoom: ‘Ilima)

Medea, Uninterrupted

Medea, Uninterrupted is a novella written as an English creative undergraduate thesis. It is centered on the famed narrative of Medea, a prominent Greek mythological figure who has been portrayed by various Greek and Roman playwrights and poets such as Euripedes, Seneca, Ovid, and Apollonius of Rhodes. What makes her especially compelling is not only her notorious violent psyche but also her kaleidoscopic portrayal throughout the various narratives she inhabits—she is illustrated as a love-sick damsel in distress, a pitiless sorceress, a vindictive wife, and a frigid mother, among many other archetypes. The purpose of this thesis was not only to superimpose multiple components of each previously-written narrative but to also craft a unique storyline that explores Medea’s multi-layered characterization in a novel and comprehensible matter, as many narratives contain rifts or variations in their respective plotlines that had to be pieced together.

The craft techniques utilized in the execution of Medea’s narrative for this thesis featured written prose that emphasized the mode of first-person narration invoking the sense of an unreliable narrator. The entirety of the novella is broken up into twelve chapters with a separate prelude that is set up to be circular in presentation, as the narrative begins and ends with the same defining event (the infamous portrayal of Medea killing her children), the journey for the reader lying in the buildup to the moment that has been analyzed by various classicists throughout centuries.

Mentor: Dr. Craig Howes

Cade Kane
Computer Science
Minor in Biology
Natural Sciences
MARC (Maximizing Access to Research Careers) Scholar
Oral Presentation: Session 1 (9:30-10:20a) in KUY 406 (Zoom: ‘Awa)

Identifying Biomarkers of Colorectal Cancer

Introduction: Colorectal cancer (CRC) ranks as the fourth most common cancer and the second leading cause of cancer-related mortality in the US, with notable disparities among racial/ethnic groups. This study examines the genomes of ten CRC samples from Native Hawaiian (NH) patients, comparing them with samples from individuals of white, black, and Asian descent to pinpoint significant, clinically relevant CRC biomarkers in NH patients.

Methods: Using an adapted pipeline from the Broad Institute's Genome Analysis Toolkit, ten paired NH CRC whole genome sequencing samples underwent variant discovery, generating mutation annotation format (.maf) files. This involved preprocessing, creating a panel of normals, variant calling with Mutect2, and aggregating individual samples into a .maf file, analyzed using R. Simultaneously, data from the Colon Adenocarcinoma (COAD) project of The Cancer Genome Atlas (TCGA) were imported using the R Maftools package for comparative analyses of tumor mutational burden (TMB) and driver genes (identified with MutSig2CV) between NH-CRC and white, black, and Asian races.

Results: Successful DNA sequencing spanned approximately two weeks, with one week for preprocessing and half a week each for generating the panel of normals and variant calling. TMB and driver gene identification was completed, with initial observations suggesting some differences. However, rigorous statistical tests are necessary to confirm observations.

Conclusion: This study's progress marks a significant step toward identifying CRC biomarkers in NH patients, with potential implications for treatment strategies and improved health outcomes within the NH community.

Mentors: Dr. Youping Deng, Dr. Yuanyuan Fu, Isam Ibrahim

Brendon Kawabata
English
Arts & Humanities - Creative
Honors
Oral Presentation: Session 1 (9:30-10:20a) in KUY 306 (Zoom: ‘Ilima)

The Enunciations of Silence

“I have searched for a sense of belonging and have been disappointed time and again. I have tried to find a home in the places I go to, and they have all offered me no respite. It is through this searching, however, that I recognized the only way for me to feel a sense of belonging lies with my family. I began to seek out the stories of the lives that they lived, piecing them together to see if I could find my positionality in a world of others who were trying to do the same exact thing.”

Genealogy and family history plays a unique yet pivotal role in the construction of cultural identity and positionality for multiracial individuals. This small excerpt from my project highlights a crucial question that I have sought to answer in its margins, one I know that many others have pursued before me and still do. Using prose to critically examine historical context and palinode to speculate on the memories of my family, I weave together a narrative that chronicles my journey as I sought to discover a history that is filled with silence. Problematic at first, as I continue to unravel secrets from my family's past and painful memories better kept buried, I realize that this silence can be generative. More than that, cultural identity and positionality is not some fixed object, it is something that we construct through our experiences, and the values and traditions we uphold as we look towards the future.

Mentor: Candace Fujikane

Michael Kawasaki
Bioengineering
Engineering & Computer Sciences - Research
UROP
Oral Presentation: Session 1 (9:30-10:20a) in KUY 302 (Zoom: Olonā)

Development of a Multiplexed Low-Cost Microfluidic Bioreactor to Study Cell Physiology

Microorganisms in soil environments pose many challenges for observation due to the opacity of soil which leads to the limited observation of microbial interactions with chemicals over time. To address these challenges, an idea to create a multiplexed low-cost microfluidic bioreactor for live cell imaging in a soil-like environment was proposed. The use of Microfluidics offers precise fluid manipulation within a small volume which is crucial in maintaining and controlling a specific cellular environment while being cost-effective. To simulate a soil-like environment, a transparent soil model was included in the design. This provided a more accurate, three-dimensional in-situ environment resembling natural soil conditions, while also maintaining visibility for imaging purposes. The microfluidic bioreactors for this project were developed via 3D-printing which allowed for the rapid prototyping of designs due to the low cost and quick turnaround time associated with 3D-printing. Confocal microscopy was utilized to observe the growth and behavior of cells within the transparent soil under various cellular conditions to image the bioreactors. This technique allowed for detailed visualization of cell interactions and responses within the simulated soil environment, providing valuable insights into cellular dynamics and physiological processes. Current results indicate that the implementation of a transparent soil model allows for the study of microbes in a soil-like environment while providing an environment able to support microbial growth. If successful, this project would enable real-time observation of cell morphology and physiology in response to different chemical conditions within a soil-like environment.

Mentor: Dr. Wei Wen Su
Co-Author: Dr. Zhenlin Han

Emma Kelly
Finance and International Business
Arts & Humanities - Research
Honors
Oral Presentation: Session 1 (9:30-10:20a) in KUY 301 (Zoom: Koa)

Feasability of Microfinance Programs to Empower Women's Entrepreneurship

Is the implementation of microfinance programs in developing countries and communities an ethical and principled, yet achievable course of action to empower women’s entrepreneurship? This study examines the ethical and philosophical dimensions associated with the implementation of microfinance initiatives aimed at promoting women's entrepreneurship in developing countries. The research employs observational methods and examines a case study analysis of Grameen Bank as a focal point. This study presents significant findings that are crucial for improving the effectiveness of microfinance programs aimed at women. These findings were obtained through the implementation of observational research, a comprehensive evaluation of existing literature on both successful and unsuccessful microfinance initiatives, and an analysis of governmental responsibilities and monetary policies. Despite scholarly concerns of sustainability, exploitation of women, and high-interest rates, this study contends that microfinance has the potential to alleviate poverty and promote women's economic empowerment, as long as it is implemented efficiently. Given the critical significance of women's entrepreneurship in today's economy, the study believes that certain conditions must be met for microfinance programs to be successful. Furthermore, it discusses regulatory implications and effective business tactics, demonstrating how judicious microfinance deployment in developing countries can enhance women's empowerment while also stimulating greater economic and social advancement on a national scale. The key takeaways from this study highlight the critical need to modernize the microfinance framework, emphasizing the need to generate profitable and successful companies while also fostering women's entrepreneurship.

Mentor: Dr. Kelly Holden

Mary-Magdalene Kim
Biology
Natural Sciences
UROP, Also presenting for INBRE
Oral Presentation: Session 2 (10:30-11:20a) in KUY 406 (Zoom: ‘Awa)

Cytokine/Chemokine Expression and Kinetics of Human Coronavirus Antibody Response Following COVID-19 Vaccination and/or SARS-CoV-2 Breakthrough Infection

COVID-19 vaccines induce robust immune responses, including the production of cytokines and chemokines (CC), SARS-CoV-2 specific antibodies, and T cell memory responses that can activate immune responses when challenged by a natural infection (NI). We hypothesize that immune responses based on the expression levels of CC and HCoV specific antibodies among SARS-CoV-2 infected and/or COVID-19 vaccinated individuals can differentiate infection vs. vaccination. This research will fill gaps in our knowledge of the natural history of disease and offer important insights into the next generation of therapies and vaccines to combat COVID-19. Further, the data will delineate the novel immune mechanisms following SARS-CoV-2 NI and/ or COVID-19 vaccination.

Our study follows longitudinal and cross-sectional cohorts of 123 individuals and 232 serum samples before and after receiving COVID-19 vaccination. CC levels were evaluated by a Luminex-based assay. Binding antibody responses were evaluated by a laboratory-developed microsphere immunoassay (LD-MIA), which included spike (S1) and nucleocapsid (N) antigens for the seven common cold human coronaviruses. The plaque reduction neutralization test using the SARS-CoV-2 isolate measured the functional neutralizing antibody responses.

The longitudinal analysis displayed decreasing CC levels, indicating reduction of inflammation after vaccination. Increased cytokines (IL-15) suggests long-term protection as a result COVID-19 vaccination. In aggregate analysis, decreased CCs suggest reduction in severe inflammation to the lungs. The longitudinal HCoV LD-MIA revealed increased levels of S IgG post vaccination, indicating the development of robust immune response. These findings demonstrate that COVID-19 vaccination influences the production of CC and HCoV specific antibody responses levels.

Mentor: Dr. Vivek R. Nerurkar
Co-Authors: Lauren Ching, Alanna Tseng, Tatiana Aguilar, and Maansi Murty

Yejun Kweon
Asian Studies
Arts & Humanities - Research
UROP
Oral Presentation: Session 1 (9:30-10:20a) in KUY 305 (Zoom: Makaloa)

Exploring Gender Perspectives in North Korean Science Fiction: Tracing Ecofeminist Themes Since the Emergence of Ecocriticism

In this paper, I incorporate the theory of blue ecocriticism in North Korean science fiction. Through exploring and comparing texts that were published in different time periods- 1960s, 1980s, and early 2000s, I suggest the emergence of blue ecocriticism in North Korean science fiction. I examine three texts, Land Arose From Ocean, Green Seedlings, and Make the Ocean Blue. I focus on how authors raise awareness in environment sustainability and rehabilitation as time shifts, using the ocean as a chronotope. I mostly concentrate on the transition of landscapes and its utilization authors made throughout the time and how these approaches guide readers towards the eco-friendliness of the nation. In conjunction with the advent of ecocriticism, I explore the ecofeminist themes shown in the texts above. I mostly focus on women's depicted role as caregivers and its relevance to maintaining and rehabilitating the environment. I highlight narrative of Ŏmŏni (mothers)'s deep consideration of the devastated environment that has been neglected overtime due to urbanization and industrialization project of North Korea. Overall, I propose that women characters' concerns of the environment should be regarded beyond sacrificial and domestic and are key for relinquishing human activities that cause harm to the environment, leading readers and parties towards environment sustainability.

Mentor: Dr. David Krolikoski

Kylah Lau
Biological Engineering
Engineering & Computer Sciences - Product Design/Development
UROP, Also presenting for the CTAHR Showcase and Research Symposium
Oral Presentation: Session 3 (11:30a-12:30p) in KUY 302 (Zoom: Olonā)

Automated Nutrient Feeder for Optimization of Cell Growth in Fed-Batch Bioreactors

This project aims to improve bioconversion processes, such as the synthesis of high-value bioproducts and the value-added processing of CO_2 as waste, through the use of an automated nutrient-feeding system. Microorganisms in bioconversion processes are often limited by a lack of food or nutrients, which slows cell growth and incurs unnecessary time and resources, hence reducing productivity. Whereas manual nutrient-feeding techniques rely on rough estimates or physical sampling, which risk product inconsistency or contamination, automated nutrient-feeding techniques are much more efficient, consistent, and sanitary because they allow for precise control over nutrient concentration and require minimal human intervention for maintenance. The automated nutrient feeding system will facilitate continuous cell growth in *Saccharomyces cerevisiae* by monitoring the culture's carbon dioxide (CO_2) production. As a CO_2 sensor measures the concentration of CO_2 within the headspace of the bioreactor, a computer algorithm will calculate a CO_2 evolution rate and estimate the culture's cell concentration over time with a theoretical yield coefficient. It will then calculate the amount of nutrients needed to support growth in the culture. When the algorithm senses a plateau in cell growth, it will communicate with a peristaltic pump to add the corresponding nutrients into the culture. This process will maximize cell growth and thus make fed-batch operations more productive. While experimental tests are still being conducted, initial findings support a direct correlation between CO_2 evolution and cell growth. Future tests will evaluate the system's capability to provide sufficient nutrients in order to produce a maximum amount of cells.

Mentor: Ryan Kurasaki

Quentin Lee
Entrepreneurship
Minor in Art
Arts & Humanities - Research
Honors
Oral Presentation: Session 2 (10:30-11:20a) in KUY 301 (Zoom: Koa)

Harnessing Design Thinking for Sustainable Entrepreneurship: A Portfolio Study

This portfolio explores the application of design thinking principles in entrepreneurship, with a focus on sustainable business practices. The portfolio consists of three key components: a business plan, a case study, and a design thinking manual. The portfolio employs a mixed-methods approach, integrating qualitative and quantitative research methods. Data collection includes market research, interviews with stakeholders, observational studies, and analysis of secondary sources. The study investigates how design thinking principles can be leveraged to drive innovation, solve complex problems, and create value in entrepreneurial ventures. The business plan outlines a strategic roadmap for launching a sustainable business venture, incorporating design thinking methodologies into every stage of the planning process. The case study on Banán examines how the company applies design thinking principles in product design, customer experience, and sustainability initiatives, leading to its success as a model of sustainable entrepreneurship in Hawaii. The design thinking manual provides a practical guide for entrepreneurs to adopt design thinking principles in their own ventures, offering step-by-step instructions, tools, and techniques for problem-solving and innovation. This portfolio study demonstrates the potential of design thinking to revolutionize entrepreneurship by fostering creativity, empathy, and sustainability. By integrating design thinking into business planning and operations, entrepreneurs can develop innovative solutions to real-world challenges while creating value for their communities and the environment. The findings from this study contribute to a deeper understanding of how design thinking can drive sustainable entrepreneurship and inspire future entrepreneurs to embrace this transformative approach in their ventures.

Mentors: Clare J. Fujioka-Sok, M.Ed., Dr. Brown, Dr. Holden

Quinn Leggett
Tropical Agriculture: Plant Production and Management
Natural Sciences
UROP
Oral Presentation: Session 2 (10:30-11:20a) in KUY 309 (Zoom: ‘Ulu)

Facultative NItrogen Fixation in Sugarcane

Sugarcane has been investigated for its regulation of nitrogen given the amount of ammonium and nitrate present in the soil. The presence of plant-available nitrogen affects the activity of biological nitrogen fixation performed by microbes. This project is rooted in Dr. Noa Lincoln's study on the downregulation of nitrogen fixation observed in kō (sugarcane). Dr. Lincoln's study conducted experiments in a greenhouse setting, producing significant results that sugarcane is facilitating the fixation of nitrogen depending on the amount of ammonium and nitrate in the soil. This study takes the experiment out of the greenhouse and into the outside environment, to investigate if the same trend is observed in farm and real world settings. Acetylene reduction assay (ARA) and gas chromatography were the tools used to trace the activity of the enzyme nitrogenase, responsible for converting atmospheric nitrogen into ammonia. Sugarcane was sampled across 12 sites on Hawai’i island for the ARA, with additional soil samples taken for nitrate and ammonium tests. For the ARA, five plants were sampled at each site by their leaf litter, stalk, roots, and soil. The sites provide a range of samples of kō that have received synthetic fertilizer inputs, utilize organic practices, or have not received any treatment at all. Understanding the downregulation of nitrogen fixation by sugarcane can lead to design of more efficient nutrient plans for the crop.

Mentor: Dr. Noa Kekuewa Lincoln

Rhealyn Letada
Religion
Arts & Humanities - Research
UROP
Oral Presentation: Session 3 (11:30a-12:30p) in KUY 305 (Zoom: Makaloa)

Voices of the Unaffiliated: How Tarot and Astrology are Influencing Public Opinion

This project expands scholars' understanding of the connection between magical rituals, tools and systems, such as tarot, and astrology, used by esoteric and religious traditions, and how they influence political behavior and public opinion. While little is written addressing magic and politics, or "magic" as a legitimate religious phenomenon, I argue this phenomenon is alive and influencing people now. My findings reveal that both left and right ends of the American political spectrum participate in these kinds of online behaviors. Although many scholars assumed the practice of "magic" is isolated or in "secret", my preliminary research project findings demonstrate that much of this practice occurs in publicly-accessible spaces online and in face to face events. I have relied on both Ninian Smart's worldview analysis in 7 dimensions to provide a full descriptive profile and Chidester's tripartite model of religious worldviews, which assist in developing a framework for how tarot and astrology practitioners view each other's roles and society's role in terms of people, space, and time. Initial research also indicated that there was much more prominent activity of influencers, producers of content and users commenting on American national politics rather than California state politics. Coding and analysis of the data collected has been given to how magic is politicized affecting the religiously and politically, self-identified and unidentified participants mainly on Youtube or other platforms to track online and in-person events, starting between February 2023 and January 2024 to determine how practitioners are utilizing these tools.

Mentor: Dr. Helen Baroni

Akili Ligons
Marine Biology
Minor in French
Natural Sciences
UROP
Oral Presentation: Session 2 (10:30-11:20a) in KUY 309 (Zoom: ‘Ulu)

Development of a Density Separation Device (DSD) for Microplastics in Hawaiian Coral Substrates

[abstract forthcoming]

Mentors: Dr. Robert Richmond, Keiko Wilkins
Co-Authors: Mackenzie Jahnke and Maya Singh

Kennedy Logan
Marine Biology
Certificate in Spanish Language
Natural Sciences
Honors
Oral Presentation: Session 1 (9:30-10:20a) in KUY 308 (Zoom: Limu Kohu)

Environmental Effects on the Morphology of Hawaiian Rice Coral *(Montipora capitata)*

Hawaiian scleractinian corals provide diverse ecosystems that are extremely sensitive to environmental changes. The island of O`ahu experiences rapid environmental alteration due to its human population, thus offering an ideal test region for this study. Here, I focus on identifying the relationship between the morphology of the coral Montipora capitata and the environmental factors of sea surface temperature (SST), depth, irradiance (PAR), and sedimentation using an analysis of variance (ANOVA). Environmental factor values were derived from the 2018 Ocean Tipping Points Hawai`i Study and correlated with data from 199 coral colonies, which were collected via a comprehensive sampling campaign at 97 locations. Statistical analyses found significant relationships between M. capitata morphology and SST, sedimentation, and wave action ($p < 0.001$). Specifically, areas with high wave action favored encrusting coral growth. Additionally, a visual representation of coral morphology around O`ahu provides direct insight on the prevalence of different coral growth patterns while supporting the findings of the ANOVA. These findings present documentation of coral growth island-wide, allowing for a more widespread understanding of Hawaiian *Montipora* corals and their growth factors that will later allow for development in conservation efforts to mitigate the impacts of natural and anthropogenic climate change.

Mentor: Dr. Cynthia Hunter

Emilia Lubet
Spanish
Certificate in Travel Industry Management
Arts & Humanities - Research
Honors, UROP
Oral Presentation: Session 1 (9:30-10:20a) in KUY 305 (Zoom: Makaloa)

The Challenges Latino Migrants Face in Accessing Resources in Kailua-Kona, Hawai‘i

This research explores the challenges Latino migrants who work in the agriculture coffee industry of Kailua-Kona, Hawai‘i, face in accessing resources (e.g., affordable health care, language services, education, etc.). In-person interviews in Kailua-Kona were conducted with nine Latino migrants, clients of the University of Hawai‘i at Manoa William S. Richardson Refugee and Immigration Law Clinic (RILC), to understand their challenges in establishing their new life in Hawai‘i. Additional interviews were conducted with four community members and seven organizations to determine community efforts to assist migrants. This research discovered an established resource system in Kailua-Kona, with beneficial community efforts in place. However, the Latino community still faces language barriers and fear when accessing non-profit agencies, both making it difficult to fully feel comfortable in Hawai‘i. Language barriers exist for migrant workers when they need to access resources to help them situate themselves in Hawai‘i. Resources become inaccessible to the Latino community when organizations do not have materials in Spanish, personnel to assist in filling out forms, and outreach information to the community. Therefore, this research has found that it is beneficial for organizations to hold in-person outreach events to build trust with the community. Equally important, this research highlights the need to hire Spanish interpreters and translate material such as brochures, forms, and flyers. This research suggests that these efforts will continue improving the existing support for Latino communities. Furthermore, acquiring more state funding for non-profit organizations responsible for supporting the migrant community will expand the accessibility of these resources.

Mentors: Dr. Lucía Aranda, Esther Yoo

Auliʻi Ludington
American Studies and Ethnic Studies
Arts & Humanities - Creative
UROP
Oral Presentation: Session 3 (11:30a-12:30p) in KUY 306 (Zoom: ʻIlima)

E hoʻi i ka piko: Returning to Land, Genealogy, and Self

ʻĀina feeds us in the physical ways of providing us life sustaining waters and food, but it also provides us with a central space of connection and self-identity. ʻĀina is the central component in understanding all of life. From a Hawaiian perspective, there is no moʻokūʻauhau or sense of self without ʻāina. By first understanding ʻāina, personal ancestral ties to certain wahi, and their moʻolelo, one can begin to gain a sense of self that is deeply rooted in Hawaiian ways of knowing, referred to as moʻokūʻauhau. Rather than thinking of ourselves as occupying a singular space in time, through moʻokūʻauhau, we realize that our ancestors have never left and will never truly leave us. In this way, moʻokūʻauahau gives us a way to orient ourselves within space and time.

This project employs film photography and poetry to document, explore, and analyze ʻāina, moʻokūʻauhau, identity, and moʻolelo.

Mentor: Dr. Brandy Nālani McDougall

Justin Do, Howin Ma
Mechanical Engineering, Mechanical Engineering
Engineering & Computer Sciences - Product Design/Development
UROP
Oral Presentation: Session 3 (11:30a-12:30p) in KUY 302 (Zoom: Olonā)

Optimization of High Resolution 3D Printed Molds for Soft Lithography

Microfluidic systems find widespread utility in biochemical and clinical domains, such as high-throughput drug screening, organ-on-a-chip platforms, and clinical diagnostics. In clinical contexts, these systems often utilize microfluidic devices crafted by casting biocompatible silicon material, polydimethylsiloxane (PDMS), onto glass molds through soft lithography. Recent advancements in three-dimensional (3D) printing technologies offer a promising alternative for mold fabrication to the costly, multistep process, and time-extensive cleanroom protocols associated with glass molds. However, vat photopolymerization, a prevalent method in high-precision 3D resin printing, can inadvertently leave toxic photoinitiators on printed surface due to material composition. This residue poses a challenge as it can inhibit the curing process of PDMS. Here, we developed a method to mitigate cure inhibition across various commercially available resins available. We explored different post-process strategies (e.g., water bath, heat exposure, and vacuum) aimed at either curing or dissolving the photoinitiators present on 3D printed surfaces. Our investigations reveal that heat treatment effectively promotes the curing of photoinitiators, yielding the smoothest PDMS finishes. Furthermore, the features embedded on the mold serve as valuable metrics for assessing the dimensional accuracy of 3D printing technologies.

Mentor: Dr. Tyler Ray

Jaine Lynn Macias
Psychology
Social Sciences
Presentation experience
Poster Presentation: Poster Session (12:30-1:15p) in KUY 101 Auditorium

How Immigration Status Impacts Identity-Related Experiences: A Quantitative Investigation

The present mixed-methods (*N* = 221) project investigates how stereotypes in a prejudicial environment specifically impact those with an immigrant identity. The quantitative findings compare those with an immigrant identity (*n* = 37) vs. those who do not (but still have some type of minoritized identity; *n* = 189) to see if there are mean differences between their strength of identity, experiences of discrimination, and awareness of stereotypes about their minoritized identity. Immigrants had a greater strength of identity ($p < .001$), but no differences were found for experiences of discrimination or awareness. Immigrants may have stronger positive cultural ties to their identity beyond an identity label. They could be impacted similarly to other minoritized identities in a social context to explain no differences between immigrants and other minoritized individuals in their experience of discrimination and awareness of stereotypes. Socially, having an immigrant status may not differ from having other minoritized identities in the United States. Researchers should consider investigating larger samples of those with immigrant status as the only minoritized identity as well as using larger samples that include immigration status in other countries around the world.

Mentors: Dr. Ashley Maynard, Maximillian Soares Miehlstein
Co-Author: Gabriella Nakamaru

Malia Martin
Global Environmental Science
Natural Sciences
MARC (Maximizing Access to Research Careers) Scholar
Poster Presentation: Poster Session (12:30-1:15p) in KUY 101 Auditorium

Effects of Artificial Illumination on Behavior of the Hawai‘i Deep 7 Bottomfish Species

Commercial fishing is a vital part of Hawai‘i’s culture and economy, with the deepwater bottomfish being a key target. Known as the ‘Deep 7’, these six snappers and one grouper are highly valued amongst local fisherman. To ensure their sustainability, the National Oceanic and Atmospheric Administration (NOAA) Pacific Island Fisheries Science Center (PIFSC) conducts yearly stock assessments. The Bottomfish Fishery-Independent Survey in Hawai‘i uses baited camera videos to survey deep waters. However, the cameras become light limited beyond 200m, thus impacting data collection.

To address this, PIFSC is developing artificial light prototypes to enhance visibility in deep deployments. Despite other research efforts stating artificial light affects fish behavior, there has been no study done on the Deep 7. This research aims to determine how different wavelengths of light (Blue, Red, Green, Amber) affect Deep 7 behavior, which is crucial for integrating artificial illumination into the survey. Success would allow for a comprehensive assessment of fish abundance across their full depth range.

Mentors: Dr. Jeffrey Drazen, Dr. Benjamin Richards

Nicole Celine Sulla Mathews
Global Environmental Science
Certificate in Post-Baccalaureate Certificate Candidate in Secondary Education (Science)
Natural Sciences
Honors
Oral Presentation: Session 2 (10:30-11:20a) in KUY 308 (Zoom: Limu Kohu)

Developing and Assessing a Diverse Plankton Imagery Training Set for Machine-Learning Plankton Classification in the North Pacific Subtropical Region

The Imaging FlowCytobot (IFCB) has a continually growing role in oceanographic research, particularly in the exploration of microbial life within the North Pacific Subtropical Gyre (NPSG). However, the vast amount of data generated by the IFCB poses a challenge for manual sorting and taxonomic classification. This study addresses this challenge by developing a Convolutional Neural Network (CNN) training set to efficiently categorize IFCB images into taxonomic groups. Specifically focusing on the taxa *Hemiaulus* and *Ciliophora* during a process cruise within the NPSG in the summer of 2021, the study aims to quantify the CNN's performance compared to manual annotations, providing insights into its accuracy over time. Statistical analyses of machine learning-based classifications indicate a high accuracy in the automated identification of *Hemiaulus* and *Ciliophora*. Analysis of biovolume and particle number concentration reveals trends in taxonomic abundance over the course of the cruise. Despite morphological changes of *Hemiaulus* losing fluorescence over time, the CNN demonstrates an overall improvement in accuracy as the cruise progresses, particularly for *Hemiaulus*. This study highlights the development of a robust training set of roughly 76,000 images, allowing the CNN to accurately classify images collected within the NPSG.

Mentors: Dr. Angelicque White, Dr. Fernanda Henderikx-Freitas

Erika Matsui
Physics
Natural Sciences
UROP
Oral Presentation: Session 2 (10:30-11:20a) in KUY 304 (Zoom: Māhoe)

Improving the Quantum Efficiency of Photoelectric Devices with Various Patterns

The photoelectric effect is a phenomenon in which the quantum nature of light involves the emission of photoelectrons from a metal surface upon illumination by photons with sufficient energy. The energy of a photon is expressed as E=h·f where h is Planck's constant h= 〖6.626×10〗 ^(-34) J·s, and f is the frequency of an incident photon. Einstein's 1905 revealed that the energy of photons is quantized and frequency-dependent. Photoelectrons are released only when the incident photon is larger than the target metal's work function Φ. The number of photoelectrons that successfully escape the metallic surface, rather than being reabsorbed, is significantly lower. The ratio of the number of released photoelectrons to the number of photons illuminating the surface is called quantum efficiency (QE), which is crucial in materials used for charge collection calibration in high-energy physics experiments, particularly those involving neutrino detection. Our research focuses on improving the QE of commonly used metals, such as aluminum and zinc, which typically exhibit low QE due to their high-performance emitting electrons. Preliminary findings from our Neutrino and Dark Matter Lab experiment suggest that it can be significantly enhanced by gridding patterns onto the metal surface with sandpaper, with variations in the grit size further influencing efficiency. This experiment further investigates the effects of varying the target metal, employing controlled sanding patterns, and adjusting the grit size of the sandpaper. Collecting this data is crucial for enhancing the quantum efficiency (QE) of selected materials, which is instrumental in the successful detection of neutrinos, muons, pions, and other elementary particles.

Mentor: Dr. Jelena Maricic

Kyle Matsunaka
Psychology
Social Sciences
Course requirement
Poster Presentation: Poster Session (12:30-1:15p) in KUY 101 Auditorium

Comparing Sluggish Cognitive Tempo Across ADHD and Depression Presentations

Existing research indicates that sluggish cognitive tempo (SCT) is a closely associated, yet distinct from attention-deficit/hyperactivity disorder (ADHD) and depression, due to its unique symptoms (e.g., drowsiness, confusion). However, it remains unclear if SCT symptoms emerge from the combination of ADHD and depression, considering their high rate of comorbidity. It was hypothesized that emerging adults with elevated ADHD and depression symptoms would demonstrate higher levels of SCT compared to those with only elevated ADHD or depression and those with no elevations. The sample consists of undergraduate students from wave 10 of a multi-site college ADHD study, divided into four groups: (1) ADHD/depression (n=494), (2) ADHD-only (n=251), (3) depression-only (n=812), and (4) non-ADHD/depression (n=2595). ANOVA analyses showed a significant difference in SCT levels across groups [F(3, 4148)=737.13, p<.001]. Post-hoc analyses indicated that the ADHD/depression group (M=6.42, SD=3.19) had significantly higher SCT levels than the ADHD-only (M=4.73, SD=3.21), depression-only (M=3.41, SD=3.26), and non-ADHD/depression groups (M=1.11, SD=2.06). The findings suggest that SCT may be a risk marker for depression in emerging adults with ADHD and potentially the byproduct of comorbid ADHD and depression. Additional research may be needed to clarify whether SCT should be recognized as a separate construct, given its strong association with both ADHD and Depression. Such recognition could inform accurate identification and treatment of individuals affected by these conditions.

Mentor: Dr. Patrick Goh
Co-Author: Ashlyn Wong

Maile McCall
History and Anthropology
Arts & Humanities - Research
Honors, UROP
Oral Presentation: Session 3 (11:30a-12:30p) in KUY 305 (Zoom: Makaloa)

The Domestication of Blue and White Porcelain as a Representation of China: A Study of Blue and White Porcelain as an Export Ware

When walking through stores, consumers often can find products that seem to be influenced by Oriental designs. One of the most identifiable of these is the classic blue and white pattern that originates from the blue and white Chinese porcelain made beginning around the Yuan dynasty in China. This decor trend began in the 18th century in Europe after being introduced by the Portuguese traders and continued into the 19th and 20th centuries in the United States. The goal of this research is to determine why the blue and white porcelain was so alluring to consumers and how external influences such as trends or orientalism or exoticism would have impacted how the blue and white goods were received. This includes an analysis of blue and white porcelain gifted to Lucy Thurston, the wife of a missionary that came to Hawai‘i with the first company in 1819. Ultimately, the subsequent *Chinoiserie* trend was extremely influential and the creation of replicas served to continue the interest in the product. It was found that there were conflicting opinions on Chinese people, but the blue and white stood in its popularity.

Mentors: Dr. Shana Brown, Dr. Mari Yoshihara

Nils Melbourne
Physics & Chemistry Dbl
Natural Sciences
UROP
Oral Presentation: Session 1 (9:30-10:20a) in KUY 304 (Zoom: Māhoe)

Application of Computational Chemistry Methods to Weather Routing

[abstract forthcoming]

Mentor: Dr. Rui Sun

Annika Daisy Mendoza
Studio Art
Arts & Humanities - Creative
Honors
Oral Presentation: Session 3 (11:30a-12:30p) in KUY 306 (Zoom: ʻIlima)

Lost in Translation: *He Kumulipo*

This creative thesis addresses my project based on *He Kumulipo*, a Hawaiian chant. *He Kumulipo* has been long revered as the genealogy and history of the Hawaiian people and culture. The chant consists of over two thousand verses; however, the second half of the chant was lost during the annexation of Hawaiʻi. This project focuses on the sixteenth era, the story of Maui. Three translations spanning from 1897 to 1981 were published for *He Kumulipo* by Queen Liliʻuokalani, Martha Beckwith (American folklorist), and Rubellite Kawena Johnson (a Hawaiian Historian); however, only one was most recognized while another was unsupported causing discrepancies. This thesis seeks to expose the lesser-known history behind *He Kumulipo* by starting a conversation through mixed media drawings which will utilize two aspects of Kapa, the stamping techniques and patterns. This project is a collection of one 29 ½ by 41 inches drawing and two 21 by 14 inches drawings. Each drawing represents the three translations. The use of Kapa is to connect the artistic process with Hawaiian culture. The materials used consisted of Conté crayon, chalk pastels, and ʻohe Kāpala (Kapa ink) made of kukui nuts (Hawaiian candle nuts). Handmade Kapa stamps were also used other than the chosen traditional drawing materials which are Conté crayon and chalk pastels. The project resulted in three complete drawings to tell the story of *He Kumulipo's* sixteenth era about Maui that creatively express the contrasting translations.

Mentors: Wendy Kawabata, Devin Oishi, Siobhán Ní Dhonacha

Lana Mitchell
Biology
Natural Sciences
UROP
Poster Presentation: Poster Session (12:30-1:15p) in KUY 101 Auditorium

The Endurance of Algae-Fungi Symbionts Under Various Environmental Stressors

Algae and fungi can come together to form a symbiotic relationship to protect and nourish each other and allow for a more efficient photosynthetic process. This research project focuses on their symbiotic relationship. The goal of this experiment is to discover how fungal-algal samples can better withstand different environmental stressors present in the environment today, as opposed to them remaining separate.

For this experiment, first, the fungi and the algae were inoculated and prepared to be introduced to one another via a symbiotic relationship. Methyl buffers were used for the algal samples and a nitrogen-deprived Tris Acetate Phosphate (TAP) medium was used for the fungal samples. The use of these buffers helped to maintain the pH levels in both samples once experimentation began. Once the fungi and algae were inoculated, glass filters were then assembled onto plates. Three samples, each containing fungi, algae, and the co-culture of fungi and algae together, were placed onto the glass filters.

Once preparation was complete, the samples underwent a drought experiment. Each of the three sets of samples were placed into a humidity desiccator, where they were to be dried within. Their physical states were recorded one, three and five days after their placement in the machine. After the third day, with the use of a confocal microscope, it was found that the algal-fungal sample still had a small remaining number of living cells.

This project is still undergoing experimentation, and it is anticipated that the algal-fungal samples will additionally undergo other environmental stressors.

Mentor: Julia Yuson

Kirsten Montpetit
Biology (B.S.)
Natural Sciences
UROP
Oral Presentation: Session 3 (11:30a-12:30p) in KUY 308 (Zoom: Limu Kohu)

Marine Biofouling Community Dynamics on Biodegradable vs. Non-degradable Plastics

Biofilms, a complex community comprised of marine organisms, rapidly colonize submerged surfaces in the ocean. Marine invertebrate larvae rely on bacterial cues within biofilms for recruitment. The presence of biodegradable plastics may alter the dynamics of marine invertebrate communities by influencing the composition of bacterial biofilms. This study investigates the biofouling communities of marine invertebrates on biodegradable surfaces compared to nonbiodegradable petroleum-based plastics and naturally occurring substrata. Six surface types—polypropylene plastic (PP), polyethylene terephthalate plastic (PET), polylactic acid plastic (PLA), polyhydroxyalkanoates plastic (PHA), maple wood veneer, and propagules of the mangrove *Rhizophora mangle*—were examined to determine if plastic-type affected the bacterial community composition on the surfaces as well as the macrofouling community. Three replicates of each type of substratum were deployed in Pearl Harbor, Hawai'i approximately 1 meter below the mean low tide line. Digital image analysis was used to assess macrofouling on all surfaces over twelve weeks. Photos were taken for observation of biofouling each week for the first four weeks and then every two weeks. The microbial community composition at week 1 and week 12 was analyzed using 16S rRNA barcoding to identify both the bacterial species present and the bacterial community structure on each of these surfaces. Preliminary data analysis indicates there may be variation among the abundance and diversity of macrofouling communities on the various surface types. This research provides insight into the bacterial communities that may influence the macro-fouling communities that settle and metamorphose on biodegradable and non-biodegradable surfaces.

Mentor: Dr. Michael G. Hadfield

Sierra Morales
Computer Science
Natural Sciences
UROP
Oral Presentation: Session 2 (10:30-11:20a) in KUY 304 (Zoom: Māhoe)

Enhancing Supernova Detection Using Convolutional Neural Networks in Hubble Space Telescope Images

This project aimed to develop a convolutional neural network (CNN) that could identify supernovae in images from the Hubble Space Telescope (HST). Identifying supernovae is crucial in the field of cosmology, as type 1A supernovae are used to study the universe's expansion and evolution.

A dataset was compiled of images from the HST archive. The dataset focused on images of identical spatial regions captured with the same filters but at different times, enabling us to observe the differences in light which indicate potential supernovae. Scripts were written for the purpose of image identification, downloading, overlap confirmation, and differential analysis.

In order to train the CNN, a duplicate of the dataset was created with artificial supernovae inserted. Image alignment and subtraction using TweakReg and AstroDrizzle highlighted variations in luminosity, indicative of supernovae.

The pivotal component of the project was developing a CNN. A pre-trained model was customized for this task, with its top layer retrained on the project-specific dataset. The dataset division was 70% for training, 15% for validation, and 15% for testing. The model achieved around 93% accuracy in detecting supernovae within the test data.

In conclusion, this project successfully demonstrates the potential of CNNs in automating supernova detection in space imagery. This approach not only streamlines the detection process but also paves the way for more in-depth and efficient cosmic exploration.

Mentor: Dr. David Rubin

Samantha Nagtalon, Marine Biology (B.S.)
Grace Roberts, Marine Biology (B.S.)
Natural Sciences
UROP
Oral Presentation: Session 1 (9:30-10:20a) in KUY 308 (Zoom: Limu Kohu)

Ocean Warming Effects on *Octopus cyanea* Embryonic Development

Many cephalopods have been shown to be resilient to ocean warming, with several species worldwide exhibiting population growth despite ongoing climate change. Through their rapid life cycles, high reproduction rates, and flexible behaviors and lifestyles, cephalopods have been suggested as one of the potential "winners" as climate change progresses. However, previous studies have shown that prolonged high temperatures can negatively influence the development time, size, and survival rate of octopus embryos. With this in mind, investigating embryonic development under global warming temperatures will offer insight into changes in population dynamics and how the highly abundant *Octopus cyanea* (he'e) responds to climate change. *O. cyanea* will be collected from Kāneʻohe Bay and housed at the Hawaiʻi Institute of Marine Biology in the Johansen Fish Resiliency Lab where they will undergo mating trials for eggs. Once eggs are laid, the females will brood them at one of three marine heat waves (MHW) treatments: 24.5°C (ambient; n = 3), 26.5℃ (n = 3) and 28.5℃ (n = 3). 10 eggs will be collected daily and photographed under a microscope to track their development. The egg length, egg width, total embryo length, mantle length, arm length, eye diameter, and yolk volume will be measured from the photographs. The results have shown significant increases in growth, cellular injury, and metabolic activity rates among the MHW treatments, with the highest temperature having the shortest development time. These findings offer insight into the embryonic resilience of *O. cyanea* in the wake of climate change.

Mentors: Dr. Jacob Johansen, Leon Tran

Gabriella Nakamaru
Psychology (B.S.)
Social Sciences
Presentation experience
Poster Presentation: Poster Session (12:30-1:15p) in KUY 101 Auditorium

How Immigration Status Impacts Identity-Related Experiences: A Qualitative Investigation

The present mixed-methods study explores how stereotypes specifically impact those with an immigrant identity (N = 37). The qualitative findings discuss short-answer responses by participants with an immigrant identity about stereotypes in identity-related experiences. Experiences with discrimination, awareness of stereotypes, and strength of identity were not specifically conveyed by participants in relation to their immigration status. Other minoritized identities (e.g., gender and sexuality) were the focus of the responses across participants' reported matching and clashing with stereotypes about their identity as well as how their behavior/appearance is intentionally altered. Language fluency was the only immigrant-specific theme to emerge. Being comfortable in one's immigrant and ethnic identity may be indicative of the diverse population in the local Hawai'i environment. Implications of these findings suggest that having an immigrant identity may not be cognitively prioritized compared to other minoritized identities. Immigrant participants commonly shared multiple minoritized identities in varying rates, supporting that intersecting identity, is more relevant than prioritizing immigrant status. The intersectionality of immigrant status as a distinct minoritized identity is important to investigate further in a more heterogeneous population of U.S. citizens.

Mentors: Dr. Ashley Maynard, Maximillian Soares Miehlstein
Co-Author: Jaine Macias

Alexander R. Nguyen
Biology
Natural Sciences
Professional development
Oral Presentation: Session 1 (9:30-10:20a) in KUY 407 (Zoom: ʻĀweoweo)

Genetic Identifications of Pond-raised Tilapia Using Fin Clippings and Microsatellite DNA Genotyping

Objectives: Tilapia is a commonly farmed fish, able to accommodate limiting resources and living conditions. They are ideal for small farm aquaculture in pond rearing. Because of the limited population size and isolated farms, it is important to have accessible, cost effective, streamlined protocol for rapid and efficient assessment of Tilapia genetic diversity to mitigate genetic risks and disease vulnerabilities. Methods: Fin clipping of hundreds of fish can be harvested quickly with minimal trauma. DNA isolation can be done on alcohol preserved, refrigerated samples for DNA amplification with selectively optimized microsatellite DNA primers. Amplified DNA was carried through several rounds of amplifications and used in Genotyping-by-Sequencing (GBS) to look at microsatellite DNA patterns. Microsatellites possess unique tracts of repetitive DNA, such as short tandem repeats (STRs), forming patterns that allow for DNA profiling. Closely related Tilapia specimen will exhibit similar loci of STRs while unrelated specimens are not likely to have the same STRs due to their high variability. GBS usage leverages lower cost and time savings as compared to whole genome sequencing methodology. Conclusion: This project is part of a larger study developing streamline protocols for accessible and efficient assessment of Tilapia genetic diversity. Maintaining genetic diversity would reduce the chance of accumulation of lethal mutations and increases the adaptive capacity of the Tilapia toward changing environmental condition or diseases. Thus, this protocol can serve as a template for other facilities to assist fish farmers in remote geographic regions.

Mentor: Dr. Jinzeng Yang

Chelsea Nguyen
Mathematics
Certificate in Mathematical Biology
Natural Sciences
Honors, UROP
Oral Presentation: Session 1 (9:30-10:20a) in KUY 304 (Zoom: Māhoe)

Escape Response of Copepods around a Translating Sphere

Copepods serve as a primary food source for many larval marine fishes. However, despite its abundance, larval fishes suffer extreme mortality rates, eliminating 90% of the population within a few days after first feeding. Starvation is often denoted as a major cause of this phenomenon, due to the copepods' elusive nature. However, the triggers that result in the escape of the copepod are still unknown. Thus, the objective of this project will be to use mathematical methods to model the copepod at the instance of escape and trigger of escape. The model will then be used along with concepts from mathematics and physics to determine the circumstances that lead to the copepod's escape, as well as determine the path of escape. There are current results from a previously run experiment looking at the predator-prey interactions between a single copepod escaping from a clownfish larva (represented by a ball), run by the Takagi lab in collaboration with Dr. Dan Hartline and Dr. Petra Lenz. These results were then analyzed to determine the biological validity of our proposed model by comparing our hypotheses with the experimental data in Matlab. After which, the proposed model will be adjusted to account for its limiting factors.

Mentor: Dr. Daisuke Takagi

Joel Curtis Nicolow
Computer Science
Minor in Public Health
Engineering & Computer Sciences - Research
Honors
Oral Presentation: Session 2 (10:30-11:20a) in KUY 303 (Zoom: Pe‘ahi)

FogVision: A Machine Learning Method for Detecting Fog in Mountain Trail Camera Images

Fog plays a significant role in the hydrology and ecology of diverse mountain ecosystems. Typically, the hydrological contribution of fog is estimated using passive mechanical collectors or by measuring canopy water balance. Trail cameras offer a low-cost alternative approach to observing fog presence. The aim of this study is to create a generalizable machine learning model that can detect fog in trail camera images. In this study 13 cameras were deployed on the islands of O‘ahu and Maui where fog is being studied as a water resource. A total of 24,256 natural images were manually classified for fog presence/absence, and machine learning models were trained to perform image classification. Using a leave-one-site-out cross-validation strategy, the model’s ability to generalize to new sites was evaluated and achieved an area under the receiver operating characteristic curve of 0.93 for diurnal and 0.96 for nocturnal imagery.

Mentors: Dr. Peter Sadowski, Dr. Kyungim Baek, Dr. John DeLay

Amanda Nitta
Computer Science
Minor in Pre-Health
Engineering & Computer Sciences - Research
Honors, UROP
Oral Presentation: Session 3 (11:30a-12:30p) in KUY 301 (Zoom: Koa)

From Aspiration to Realization: A Comparative Study of Salary Expectations and Real-world Experiences among Alumni and Current Students in Hawai'i

Students tend to pursue post secondary education with the perspective that gaining these credentials allows them to be more employable. Thus, the examination of salaries and personal fulfillment allows for students to understand how alumni perceive their post secondary education success. The objective of this study is to understand how University of Hawai'i (UH) alumni fare post graduation in Hawai'i compared to: those in the continental United States (US), US Census Bureau data, and student perception of their prospects post-graduation. This study entailed a survey being sent out that consisted of various questions surrounding demographics, campus attending, latest/current degrees in progress, and occupational details (e.g. salary, place residing, etc.). Upon data collection, all data was anonymized and all salaries were considered with inflation. Furthermore, data science principles were used to conduct the comparison and aggregate statistical analysis. Majority of alumni data collected can be noted to be statistically similar compared to the US Census Bureau data. It can also be observed that those who currently work in Hawai'i have more personal fulfillment in their careers. The student perception demonstrates a desire to stay in the islands, but the salary expectations differ. These findings demonstrate how UH alumni fare in industry and allow for the community/administration to see how their students succeed and how they perceive their career successes.

Mentors: Dr. Scott Robertson, Dr. Dylan Moore

Madison Olson
Molecular Biosciences & Biotechnology
Natural Sciences
UROP
Oral Presentation: Session 2 (10:30-11:20a) in KUY 408 (Zoom: Pua Kala)
Poster Presentation: Poster Session (12:30-1:15p) in KUY 101 Auditorium

Human Leptin Aggregation and the Potential Role in Obesity

Protein aggregation is an abnormal buildup of protein that forms dysfunctional structures. This may occur due to genetic modifications such as amino acid substitutions or environmental conditions such as extreme pH, changes in temperature, and increased concentration in the protein's environment. Based on previous data collection, it has been shown that the protein leptin aggregates at specific conditions. This aggregation process may be involved in diseases such as cardiovascular diseases, as well as obesity and type II diabetes. In an effort to solve the mechanism of aggregation amino acid substitutions may be introduced to observe changes in the aggregation propensity. It has been hypothesized that leptin may form a trimer that may populate on or off pathway to aggregation. To investigate if the trimeric-complex is on pathway to aggregation four amino acid substitutions were introduced predicted to break the complex. The designed leptin variant was tested at pH 5.0 to mimic physiological conditions of the secretory vesicles. In comparison to wild-type protein, our preliminary data from circular dichroism shows that there are no structural perturbations introduced by the amino acid substitutions. Interestingly, the variant has a decreased thermostability and does not form biocondensates indicating that the trimeric complex decreases the aggregation propensity. Taken together, our results suggest that the trimeric-complex is on pathway to aggregation, providing initial insight into the mechanism contributing to the obesity epidemic.

Mentor: Dr. Ellinor Haglund

Adam Joseph Parrilla
Information & Computer Science and Art Studio
Certificate in Creative Computational Media Certificate
Arts & Humanities - Creative
UROP
Oral Presentation: Session 1 (9:30-10:20a) in KUY 307 (Zoom: Loulu)

Hoʻokupu VR

This project leverages virtual reality (VR) technology to offer an engaging experience that educates users about Hawaiian moʻolelo (stories) and native lāʻau (plants), emphasizing their growth, uses, and cultural relevance. The student applied an interdisciplinary method, blending computer science, art, and VR/AR techniques, alongside various tools and software to develop an educational VR platform. The creative process involved conceptualizing representations of Hawaiian plants, like the ʻulu (breadfruit), in an approachable, educational format. The project combines low-poly and detailed 3D modeling to highlight distinctive features, aiding recognition and learning. For example, the ʻulu tree is depicted with its characteristic leaf shape and fruits, simplifying identification and understanding. The initiative to create this VR tool was driven by the student's interest in exploring Hawaiian culture, especially its plants, and narratives. Drawing inspiration from a past project with Professor Matthew Kainoa Wong, the student sought to merge traditional insights with technological innovation. The aim is to provide a novel educational platform that introduces a broad audience to Hawaiian heritage engagingly and interactively, using VR to bridge traditional culture and contemporary technology, thereby enhancing understanding and appreciation of Hawaii's cultural and natural legacy.

Mentor: Professor Matthew Kainoa Wong

Aleczander Paul
Physics
Minor in Astrophysics
Natural Sciences
Honors
Oral Presentation: Session 3 (11:30a-12:30p) in KUY 304 (Zoom: Māhoe)

Optimizing Sensitivity to Quantum Decoherence Measurements at the Belle II Experiment

To experimentally study quantum decoherence with high sensitivity, access to a large number of entangled particles is necessary. The Belle II Experiment in Japan operates at the SuperKEKB particle collider that produces large quantities of flavor-entangled B-meson pairs, making it a great way to study decoherence. Since the B-meson pairs are entangled through their flavor (one has a b-quark and the other has an anti-b quark), finding the optimal strategy to tag their flavors and decay vertex information from the signals/tracks they leave behind is necessary for a decoherence search. Two viable strategies to do so are: exclusively reconstruct both B-mesons from specific decay modes, or to reconstruct a single B-meson and use the rest of the tracks to find the flavor/vertex of the second B-meson no matter what mode it decayed into. To test which is more ideal for a decoherence search, I produced Monte-Carlo simulated events and reconstructed the events using the aforementioned strategies with the Belle II analysis software (basf2). By comparing the efficiency, flavor-tagging information, and decay vertex resolution that each produce, the optimal strategy can be determined. Preliminary results show that the first strategy has a much lower efficiency, but a significantly better decay vertex resolution than the second. What we can conclude so far is that neither of these strategies is likely the ideal one for a decoherence search, but some version of the two that weighs events based on how well they can be reconstructed would be better.

Mentor: Sven Vahsen

Kaylah Politan
Biology
Natural Sciences
UROP
Oral Presentation: Session 2 (10:30-11:20a) in KUY 407 (Zoom: ʻĀweoweo)

Effects of Pparγ Inhibition on Sociability in the Asocial Mexican cavefish

In extreme ecosystems such as caves, the availability of nutrition is sparse and highly influenced by spatial and seasonal factors. Cave organisms had to evolve more fat storage and attenuating social interactions, to adapt to periods of low food availability, perhaps due to their energy cost. Accordingly, fatty acid metabolism is expected to link to the regulation of social behavior. However, there is a significant knowledge gap in this fatty acid-sociality axis.

An experimental vertebrate platform, the Mexican tetra, *Astyanax mexicanus*, consists of surface-dwelling (surfacefish) and cave-dwelling (cavefish) ecotypes. Compared to surface fish, cavefish store more fat in their muscles while exhibiting attenuated sociality. Recently, our lab revealed that the fat-rich ketogenic diet promoted sociality in asocial cavefish. However, how fat metabolism regulates social behaviors is not well understood. PPARγ (Peroxisome proliferator-activated receptor-gamma) acts as a fatty acid metabolism regulator, promoting adipogenesis, and is a risk gene for obesity. The *pparγ* gene is upregulated in cavefish compared to surface fish.

Here, we pharmacologically inhibited PPARγ with GW-9662 (GW). After carefully sorting the fish groups, we fed either GW-containing or control diets to the surface and cavefish groups (80 fish total) for 5 weeks. In our result, the GW treatment (1) increased repetitive behavior but no detectable change in social interactions in cavefish, whilst (2) it decreased social interactions in surface fish. Therefore, suppressing adipogenesis (possibly, more circulating fatty acids) is likely to destabilize the social interactions and repetitive behavior, which is opposite to the effect of ketogenic diet feeding.

Mentor: Dr. Masato Yoshizawa

Mariko Quinn
Global Environmental Science
Minor in Political Science
Natural Sciences
Honors
Oral Presentation: Session 1 (9:30-10:20a) in KUY 308 (Zoom: Limu Kohu)

Comparison of Reproductive Success of *Tripneustes gratilla* Around Oʻahu

Sea urchins are often regarded as an indicator species, meaning that their fertility and reproductive success can be used as a metric for water quality. The Environmental Protection Agency utilizes this in a protocol comparing water quality samples using the fertilization rate of urchin gametes. A previous study conducted at Moku o Loʻe sought to use this protocol to compare water quality of sites within Kāneʻohe Bay using hāwaʻe maoli (*Tripneustes gratilla*/Collector Urchin). However, that study revealed the potential for broader comparisons of fertilization rate of Collector Urchins from different areas of Oʻahu- especially between fertilization crosses of urchins from two different locations. In this study, four locations: Kāneʻohe Bay Patch Reefs, Kāneʻohe Bay Sampan Channel, Kahe Point and Kahanamoku Beach were compared. Fertilization rates were assessed from crosses of urchins among the same location, as well as fertilization crosses of urchins between locations. There were no significant differences between fertilization rates when comparing females of different sites, as such, fertilization results were compared by location of male urchins. After combining fertilization results from males within the same location and comparing them to females both within and among locations, resultant fertilization rates were as follows: Kāneʻohe Bay Patch Reefs - 54.4%, Kāneʻohe Bay Sampan Channel- 73.8%, Kahe Point- 67.2% and Kahanamoku Beach- 78.8%. At 54.4%, urchins from Kāneʻohe Bay Patch Reefs had a significantly lower fertilization rate than any other location. Further research is needed to determine why urchins from Kāneʻohe Bay Patch Reefs consistently yield lower rates of fertilization.

Mentor: Dr. Malia Rivera

Joseph Romero
UROP
Oral Presentation: Session 3 (11:30a-12:30p) in KUY 407 (Zoom: ʻĀweoweo)

Schrankia Living on the Island of Hawai'i

[abstract forthcoming]

Mentor:

Beniamin Rutkowski
Biology (B.S.)
Natural Sciences
Honors
Oral Presentation: Session 3 (11:30a-12:30p) in KUY 406 (Zoom: ‘Awa)

Trophoblast Derived Small Extracellular Vesicles as a Vehicle for Placenta-Specific Gene Therapy

Introduction: Fetal growth restriction (FGR) is a condition in which a fetus is smaller than expected for the gestational age and deficient nutrient transport in the placenta is known to trigger such a condition. Small extracellular vesicles (exosomes) are cellular “letters,” found to transport various biological molecules such as RNA, DNA, and proteins. The present project aims to develop a novel, non-viral method of placental gene modulation via the delivery of plasmid DNA to the placental cells, after the loading of DNA into trophoblast-derived exosomes. **Methods:** BeWo human placental cell lines will be cultured in DMEM F-12 media supplemented with 10% fetal bovine serum (37°C; 5%CO^2). Exosomes will be isolated from conditioned media culture by size exclusion chromatography. A plasmid with a fluorescent reporter gene (GFP) will be loaded into the isolated exosomes, via electroporation, and immediately added back to the BeWo cell culture media, for natural reintegration into the cells. Cell transfection rate will be assessed by fluorescent microscopy in 24 hour intervals for indication of successful plasmid integration. **Results:** Preliminary data showed satisfactory exosome isolation. The GFP reporter was successfully integrated into BeWo cells after direct electroporation of cells. Loaded exosomes showed to have a low transfection rate (1%) of cells. **Conclusion:** Gene modulation of BeWo placental cells can be accomplished and visualized by the delivery of plasmid DNA with a fluorescent reporter gene using host-derived exosomes. The transfection rate using exosomes for DNA delivery is still significantly lower when compared to direct electroporation of plasmids into cells.

Mentors: Dr. Johann Urschitz, Dr. Rodrigo Weingrill

Swasthita Sadagopan
Biology
Natural Sciences
Honors, UROP
Oral Presentation: Session 2 (10:30-11:20a) in KUY 406 (Zoom: ‘Awa)

Generating New Molecular Tools to Study Amyloid Neuronal Trafficking in Alzheimer's Disease

Alzheimer’s disease (AD) is a terrible neurodegenerative disease and the most common type of dementia, which affects 6.5 million people in the U.S. The causes of AD are complex and not fully understood, but it is well established that AD patients have progressive cognitive decline including memory loss, disorientation, and decline in behavior. This cognitive degeneration ultimately destroys their quality of life and most patients become dependent on family members or caregivers. Despite decades of research and thousands of clinical trials, there are still no effective therapies to prevent or cure AD. The most widely accepted hypothesis about the underlying cause of AD is accumulation of small amyloid-beta peptides within the brain, which leads to neurotoxic plaques and progressive loss of synaptic function. Unpublished data from our laboratory has recently identified the exocyst protein complex as a potential regulator of amyloid precursor protein (APP) intracellular trafficking and amyloid-beta synthesis in neurons. The aim of this thesis research was to generate new transgenic cell models to allow advanced live-cell fluorescent microscopy studies of the exocyst and APP interactions in neurons. We successfully characterized gene integration and measured protein expression of the new cell lines through biochemical tests and fluorescent microscopy. These studies contribute to a better understanding of the molecular mechanisms regulating amyloid-beta synthesis in neurons and could provide the scientific foundation for new therapeutic approaches to AD.

Mentor: Dr. Benjamin Fogelgren

Princess Jena Dalit Santiago
Biochemistry (B.S.)
Natural Sciences
Honors, UROP, Also presenting for Tester's, CTAHR Showcase and Research Symposium
Oral Presentation: Session 2 (10:30-11:20a) in KUY 408 (Zoom: Pua Kala)

The Characterization of Mice Lacking the Gene for Selenocysteine Lyase in Brown Adipocytes

Brown adipocytes are responsible for producing heat and maintaining body temperature by expending energy. Brown adipocyte tissue (BAT) is crucial in adaptive thermogenesis, the ability to regulate heat production in response to environmental temperature or dietary changes. Selenium (Se) is an essential micronutrient necessary for energy metabolism and thermoregulation. The enzyme, Selenocysteine lyase (Scly) assists in recycling selenium in the body through degradation of the amino acid selenocysteine (Sec), essential to selenocysteine biosynthesis. Whole-body deletion of Scly leads to metabolic dysfunction such as obesity, impaired glucose tolerance, along with hepatic steatosis, and enlargement and whitening of the BAT. This project examines the consequences of targeted knockout of Scly in the brown adipocytes of mice and the impact on heat production.

We hypothesize that BAT-specific-Scly knock-out (KO) animals will exhibit metabolic dysfunction, including weight gain, glucose, and insulin intolerance. The goal was achieved by feeding customized diets of known amounts of Se and exposing animals to the cold, initiating adaptive thermogenesis. A thermo probe was surgically implanted in the mice to record internal body temperature and glucose levels were measured. We assessed for changes in specific selenoproteins associated with BAT thermogenic activity. Our results show that BAT-specific-Scly KO mice challenged with low Se diets present no metabolic dysfunction compared to animals on adequate Se diets. Mice in low Se-diets did not maintain average core body temperatures upon cold exposure. We conclude that Scly in BAT participates in energy expenditure mechanisms and thermoregulation.

Mentor: Dr. Lucia Seale
Co-Authors: Briana K. Shimada, Naghum Alfulaij, Pamela Toh

Emma Seidfathi
Psychology
Social Sciences
UROP
Oral Presentation: Session 2 (10:30-11:20a) in KUY 310 (Zoom: Kukui)

Emotions and Ethics: Exploring the Impact of Sadness and Relational Dynamics on Whistleblowing in Close Relationships

Understanding the psychology of whistleblowing (i.e., reporting the wrongdoings committed by another person) in the context of close relationships is crucial for developing interventions to support ethical decision-making without compromising close personal bonds. The current study builds on previous research by exploring the role of emotion in these complex situations.

145 American Adults ($Age_{M/SD}$ = 39.6/12.95; 47.3% Male, 48.6% Female; 69% White) were asked to imagine witnessing a close other (significant other or best friend) commit fraud and then asked by a law enforcement officer if they knew anything about the incident. In addition to reporting the likelihood of telling the officer the truth, participants were also asked to report how close they were to the perpetrator as well as the degree they felt sad. Both of these were asked before and after they simulated learning about the fraud committed by their close other.

To address the research questions, we first regressed the likelihood of whistleblowing on post-incident sadness, controlling for pre-incident sadness. The relationship between increased sadness and whistleblowing was positive and significant (B = .41, *p* =.031). Next, we fitted a model with post-incident closeness (controlling for pre-incident closeness) as a mediator. Results show that decreased closeness fully explains the relationship between increased sadness and the likelihood of whistleblowing (B = .031, p =.635).

This study underscores the pivotal role of emotions, particularly sadness, in whistleblowing decisions within close relationships, highlighting the intricate interplay between emotional response, relational dynamics, and ethical action.

Mentors: Dr. Walter Sowden, Dr. Scott Sinnett

Jason Shimoko
Biology and Microbiology
Engineering & Computer Sciences - Product Design/Development
Honors
Oral Presentation: Session 3 (11:30a-12:30p) in KUY 302 (Zoom: Olonā)

Sustainable Biofuel Synthesis from Food and Agriculture Residues Through the Utilization of *Mortierella alpina*

Current methods for disposing of food and agricultural waste—encompassing landfilling, incineration, and composting–come with many notable shortcomings. These limitations underscore the urgent need for a more holistic and sustainable approach to managing food waste. Oleaginous fungi represent a unique category of microorganisms renowned for their remarkable lipid production capabilities–excelling in accumulating lipids, rendering them invaluable for bioenergy generation. The fungal lipids produced by such fungi–including *Mortierella alpina*–possess a high energy density, are inherently renewable, and can be produced at a large scale. These inherent characteristics firmly establish fungal lipids as a sustainable and ecologically friendly substitute for traditional fossil fuels. For this research, wildtype *Mortierella alpina* was grown on a wide variety of food wastes from various food vendors and farms across Hawaii. This includes potatoes, bananas, cucumber, tomato, and basil/spinach. These waste samples were then used to grow the oleaginous fungi *Mortierella alpina* in different solid and liquid mediums, from which growth curves and assays on biomass and lipid content measurements were made. Data from this project was compared to the standard potato dextrose broth used in labs to determine that agricultural food waste could be used to effectively grow *Mortierella alpina*, however, further testing is required to properly understand the amount of energy that can be generated from the fungal lipids and whether this would be realistic to upscale on a community level.

Mentor: Dr. Zhiyan Du

Wesley Simko
Biochemistry
Natural Sciences
UROP
Oral Presentation: Session 3 (11:30a-12:30p) in KUY 408 (Zoom: Pua Kala)

Longitudinal Dynamics of SARS-CoV-2 Breakthrough Infections in Hawai‘i

Abstract: The COVID-19 pandemic has highlighted rapid antigen tests and quantitative real-time polymerase chain reaction (qRT-PCR) tests as essential strategies for identifying severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection. However, antigen tests only report the presence of viral antigen, and qRT-PCR tests are unable to distinguish between actively replicating and noninfectious RNA during infection. Therefore, how long an individual is generating actively replicating viral RNA is still not yet clearly defined. The objective of this study is to analyze the viral dynamics of SARS-CoV-2 after breakthrough infection to elucidate the window of infectiousness in vaccinated individuals. We analyzed over 170 longitudinal nasal swabs collected up to 46 days post-symptom onset (PSO) from infected individuals (n=50) using antigen tests and qRT-PCR assays. The CDC qRT-PCR Panel targeting the viral nucleocapsid genes (N1 and N2) was used to detect SARS-CoV-2 RNA and cycle threshold (Ct) values <40 were defined as positive. The qRT-PCR analysis revealed that viral load peaked between 1-3 days PSO and steadily declined after 4 days PSO. Further, we were able to detect viral RNA up to 26 days PSO, but only detected positive antigen results up to 15 days PSO, indicating the higher sensitivity of qRT-PCR tests. Additional assays using strand-specific qRT-PCR to specifically detect actively replicating RNA intermediates and plaque assays to measure infectious virus are ongoing. Results from this study will expand our understanding of SARS-CoV-2 breakthrough infections and create more dynamic COVID-19 isolation guidelines for individuals to accurately isolate during the window of infectiousness.

Mentors: Dr. Alanna Tseng, Dr. Sandra Chang

Maya Singh
Global Environmental Science
Natural Sciences
UROP
Oral Presentation: Session 3 (11:30a-12:30p) in KUY 308 (Zoom: Limu Kohu)

High Density Polyethelene Microplastic Effects on Sea Urchin Fertilization

My project was to test the various shapes of High Density Polyethylene microplastic and see if they have a negative impact on *Echinometra mathaei* fertilization. Microplastic pollution and its effect on marine life is a relatively new and understudied problem in our oceans. I chose polyethylene plastic because it is by far the most produced plastic type out there. This means there is an increased rate of polyethylene being found everywhere, especially in the oceans (Brignac et al. 2019). When these sea urchin gametes were exposed in jars with fragmented HDPE and spherical HDPE, there was not a significant impact on the fertilization rate. This is a good sign, it tells us the significance of the shape does not directly impact sea urchin fertilization in a harmful way. More studies similar to this one could be done in order to support the accuracy of my results. In the future I would like to either re-do this experiment or test a different variable. The importance of the project helps future studies because it gives us insight on the possibilities microplastic pollution could have on our marine life. There is so much more to be studied with microplastics and its effect on our ocean.

Mentors: Dr. Robert Richmond, Keiko Wilkins

Kylah Slane
Biochemistry
Natural Sciences
Honors
Oral Presentation: Session 3 (11:30a-12:30p) in KUY 307 (Zoom: Loulu)

Extended Reality Case Presentation for Online Case-Based Learning with Emphasis on Biochemical and Molecular Biology Concepts of Disease Pathogenesis

Case-based learning is an important teaching method in medical education and thus must be integrated into current online learning platforms. This study will focus on using Extended Reality (XR) based education to teach osteology to a medical student population, involving 3D visualization and case creation. In medical education, students often learn through memorization methods which are not sustainable when transitioning into their career as physicians. Instead, a case-based learning approach may be a better fit, as students will gain problem-solving skills that they can directly apply to clinical practice.

The long-term goal of this research is to fulfill the need for effective medical education delivered remotely that facilitates a practical understanding of complex basic science mechanisms. The specific aim of this study includes generating a case-based approach to medical education. To fulfill this, we have created an XR-based course using the Canvas learning management system. Cases were created using methods such as photogrammetry and segmentation and subsequent fact sheets after analysis. About 20 undergraduate, graduate, and medical students from varying levels of a general scientific background were recruited at random to trial the course, which they were given one week to complete. Data was retrieved from course analytics and a survey that was conducted afterwards analyzing how students rated case-based learning compared to other teaching methods. Results suggest that students prefer interactive case-based learning opposed to textbook memorization. Suggestions include including distinct borders within models and reducing lengthy text on the Canvas module, providing a baseline for future anatomy courses.

Mentors: Dr. Scott Lozanoff, Dr. Gunes Aytac

Jared Sloan
Biology (B.A.)
Minor in Spanish
Natural Sciences
UROP
Oral Presentation: Session 2 (10:30-11:20a) in KUY 408 (Zoom: Pua Kala)

Sequence Adaptation in Various Environment across Organisms; Similar yet Different Superoxide Dismutase

Superoxide dismutase (SOD) is an oxidoreductase that can convert radical oxygen species (ROS) into H_2O_2. and O_2, a crucial process for cell survival. SOD is a homodimer with Cu^{2+}/Zn^{2+} cofactors that is found in various cellular compartments and organisms. In this research, we focus on the environmental contribution to the SOD sequence adaptation utilizing two SOD proteins: human SOD 1 (hSOD1) and its bacterial homolog *Mycobacterium tuberculosis* SOD (MtSOD). While hSOD1 exists in the cytoplasm, MtSOD exists in the periplasm, where redox potential controls the formation of the disulfide bonds. Unlike hSOD1, MtSOD contains only Cu^{2+} binding sites as an adaptation to the Zn^{2+} deficient environment caused by the host immune response against *M. tuberculosis*. Both the metal cofactors and the disulfide bond play important roles in the protein dimerization that is essential for its biological activity. To determine the sequence adaptation in various organisms, we conducted thermodynamic experiments on these model proteins. Our results indicate that the SOD homologs share secondary structure similarities despite having a low sequence identity. Moreover, MtSOD, with only Cu^{2+} cofactor, has a similar stability when compared to the human protein with two metal cofactors. Therefore, we hypothesize that the loss of the Zn^{2+} binding site in MtSOD has no significant effect on enzymatic activity.

Mentors: Dr. Ellinor Haglund, Ivy Vo

Amanda Spincola
Anthropology
Minor in History
Social Sciences
Honors, Also presenting for Tester's
Oral Presentation: Session 2 (10:30-11:20a) in KUY 305 (Zoom: Makaloa)

The Power of Clothes: Material Culture Exchange During the Kingdom of Hawai‘i

This paper will look at the exchange of material culture, particularly dress, and the role it played in politics during the Kingdom of Hawai‘i (1795-1893). As Hawaiians interacted with the increasing number of foreigners that came to their shores, a unique blend of cultural aesthetics and symbolism took place regarding one’s personal adornment. This was influneced by the arrival of British explorers and material goods, Asian textiles, and American missionaries during the early days of the Kingdom. The introduction of different modes of dress were often fused with existing symbols of power, which served to further highlight and strengthen power dyamnics within Hawaiian soicety. Many of the ali‘i utilized dress as a political tool to present Hawai‘i to the world in the most advantageous way. This presentation played a role in shaping and developing a national Hawaiian visual identity and serves to highlight the role of Indigenous agency in foreign affairs during the Kingdom.

Mentors: Maile Speetjens, Dr. James Bayman

Tierra Monique Sydnor
English, French, German
Arts & Humanities - Creative
Honors
Oral Presentation: Session 3 (11:30a-12:30p) in KUY 306 (Zoom: ‘Ilima)

Let The World Stand Still

Let The World Stand Still explores elemental love in an era of climate change through a biblical lens. Ruach, the protagonist, is the breath of God, Spirit of God, and the wind. Ruach is the most powerful element and the closest to God. He was there in the beginning, before light, when God spoke, and he controls most of the other elements’ movements. Ruach lives among the Genesi, the elements first created in Genesis One. During climate change, the elements become angered. Ohr, light, and Mayim, water, in a coup, put Ruach, the wind, on trial for his crimes against Adam, mankind. This story shows the interpersonal relationships between Ruach and the other elements.

I utilize different names of God to emphasize God’s intentions. When Ruach discusses God’s judgement, he calls him the God of peace, emphasizing God’s desire to do no harm or enact no revenge. I personify the elements with human characteristics to draw parallels between elements and the human condition.

Let the World Stand Still functions within the theme of reciprocity. What one gives is what one receives, which not only has biblical implications but also other diverse worldviews.

Elemental love in an era of climate change is the miscommunications of intention. Ruach, the one on trial, displays his love through justice, and serving what has been sown. Ruach’s destruction is not completely his fault. He follows the natural law of reciprocity, which is elemental love.

Mentor: Raindrop Wright

Rebecca Koeroessy, Makenzy Tamura
Global Environmental Science, Global Environmental Science
Natural Sciences
UROP
Oral Presentation: Session 1 (9:30-10:20a) in KUY 309 (Zoom: ʻUlu)

Chemical and Isotopic Analysis of a Catchment in Manoa, Hawaii

This study investigates the complex relationship between rainwater and stream water in a tropical catchment system, specifically the Mānoa catchment of Hawaiʻi. Examining both isotopic and chemical analyses of these samples can lead to a better understanding of the hydrologic processes and water quality dynamics. Samples were collected between February 2023 and December 2023 at Harold L. Lyon Arboretum and the University of Hawaiʻi at Mānoa's Campus.

Isotopic analysis of rainwater and streamwater (δ^2H and $\delta^{18}O$) reveals seasonal variations and underlying mechanisms governing rainfall and streamflow. Distinct seasonal isotopic patterns highlight the direct influence of local climate on water sources. In particular, variations in rainwater isotopes suggest that changing weather patterns have a major impact. The observed deviations in June's streamwater isotopes suggest potential anomalies, possibly linked to altered hydrological pathways like increased evaporation or modified groundwater influxes.

Chemical analysis of the major ion concentrations (Cl^-, Na^+, Mg^{2+}, SO_4^{2-}, Ca^{2+}) in rain and stream water was done through ion chromatography and can provide valuable insights into water quality. The dominance of chloride and sodium in rain and streamwater samples suggests that marine aerosols act as cloud condensation nuclei and are involved in rainfall processes that end up in the stream. Correlations between different ions help identify their potential origin leading to a better understanding of what processes might affect their abundance in the catchment.

Analysis of isotopic and chemical components of rain and stream water can provide critical insights into the complex dynamics of tropical island hydrology.

Mentor: Dr. Giuseppe Torri

Cara Tan
Economics
Social Sciences
Honors
Oral Presentation: Session 3 (11:30a-12:30p) in KUY 301 (Zoom: Koa)

Estimating the Impact of School Shootings on Fertility Rates in the United States

The frequency of K-12 school shooting incidents in the United States is a national concern. The direct impact of these events is felt primarily by students, educators, and parents in the nearby community, and it may influence a variety of outcomes. This paper investigates the potential consequences of school shooting incidents particularly on fertility decisions, an outcome that may be affected due to psychological stress and apprehension over safety in schools. I use an event study approach by combining school shooting incident records from the Washington Post with natality records from the National Vital Statistics System at the county-level between 2003 and 2022. I find that the general fertility rate in a county decreases in the years of and after a fatal school shooting incident compared to the year prior. Furthermore, the effect is stronger among counties that experienced a school shooting incident with more than one fatality. These findings suggest that school shooting incidents may have a negative short-term impact on childbearing decisions, but the mechanism through which it occurs is unclear.

Mentor: Dr. Teresa Molina

Haley Taylor
Communications
Minor in Business
Arts & Humanities - Research
Honors
Oral Presentation: Session 1 (9:30-10:20a) in KUY 301 (Zoom: Koa)

What Are the Relationship Characteristics of Small Businesses Instagram Posts to Create Viral Content: A Case Study in Hawai'i

This study analyzes the impact of viral content for small businesses on O'ahu. Nine local jewelry businesses were the subject of this study. Twenty percent of the instagram content over a six month time frame were collected. Each post was sorted in the following categories by frequency: Displaying Products, Creating a Product, Location, News/Updates, Giveaways, and Family Content. The interaction rates were analyzed with giveaways being the most popular. We conclude that it is important to form a company's own distinguishable brand, build relationships with customers, and call for interaction via incentives to help grow their platform and business.

Mentor: Dr. Ji Young Kim

Christina Tong
Biology (B.S.)
Natural Sciences
UROP
Oral Presentation: Session 2 (10:30-11:20a) in KUY 407 (Zoom: ʻĀweoweo)

CRISPR-Based Genotyping of Surface Fish to Investigate Genetic Factors Influencing Social Behavior

The genetic basis of social behavior is pivotal for understanding complex disorders like autism. Currently, the cave-dwelling form of the Mexican tetra, *Astyanax mexicanus*, exhibits ~1,000 gene dysregulations, which parallel those seen in patients with autism, including asociality and repetitive behaviors. However, revealing the key gene-gene interactions associated with these behaviors requires a genetic tool. Here we first attempted to disrupt *shank3* gene in *A. mexicanus*, a well-studied autism risk gene and its mutation in murine models has been linked to attenuated sociality and the emergence of repetitive behavior via CRISPR/Cas9 technology. We then edited the *shank3b* gene in surface fish, which is highly expressed in surface fish. Before behavior assay, fish were subjected to tattooing for its individual identification and fin-clipping for individual genotyping at the *shank3b* locus. Two weeks-long acclimation/recovery of the fin-clipping period before behavioral assays were given to fish. Contrary to expectations, the *shank3b* CRISPants of surface fish did not show significant reduction in social behavior. Genotyping/sequencing revealed inefficient CRISPR/Cas9 editing, with all mutants being single mutation heterozygotes. Further improvements in CRISPR technology, such as CRISPR inference, may be necessary to elucidate the role of *shank3b* in regulating social behavior in *A. mexicanus*.

Mentor: Dr. Masato Yoshizawa

Ashlyn Uehara
Civil Engineering
Engineering & Computer Sciences - Research
UROP
Oral Presentation: Session 2 (10:30-11:20a) in KUY 303 (Zoom: Peʻahi)

Specialized ChatGPT for PFAS Research

Per- and polyfluoroalkyl substances (PFAS), commonly known as "forever chemicals," pose significant risks to public health and the environment due to their persistence and widespread use. Research on PFAS has grown rapidly in recent years, but the increasing number of publications risks overlooking valuable insights. This underscores the need for a condensed, easily accessible database for PFAS understanding and research. In this project, a domain-specific variant of the broader ChatGPT model, optimized for detailed knowledge and understanding of PFAS was developed. An extensive literature review encompassing various sources related to PFAS was conducted. Using various software, the ChatGPT model was trained with this PFAS literature. The validity of the specialized chatbot was ensured through cross-referencing with reputable sources. In-depth analysis of PFAS using the chatbot was conducted, focused on concentrations of PFAS in common household products in Hawaii. The specialized chatbot was disseminated via its own webpage, serving as a valuable resource that provides up-to-date information about PFAS to the public.

Mentor: Dr. Albert S. Kim

Carlo Auke van Dijken
Global Environmental Science
Natural Sciences
UROP
Oral Presentation: Session 2 (10:30-11:20a) in KUY 309 (Zoom: ‘Ulu)

Iron and Cobalt Limitation in Atlantic *Prochlorococcus* MIT9301

Prochlorococcus is an abundant marine microorganism playing a vital role in the Earth’s carbon cycle and therefore climate. This organism is a cyanobacteria meaning it obtains energy through photosynthesis. A large portion of the ocean’s phytoplankton populations are limited by low concentrations of trace metals such as iron and cobalt. Future climate change will likely alter ocean circulation and supply of trace metals to the surface ocean, and may impact *Prochlorococcus* populations, which can affect marine food webs. We only have information on iron and cobalt requirements for a few strains of *Prochlorococcus*. Therefore, we performed culturing experiments to understand the growth and decay of *Prochlorococcus* in a lab environment with changes in levels of iron and cobalt. Iron limitation on Atlantic *Prochlorococcus* did not have a significant impact on growth rates, while cobalt limitation experiments did significantly impact the growth of these phytoplankton when lowered. The growth rates resulting from these experiments can be used to model future changes in *Prochlorococcus* populations as the impacts of climate change become more prevalent.

Mentor: Dr. Nicholas Hawco

Abigail Vanblaricom-Nutt
Management and International Business
Arts & Humanities - Research
Honors
Oral Presentation: Session 2 (10:30-11:20a) in KUY 301 (Zoom: Koa)

ESG Management Across Cultures: A Study of American & Japanese Firms

Organizations use Environmental, Social, and Governance (ESG) reports to disclose their sustainability practices, crucial for investor evaluation and public transparency. This study focuses on U.S. and Japanese firms' ESG management practices, considering historical and regulatory contexts. Case studies on the ESG activities of Toyota and General Motors are used to investigate four research questions for whether: 1) Japan will have a higher quality of ESG disclosure than the United States, 2) businesses focus on short-term gains via "easy" ESG issues that have established public and corporate awareness, 3) ESG disclosure and activity of firms in Japan will be higher than those in the United States, and 4) these differences will be influenced by cultural factors. It is found that both firms prioritize ESG issues with established public awareness, reflecting an inclination towards short-term gains. However, findings suggest gaps in substantive disclosures in Japan despite more stringent regulations, challenging the assumption of higher quality. Differences in ESG activities between U.S. and Japanese firms were observed, however these differences were found to be influenced by distinct regulatory environments and historical events rather than cultural differences, suggesting that cultural factors alone do not drive differences in ESG management between countries. This study contributes to understanding ESG management dynamics, emphasizing the importance of research considering regulatory contexts, industry trends, and global events. The findings offer valuable insights into how external events, such as global sustainability agendas and economic crises, shape ESG priorities and transcend cultural boundaries, underscoring the need for broader research.

Mentors: Dr. Dharm Bhawuk, Dr. Shirley Daniel

Jesse Viernes
Biochemistry
Natural Sciences
UROP
Oral Presentation: Session 3 (11:30a-12:30p) in KUY 309 (Zoom: ‘Ulu)

Ethnobotanical Investigations into the Chemical Composition of Medical Preparations of Banana Leaves

Banana leaf is a material that has been utilized in medicine and culinary art in various cultures around the world. There exist claims of the leaf’s antioxidant, antimicrobial, and anticancer properties but not much is known about the specific chemicals responsible or how the chemical composition of the banana leaves changes during preparation for indigenous medicinal practices–usually cooking.

Crude samples will be extracted with solvents of different polarities and analyzed by liquid chromatography-mass spectrometry (LC-MS) to separate the components and obtain profiles of the chemical composition that include the “weight” of each chemical. The raw and treated leaves data will then be compared using relevant statistical software to identify meaningful chemical differences between the samples. Using this information, compounds of interest responsible for the significant changes will be identified by comparing our data with available mass spectrometry databases. For chemicals of interest that we can not directly identify using the mass spectrometry data alone, we will purify these using liquid chromatography and then determine its chemical structure using Nuclear Magnetic Resonance (NMR).

Mentor: Dr. Philip G Williams

Hershel Weiner
Physics
Minor in Astrophysics
Natural Sciences
Honors
Oral Presentation: Session 3 (11:30a-12:30p) in KUY 304 (Zoom: Māhoe)

Searches for Decoherence in A Two-Particle Quantum Entangled System at the Belle II Experiment

Quantum entanglement is the connection of quantum objects, where measurement of one would influence the other regardless of their spatial separation. First introduced in the 1935 paper, Can Quantum-Mechanical Description of Physical Reality Be Considered Complete?, by Einstein, Podolsky, and Rosen, entanglement has now become an accepted feature of quantum mechanics. However, there are still uncertainties regarding efficiency of entanglement with respect to the time evolution of physical systems. A loss of entanglement is called quantum decoherence, and measurements of decoherence can yield deeper insight into the inner workings of entanglement. The goal of this research was to develop an analysis framework to measure the sensitivity of the Belle II Experiment to a Lindblad type decoherence model. Belle II is used due to its location at the world's highest luminosity collider, SuperKEKB, in Tsukuba, Japan. SuperKEKB produces entangled B Mesons just above threshold energy, yielding low background decays. Following the mathematical derivation of the decoherence model, Belle II simulation tools were used to produce mock experimental particle decay data. An algorithm for fitting the decoherence model to the simulated decay data was developed. Physics generators which simulate Lindblad type decoherence were then implemented into the Belle II software framework. Decays with various levels of decoherence were analyzed, using the established fitting algorithm, so that the experimental sensitivity to decoherence could be established.

Mentor: Dr. Sven Vahsen

Kaitlynn Weiss
UROP
Oral Presentation: Session 3 (11:30a-12:30p) in KUY 307 (Zoom: Loulu)

Mindfulness meditation and Perceptual Load in Performance on a Visual Capture Task

[abstract forthcoming]

Mentor:

Stryder Williams
Biology
Natural Sciences
Honors, UROP
Oral Presentation: Session 3 (11:30a-12:30p) in KUY 408 (Zoom: Pua Kala)

Stabilizing Kavalactone Dispersions Utilizing Common Emulsifiers

Piper methysticum, commonly known as kava, is a traditional medicinal herb widely used across the Pacific. The main bioactive compounds within kava are the kavalactones which can be used for the treatment of insomnia and anxiety; however, they have low bioavailability due to their poor water solubility. In order to increase the water-solubility of kavalactones, we tested the common emulsifiers, polysorbate 20, polysorbate 80, and lecithin, at different concentrations to determine the ideal kava dispersion system. The dispersion systems (containing 5.8% w/w kava powder) were mixed using a high-shear mixer prior to centrifugation to remove the sediment. The stability for each sample was then determined by measuring the particle size, zeta potential, and polydispersity index (PDI). In addition, the oxidation of the various samples was quantified by measuring the concentration of conjugated dienes present in the emulsified systems. As indicated by the results, polysorbate 20 exhibited the most stability as it maintained a particle size of 130.4 nm and a PDI of 0.44. In addition, the emulsified droplets present in this sample had the lowest concentration of conjugated dienes over the 10-day period. These results are a positive indication that nonionic emulsifiers, including polysorbate 20, at lower concentrations are suitable for kavalactone stabilization. As a result, this class of emulsifier has the potential to increase the colloidal stability of kavalactones, which is a prerequisite for bioavailability and subsequent health outcomes associated with ingesting kava.

Mentor: Dr. Kacie Ho

Sophie Mya Wong
Molecular Cell Biology
Natural Sciences
UROP
Oral Presentation: Session 3 (11:30a-12:30p) in KUY 406 (Zoom: ‘Awa)

Nickase Mechanism for CFTR1 Gene Targeting and Engineering

Mutations in the CFTR gene cause cystic fibrosis (CF), a life-threatening condition due to the buildup of mucus throughout the body. Currently, therapies for CF are limited to treating symptoms rather than addressing the origin of the disease. Thus, this project aims to demonstrate that a novel combination of transcription activator-like effectors (TALE), transposases, and cleavage components can insert a large therapeutic gene at a desired sequence in the genome to model a therapy for CF.

This project consists of building a panel of enzymes with different combinations and positionings of transposases, DNA binding domains, and cleavage domains through multiple rounds of subcloning. The enzymes differ in the type and number of transposases they contain, the presence or absence of the FokI cleavage domain, and the TALE used to bind the target sequence. Following the construction of this panel, DNA is transfected into human cell lines, and efficiency for target DNA insertion is assayed. The panel of enzymes has been successfully constructed with plasmid size and components verified by restriction digests and sequencing. Efforts are ongoing with integration into human cell lines.

This project demonstrates the possibility of a single solution to correct over 350 different mutations that cause CF by insertion of a corrected copy of all exons of the CFTG gene at exon 1, skipping downstream mutations. The use of the FiCAT gene delivery mechanism allows us to overcome the main challenge of current technologies for gene editing which demonstrates a decrease in efficiency as insert size increases.

Mentor: Dr. Jesse B. Owens

Michael Yamada
Global Environmental Science
Natural Sciences
UROP
Oral Presentation: Session 2 (10:30-11:20a) in KUY 308 (Zoom: Limu Kohu)

ZooScanning the CCZ

Zooplankton, small animals that inhabit the water column, are the dominant secondary producers of the global ocean. They serve several important roles in food web dynamics and ecosystem function but may be at risk due to the emerging industry of deep-sea mining of polymetallic nodules. This project examines deep-sea plankton within the Clarion Clipperton Zone (CCZ), a region of the eastern tropical Pacific (ETP) that is rich in polymetallic nodules, as part of a baseline survey of ecosystem function prior to mining impact. Samples were collected over the NORI-D exploration mining claim using a 1m2 Multiple Opening and Closing Net and Environmental Sensing System (MOCNESS) to obtain depth-stratified material. Zooplankton abundance was highest in the near surface (upper 100m) compared to the midwater oxygen minimum zone (OMZ) (100-700m) as well as below the OMZ (>700m). At the collector test area (CTA) site, significant seasonality was observed only within the core of the OMZ in the small and large size fractions, with higher zooplankton abundance in spring. These site-specific differences in the strength of seasonality may have been due to higher oxygen concentrations in the upper portion of the OMZ during spring (100-300 m). This study will provide some of the first information on zooplankton community structure in the Eastern Tropical Pacific, as well as seasonality in the mid-trophic levels in this region.

Mentor: Erica Goetze

Samantha Yamamoto
Molecular Cell Biology (B.S.)
Natural Sciences
Honors, UROP
Oral Presentation: Session 1 (9:30-10:20a) in KUY 408 (Zoom: Pua Kala)

Quantification of Ribosomes and Zinc in *Mycobacterium smegmatis* Grown in Zinc Limitation

Zinc (Zn^{2+}) is an essential micronutrient to living cells, required by various enzymes involved in physiological processes. However, bacteria often encounter Zn^{2+}-limited environments, of interest being those inside necrotic granulomas developed during tuberculosis infection. Zn^{2+} sequestration as a part of host nutritional immunity appears ineffective in controlling *Mycobacterium tuberculosis (Mtb)*, instead leading to Zn^{2+}-limited subpopulations that exhibit increased survival. *Mtb* responds to Zn^{2+} limitation by expressing Zn^{2+}-independent, alternative ribosomal proteins (AltRPs) for the replacement of Zn^{2+}-dependent, primary ribosomal proteins (PrimRPs). AltRPs studied in a model mycobacterium, *Mycobacterium smegmatis (Msm),* have been demonstrated to cause morphological changes and allow for continued growth and survival when Zn^{2+} is limited. This suggests that AltRPs can functionally replace PrimRPs as an adaptation to limited Zn^{2+}.

This project aims to understand how AltRPs contribute to ribosome biogenesis and Zn^{2+} homeostasis in mycobacteria by analyzing how alternative ribosomes bind Zn^{2+} and are synthesized compared to primary ribosomes. The number of ribosomes per cell, as well as Zn^{2+} abundance in ribosomes in a wild type and deletion mutant (*ΔaltRP*) of the *altRP* operon in *Msm*, which synthesize alternative and primary ribosomes, respectively when grown in Zn^{2+}-limited conditions, was quantified. The results show that alternative ribosomes containing Zn^{2+}-independent AltRPs bind less Zn^{2+} compared to primary ribosomes and that Zn^{2+} is more abundant in the cytoplasm of cells expressing AltRPs. We conclude that AltRP expression by mycobacteria, including *Mtb,* reduces ribosome dependence on Zn^{2+} and helps to increase Zn^{2+} availability during Zn^{2+} limitation.

Mentor: Dr. Sladjana Prišić

Paige J Yuen
Political Science and Sociology
Social Sciences
Honors
Oral Presentation: Session 2 (10:30-11:20a) in KUY 305 (Zoom: Makaloa)

East Asian Settler Colonialism: Examining Statehood and Land Legislation of the 1959 Senate of the Territorial Legislature of Hawai‘i

During the 1950s, politicians of East Asian descent began to gain economic and political power in Hawai‘i. With a hegemonic legislature, East Asian politicians, along with their White counterparts, proposed legislation regarding government institutions and the economy in order to prime Hawai‘i structurally and ideologically for statehood.

This study examines the legislation of the 1959 Senate of the Territory of Hawai‘i through settler colonial, critical race, and Indigenous theoretical frameworks. Through my archival research and analysis, I argue that the legislation proposed and advanced by specifically East Asian legislators aided East Asian's profits and power in Hawai‘i. Furthermore, my research addresses the following questions: (1) how does the quest for statehood advance East Asian settler colonialism, (2) how does East Asian settler colonialism fabricate narratives of the need for capitalism and U.S. occupation, while simultaneously subverting Kanaka movements for sovereignty and deoccupation, and (3) how do ideals of liberal multiculturalism enable East Asian legislators to maintain power and paint Hawai‘i as racially harmonious?

With the aid of *Land and Power in Hawai‘i: The Democratic Years* by George Cooper and Gavan Daws, I find that East Asians politicians largely profited and benefitted from the statehood and land bills they proposed, consolidating their wealth within their own ethnic groups. The legislation they introduced mirrored their own business ventures pursued outside of politics. Thus, these findings spotlight the techniques of the advancement of settler colonialism and how it reinforces capitalist structures of economies that rely on the exploitation of other marginalized groups.

Mentor: Dr. Dean Saranillio

Melissa Zakala-Downs
Civil and Environmental Engineering
Engineering & Computer Sciences - Research
UROP
Oral Presentation: Session 1 (9:30-10:20a) in KUY 302 (Zoom: Olonā)

Optimizing Analytical Methods for Intracellular Microbial Polymers in Environmental Applications

Polyhydroxyalkanoates (PHAs) are intracellular polymers with promising applications in various industries as a substitute for standard petroleum-based polymers due to their increased biodegradable properties. P3HB, P3HV, and P3HH are three forms of PHA, the accurate quantification of which is essential for optimizing the production processes of PHA. This research aims to develop an optimized analytical method for the quantification of PHA in forms P3HB, P3HV, and P3HH through variation of processing parameters and testing a range of biomass sources.

To quantify PHA, the polymer(s) were first extracted from biological cells and then depolymerized to their monomer form(s). They were quantified using a gas chromatogram (GC) equipped with flame ionization detection, and results were compared with externally created calibration curves to determine the percentage 3HB, 3HV, and 3HH yield of the samples by normalizing to initial dry mass. A series of temperatures (60°C - 140°C) and heating times (30 min - 2.5 hr) were then tested to determine the optimum processing conditions for maximum PHA yield.

It was found that the optimum length of the methylation and depolymerization stage was 1 hour, and the optimum temperature was 120°C. PHA yield was minimal for processing times less than 1 hour, and slightly lower for times exceeding 1.5 hours. Temperatures less than 100°C did not fully process the samples, and temperatures above 120°C degraded a significant portion of the PHA, leading to less desirable yields.

Mentor: Dr. Zhiyue Wang

Jing Ting Zheng
Computer Science
Engineering & Computer Sciences - Research
UROP
Oral Presentation: Session 3 (11:30a-12:30p) in KUY 303 (Zoom: Peʻahi)

Gamification of Web Application for Diverse Facial Emotion Data Collection

As human lives become increasingly dominated by technologies, understanding human affect in human computer interactions becomes crucial. Machine learning models designed to recognize facial emotions often face a scarcity in annotated data, hindering their generalizability. Furthermore, existing datasets frequently focus on a limited range of emotions, primarily rooted in Paul Ekman's six basic emotions: anger, disgust, happiness, sadness, fear, and surprise.

This study proposes a novel gamified approach to address these limitations and collect semi-structured data encompassing a diverse spectrum of emotions. A custom web application was developed to collect both video and text data. Our study also leverages a referral program to create a continuous cycle of data collection.

From our preliminary mixed-methods user studies, most participants selected diverse emotional expressions, and few chose to act out an emoji that required other props. The resulting dataset, made publicly available with participant consent, empowers development of robust and generalizable facial emotion recognition models, paving the way for more nuanced and emotionally aware systems.

Mentor: Dr. Peter Washington
Co-Authors: Ali Kargarandehkordi, Armin Soltan

Damien Zimmermann
Cinematic Arts: Digital Cinema
Arts & Humanities - Creative
Honors
Oral Presentation: Session 2 (10:30-11:20a) in KUY 306 (Zoom: ʻIlima)

Write, Direct, Shoot, Edit: Manifesting Emotion from Notebook to Big Screen

In this senior honors portfolio, I reflect on my endeavors as a filmmaker at the University of Hawaiʻi at Mānoa's School of Cinematic Arts. I here document my efforts in evoking emotion from my audience using techniques present in my work across various filmmaking roles – director, cinematographer, editor, and screenwriter. The non-visual portion of this portfolio is broken down into written chapters that represent scopes of my artistic evolution, detailing the specific methodologies and insights gained along the way. Chapter One delves into the foundational aspects of filmmaking, where I explore the nuances of screenwriting, cinematography, as well as the director's role in shaping narrative emotion through actors' performances and the editor's role in creating emotion through choices made during post-production. Chapter Two elucidates the purpose behind my portfolio, serving as a testament to my commitment to crafting compelling stories that evoke emotional experiences from my audience. Chapter Three comprises the heart of my portfolio, showcasing my work across different components. In Components 1, 2, and 3; I highlight my screenwriting abilities, my directorial endeavors, cinematography and editing skills, respectively. The visual portion of this portfolio is a collection of stills, short films and screenplays that display stylistic choices found in my work, ultimately showcasing my work in the field of evoking emotion from an audience using techniques applied across the many roles in filmmaking. In essence, this senior honors portfolio serves as a comprehensive testament to my experiences in digital cinema at UH Mānoa's School of Cinematic Arts.

Mentors: Anne Misawa, Thomas Takemoto-Chock

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