Symposium of University Research and Creative Expression • Celebrating Creativity! Empowering Voices!

CWU

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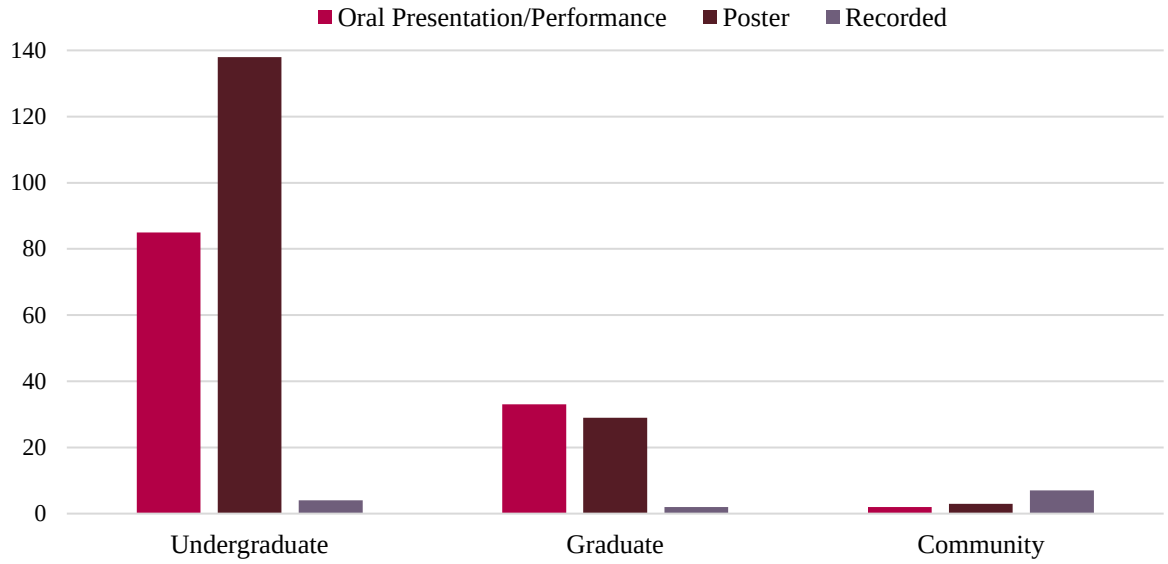
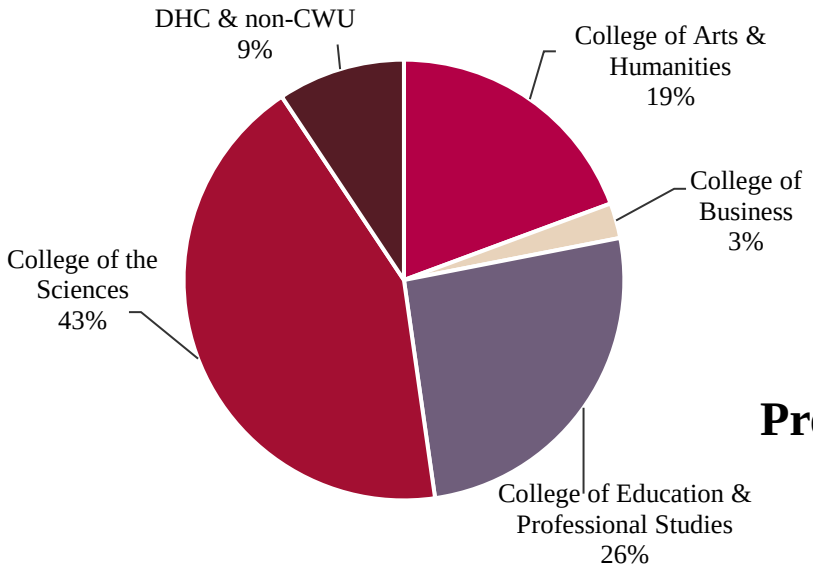
SOURCE 2025 Statistics

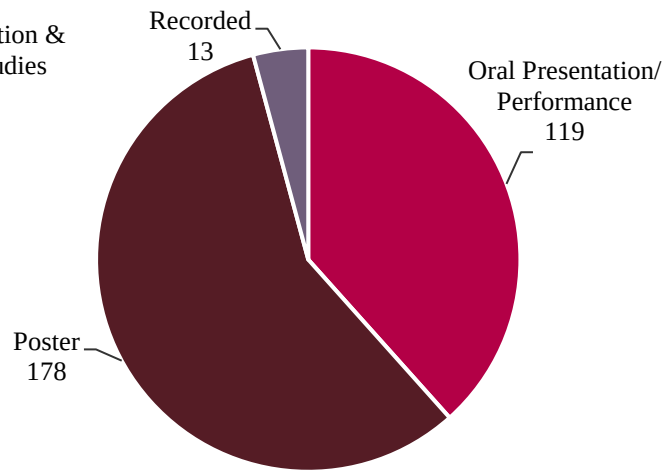
Participants by Affiliation



Participation by College



Presentations by Format



Central Washington University Presents

SOURCE 2025

The Symposium of University Research and Creative Expression

Program and Proceedings

30th Annual Conference
May 14th & 15th, 2025

Table of Contents

SOURCE Schedule

Day 1: Wednesday, May 14 | SURC

Time	Session
10:00am–12:00pm	Oral & Panel Presentations
11:30pm–1:00pm	Fashion Show & Poster Presentations
12:30pm–1:00pm	Welcome Lunch | SURC Ballroom
1:00pm–4:00pm	Oral & Panel Presentations
3:00pm–4:30pm	CWU Virtual Leadership Academy
See "Community & Student Groups" Section for Panels	

Day 2: Thursday, May 15 | SURC

Time	Session
10:00am–11:30am	Morning Poster Session
11:30am–1:00pm	SOURCE Sustainable Lunch
1:00pm–2:30pm	Afternoon Poster Session
See "Community & Student Groups" Section for Panels	

Pre-recorded Presentations

Visit https://www.youtube.com/@cwusource5518 to view this year's pre-recorded presentations.

SOURCE 2025 Award Ceremony

Tuesday, May 20 | SURC Ballroom
5:00pm–8:00pm

What is SOURCE?

The CWU Symposium of University Research and Creative Expression is an annual event that showcases all disciplines of research, scholarship, and creative activities.

SOURCE works to connect students with resources and funding to aid them in their research as well as provide students a forum to present their findings in a professional and juried environment.

Where to Start

- Generally, projects are characterized by evidence-based exploration of a question or hypothesis that is important to others in your field of study.
- Get familiar with the methodology of your project field.
- All participants must have a faculty mentor/sponsor to provide project development guidance.
- Attend SOURCE-related events before SOURCE to improve your research and presentation skills.

Participating In SOURCE

Benefits

- Critical thinking
- Public speaking
- Enrich your resume
- Conference experience
- Networking experience
- Mentorship experience
- Self-confidence

What You Can Present

- Oral presentation
- Research poster
- Creative exhibition
- Group or individual project
- Preliminary findings
- In-progress project

CWU | Office of University Student Research

Questions? Contact us!
SOURCE@cwu.edu

Sponsors & Support

2025 SOURCE Planning Committee Members

SOURCE happens because of the efforts of the faculty, staff, and students that serve on the planning committee. Our thanks to the 2025 SOURCE Committee for their support of the SOURCE event.

- Tishra Beeson, *Interim Dean, Undergraduate Studies*
- Michael Braunstein, *Professor, Physics*
- John Choi, *Assistant Professor, Engineering Technologies, Safety, and Construction*
- Tennecia Dacass, *Associate Professor, Economics*
- Volha Isakava, *Department Chair, World Languages & Cultures*
- Samuel Lohse, *Assistant Professor, Chemistry*
- Mason Low, *Research Compliance & Development Administrator, Graduate Studies & Research*
- Gabrielle McNeillie, *Assistant Professor, Sport and Movement Studies*
- Ana Paula-Freire, *Associate Professor, Health Sciences*
- Ash Perron, *Program Coordinator, Undergraduate Studies*
- Shawn Reichert, *Lecturer, Douglas Honors College*
- Chelsea Riddle, *Assistant Professor, CWU Libraries*
- Katie Seymour, *Office Assistant, Undergraduate Studies*
- Yoshiko Takahashi, *Dean, Undergraduate Studies*
- Hideki Takei, *Director, Office of University Student Research*
- Chad Tester, *Director, Multimodal Education Center*

Thank you to Amy Walker who designed the 2025 SOURCE poster.

Our Sponsors

Thank you to our sponsors and campus departments that have supported SOURCE and its students.

Apparel, Textiles, & Merchandising (ATM)
CWU Faculty-Student Provost Research, foundry10, & OUR Grants
CWU Graduate Student Research/Creative Activity Grant
CWU Student & Activities Fee Fund & Committee
CWU Craft Brewing Program
CWU Alumni Association
CWU Brooks Library & Staff
CWU Catering
CWU Transfer Center
CWU Office of Marketing and Communications
CWU Foundation
CWU Sustainability Council
CWU Virtual Leadership Academy
CWU Wadaiko Club
Eisenhower High School Jazz Bands
Ellensburg High School
foundry10 Education Research Organization
Graduate Student Association (GSA)
Ida Nason Aronica Elementary School
Lincoln Elementary School
Manastash Student Literary Journal
Matthew Wenz & Class
McNair Scholars Program
Mt. Stuart Elementary Robotics Team
Multimodal Education Center (MEC)
Museum of Culture and Environment
Music Department
Office of the President
Office of the Provost
Publicity Center
School of Graduate Studies & Research
Student Leadership, Involvement, & Community Engagement (SLICE)
Student Union Recreation Center & Staff
Students With A Purpose (SWAP)
Wildcat Printing
Wildcat Shop
William O. Douglas Honors College (DHC)

LETTER FROM PRESIDENT

To our SOURCE 2025 participants and guests:

We welcome you to the Central Washington University's annual Symposium of University Research and Creative Expression, or SOURCE. Now in its 30th year, SOURCE has a long-standing history as CWU's flagship research event where our campus and local communities come together to celebrate the outstanding research and creative work that happens at our university every day.

Here at CWU we are proud of the impact that our hands-on learning approach has on students. The benefits of these High-Impact Practices will be evident in the presentations, demonstrations, talks, and performances you will interact with at SOURCE. The knowledge and experience gained by our students through their preparation for and participation in this event will serve them not only through the remainder of their academic careers, but into the future as they enter the workforce.

The work our students are presenting would not be possible without the guidance of their faculty mentors. The relationships developed while working on these projects encourage critical thinking and analysis and support the growth of oral and written communication skills. Our faculty and students learn from each other throughout the process, and the bond that is built through these collaborations creates lifelong faculty-student relationships that exemplify what it means to be a Wildcat.

As you participate in all SOURCE has to offer this year, you'll gain a better understanding of the quality and quantity of undergraduate and graduate student research and creative expression that is taking place here at CWU. The talent that is displayed makes me excited for our future as we send these students out into the world to continue contributing to their fields.

Thank you again for joining us as we celebrate the students and faculty who have prepared so diligently to share their work with us, and a special thank you to the individuals across our campus who have made SOURCE possible. We couldn't provide this opportunity without the commitment and dedication of everyone involved and we look forward to a memorable event.

J. James Wohlpart

Jim Wohlpart, President

LETTER FROM PROVOST

Dear Students, Faculty, and Guests,

Welcome to SOURCE! This year, CWU is holding the 30th annual Symposium of University Research and Creative Expression. It is with great pleasure that I welcome everyone as we gather today to celebrate the outstanding achievements of our students and faculty. Your presence and participation today are a testament to the power and importance of academic inquiry and human creativity.

Central Washington University is well known for our world-class faculty and the unique opportunities they provide students for hands-on, experiential learning. Every day, students are deeply engaged in laboratories, community projects, studios, performances, and field experiences. As you explore all there is to learn and experience during SOURCE, the value of experiential learning for students, and the value that students, in turn, provide to our communities, will be self-evident.

To all the students who have dedicated countless hours to their projects, I commend your hard work, passion, and dedication. Your commitment to intellectual and creative exploration is inspiring! Today is for you to showcase and celebrate the culmination of your efforts and the beginning of your journey as scholars and innovators. To the faculty who mentor students, I extend my heartfelt gratitude for the guidance and support you provide to our students throughout their journey of discovery. Your expertise, encouragement, and mentorship are the foundation that empowers students to push themselves and grow as scholars.

I also want to acknowledge and thank the organizers, volunteers, and sponsors of SOURCE. The team behind the event worked tirelessly to make this event a success. Your dedication to fostering a culture of research and creative expression on our campus is deeply appreciated and it would not be possible without your commitment.

Once again, welcome to SOURCE. Engage and enjoy the insightful discussions, reach out and make meaningful connections, and let us all celebrate the outstanding achievements of our students.

Patrick Pease, Provost

2025 CWU ART + DESIGN

JURIED STUDENT ART EXHIBITION

RECEPTION AND AWARD CEREMONY

APRIL 17
5- 7 PM

AWARDS ANNOUNCED AT 6 PM

SARAH SPURGEON GALLERY

EXHIBIT ON DISPLAY APRIL 17 - MAY 17

CWU

Sarah Spurgeon Gallery is supported by the ASCWU and the Department of Art + Design
CWU is an EEO/AA/Title IX Institution. For individuals with disabilities who would like to request an accommodation, email Disability Services at DS@cwu.edu.

sarah spurgeon gallery

College of Arts and Humanities

The College of Arts and Humanities has presentations from the following departments and programs:

- Art and Design
- Communication
- English
- History
- Music
- Philosophy and Religious Studies
- Theatre Arts

Art and Design

Frida Kahlo: More Than the Unibrow, a Cultural Feminist Analysis

Karen Valencia
Project Mentor(s): Erika Pazian

Frida Kahlo has been a common name in the art historical canon – someone who reinvented Surrealism without needing to identify with the style, and challenging conventional norms in artistic practices despite her "outsider" status. Her art was surreal without the need for Surrealism. Many of her works are discussed in Mexican art historical literature. This research focuses on Kahlo's painting *The Two Fridas* to offer additional discussion on how it connects to feminist art theory. Kahlo was a profoundly complicated woman, reduced to her bus incident, infertility, and tumultuous relationship with muralist Diego Rivera. The materials used as sources in this presentation will give insight into the vision of Kahlo's mentality and conflicted personal identity. The research will thoroughly examine Kahlo's womanhood and personhood as an artist in 20th-century Mexico. Deconstructing *The Two Fridas* and Frida Kahlo herself will help provide answers to the following questions: what was Kahlo attempting to communicate, and why has it been simplified via popular media? Why has Kahlo herself been a victim of simplification? Feminist theory suggests how her performance of gender norms intersected with her race and sexuality, ultimately becoming defined by these characteristics in a simplified manner. Who Kahlo was and how her most celebrated piece communicates her ideals, values, and sense of self is what this presentation will dissect; to not only better understand the artist and her work but also the application of feminist theory to *The Two Fridas*.

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: Art History, Surrealism, Surreal, Feminist Theory, Mexican, Identity, Analysis

Communication

Margaret Fell: Advocating and the Rhetoric Used

Arely Alvarado, Alesandra A. Iriarte-Canales, Nina-Kamea Nickel
Project Mentor(s): Nicholas Temple, PhD

Margaret Fell often hailed as the "mother of Quakerism," played a crucial role in both the development of the Religious Society of Friends and the early advocacy for gender equality in Christian religious life. Fell emerged as a powerful public voice in an era when women were largely excluded from religious and political discourse. As an educated woman of influence, her rhetorical strategies were deeply rooted in Biblical teachings, which she adeptly used to argue for the spiritual and social equality of women. Her most notable work, *Women's Speaking Justified*, offered a groundbreaking theological defense of women being able to speak in the church, marking a significant shift in Christian thought. In doing so, she challenged deeply entrenched patriarchal norms within the church and society. Despite persecution and personal cost, Fell's commitment to the Quaker movement and her marriage to George Fox, the movement's founder, positioned her as both a spiritual and organizational leader. Her activism laid early groundwork for the broader movement toward women's rights within religious institutions. This analysis explores Fell's rhetorical sophistication, her theological contributions, and her influence on religious equality, drawing parallels to contemporary figures who similarly blend faith and activism. Fell's legacy continues to resonate in modern religious and political activism today.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Rhetoric, Rhetorical Theory, Activism, Women empowerment, Religion, Quakerism, Christianity, Feminism

FOMO and It's Future: A Communicative Perspective

Anna Atkinson

Project Mentor(s): Josh Nelson-Ichido, PhD

FOMO is an interesting phenomenon I have explored in depth through this literature review. The review itself explores the idea of FOMO from a variety of lenses and perspectives. These perspectives include: FOMO, FOMO and Mental Health, and Treatments for FOMO. All of which is useful but missing a communicative element. Thus, I proposed the idea of looking into FOMO from the Communication Accommodation Theory (CAT). Beyond the literature review, I also chose to take this idea into a study conducted for senior seminar.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)

Keywords: FOMO, Social Media, Communication Accommodation Theory

Communication Accommodation Theory

Hayden Chase, Dominick Nagle, Kade Burgoyne

Project Mentor(s): Eun Young Lee, PhD

Communication Accommodation Theory is how people change the way they communicate with different people. This is by using convergence, divergence and not changing at all. People change the way they communicate in many different situations and the biggest is over texting. Texting is changing the way we communicate with each other and how people use textisms. In the study that was looked at it discussed how power difference increased or decreased the convergence or divergence that was seen.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)

Keywords: Communication, Communication Accommodation Theory, Divergence, Convergence

Is Seeing Believing? An Overview of Cultivation Theory

Matthew Epperson

Project Mentor(s): Mark Meister, PhD

Many people might know that the media they consume affects their beliefs, but why does this happen? This literature review explores how the media that we consume impacts our perception of real-world statistics and beliefs. Originally invented by George Gerbner in the 1960s, Cultivation Theory looks at the impact of heavy television consumption on the viewer’s perception and understanding of the real world. Since the 60’s, technology has evolved drastically. Because of that, researchers have conducted several studies that have aimed to continue this research into newer media. This review brings together key findings that explore and expand upon this theory.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)

Keywords: Cultivation Theory, Mean World Syndrome, Mainstreaming, Television, Media

How Practice Makes Perfect With DND

Kai Fritts
Project Mentor(s): Mark Meister, PhD
When it comes to the study of communication, we learn a lot about people. From why we act in a certain way to understanding how we communicate on a deeper level. But something that troubles the communication study is that practicing these theories or putting into practice different communication styles can be difficult, because while you can practice with imaginary scenarios, it doesn't compare to actually being in the situation in real time. That's why I believe that the DND final project I did for my interpersonal communication class is an excellent example of how we could be better practicing the content that we learn. In this project, a small group host's a DND game, in this game we are tasked with creating mechanics that are tied to different communication theories. This is great because it allows us to not only learn and understand the theories better, but also put them into practice, something that we rarely get to do unless we are in the situation ourselves. For my presentation, I plan to go over our mechanics and game design, explaining the significance of the theories we used, how the theories align with our mechanics, and how the mechanics allow us to practice different communication styles in real time.
Presentation Type: Recorded (https://www.youtube.com/@cwusource5518)
Keywords: Communication, DND, Theories, Practice

Learning through Experiences: Japan Exchange Program

Rebekah Harrell
Project Mentor(s): Joshua Nelson-Ichido, PhD; Steve Cook
Studying abroad is a great way to experience concepts while also learning about them in the classroom. During the summer of 2023 I participated in a short-term study abroad program in Japan for 2 weeks. We traveled to Tokyo, Hiroshima, and Kyoto. During this program I experienced many intercultural communication situations and applied my knowledge from in-class instruction before traveling to Japan. This experience taught me a lot about myself, intercultural communication, and traveling abroad.
Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Study Abroad, Japan, Culture, Communication

Family Power: Shaping the Future of College Attendance

Rebekah Harrell
Project Mentor(s): Joshua Nelson-Ichido, PhD; Mark Meister, PhD
Family relationships come alongside complicated power dynamics. The parent-child relationship and birth order are key components of family structure. Power dynamics within family structures can have a significant impact on educational attainment. The literature review explores the current research surrounding birth order, parent-child relationships, power, and educational attainment. I am currently conducting research that explores why these concepts intertwine and work together. This ongoing research paper will analyze parent-child relationships, birth order, and power dynamics within a family and why those variables would impact educational attainment.
Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Communication, Family Dynamics, Power, Birth Order, Educational Attainment, Parent-Child Relationships

Uncertainty Reduction Theory

Isabel Hoehne
Project Mentor(s): Eun Young Lee, PhD

This paper is a collection of case studies exploring the application of Uncertainty Reduction Theory (URT) in diverse contexts to understand how individuals navigate uncertainty and its effects on behavior and decision-making. My first study examines Twitter's role in communication, focusing on the interaction between uncertainty and information propagation during crises. It introduces entropy as a new variable to measure tweet uncertainty, emphasizing how language and context influence the sharing and retweeting of disaster-related information. The second case study discusses the impact of gender stereotypes in the workplace, highlighting how violations of these stereotypes lead to backlash, particularly concerning behaviors linked to warmth. It presents the concept of relational uncertainty and how both men and women experience penalties or rewards based on their conformity to gender expectations. Finally, the third study applies URT to understand how users manage uncertainty in AI-generated sources, specifically focusing on ChatGPT in educational contexts. It demonstrates the effectiveness of uncertainty reduction strategies, including peer feedback, in mitigating concerns about transparency, accuracy, and privacy. Together, these studies unite URT's utility in navigating uncertainty across various domains, emphasizing its ongoing relevance in evolving scenarios such as social media, gender dynamics, and AI technology.

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: Uncertainty, Social Media, Interactions, Entropy, Gender

Kendrick Lamar and the American Game: An Application of Fantasy Theme Analysis

Alesandra A. Iriarte-Canales
Project Mentor(s): Eun Young Lee, PhD

Kendrick Lamar’s 2025 Super Bowl halftime performance goes beyond entertainment. Instead, it operates as a rhetorical act that critiques American power structures and systemic oppression. This paper applies Fantasy Theme rhetorical criticism to analyze Lamar’s performance and identify a rhetorical vision that shows American society the rigged ‘game’ controlled by privileged people in seats of power. The stage, a giant controller, alongside symbolic figures, choreography, and color, Lamar created a fantasy theme that chained out rapidly across social media. In my analysis, I argue that through staging, costuming, and the symbolic use of Uncle Sam as the ‘game’s’ narrator, Lamar illustrates how marginalized communities are forced to navigate a system designed to punish resistance and reward conformity. This analysis also delineates Lamar’s rhetorical strategies such as incorporation of code-switching and metaphors of control as class and race-coded imageries underscores the societal expectations expected of Black Americans. This analysis argues that Lamar’s performance constructs a rhetorical vision rooted in critique of power as well as the vision for empowerment of the unprivileged, encouraging viewers to examine their roles within American power systems. By applying Fantasy Theme rhetorical criticism alongside visual rhetoric, this study contributes to rhetorical research by illustrating how symbolic storytelling in music and performance constructs shared ideological visions that spark public discourse, challenge dominant social structures, and create persuasive, socially impactful messages. Ultimately, Lamar's halftime show functions as both a mirror and megaphone, reflecting the injustice people of color face while amplifying the call to challenge the status quo.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Rhetorical Vision, Privilege, Power, Critique, America

The CWU College Life Through the Eyes of a Student: My Contributions to The Observer

Hayley James

Project Mentor(s): Jennifer Green, PhD; Francesco Somaini, PhD

From April of 2024 until January of 2025, I wrote articles for CWU's print newspaper, The Observer. For The Observer, I wrote for the Scene section about what is happening in and around campus for the students, staff, faculty of Central, as well as the surrounding community. My focus was on covering what was important to the students, things like sporting events, art exhibits, school clubs, mental health, and how students experience Central and the college lifestyle.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)

Keywords: Media, Journalism, Sports, Clubs, Scene, Newspaper, Mental Health, Students

Navigating Financial Challenges: Strategies for Nonprofit Sustainability

Benita Jangala

Project Mentor(s): Mark Meister, PhD

Nonprofit organizations play a crucial role in local human service systems, bridging the gap between public assistance and economic self-sufficiency. Now, in the first quarter of 2025, with the new federal administration pushing for widespread cuts to federally administered assistance programs, the need for nonprofits is more critical than ever.

Sustainability in this environment requires a proactive approach to funding diversification, organizational capacity-building, and strategic planning. Nonprofits vary in size, structure, and access to resources: ranging from grassroots initiatives powered by volunteers and small donations to larger, more established organizations with broad support networks and long-term fundraising strategies. Grant writing plays a crucial role in this evolution, but not all organizations are equally prepared to navigate the complexities of funding applications and compliance requirements. By analyzing the grant-seeking and financial journeys of three nonprofits at different stages of maturity, this study offers insights into the challenges and strategies that facilitate financial growth and long-term impact.

This presentation examines how nonprofits at different stages of development approach financial viability, while touching on other factors for sustainability. Drawing on first-hand experience from internships at three organizations (a grassroots artists' lab with little administrative structure, a nonprofit performance company sustained by small local grants and affordable ticket sales, and a well-established Habitat for Humanity chapter with diverse funding sources), this presentation identifies key challenges and strategies for growth. It explores how organizations can transition from solely relying on individual passion to include consistent funding and administrative stability.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)

Keywords: Nonprofit, Grant Writing, Sustainability, Funding-Diversification, Capacity-Building, Organization

An Organizational Analysis of Disneyland

Alexander Joy, Anastasia Rothlisberger, Cooper Williams, Chloe Robertson, Christoph Belford
Project Mentor(s): Nicholas Temple, PhD; Mark Meister, PhD

Organizations have many processes that surround the day to day practices on the ground. Disneyland has an extensive sprawl of operations day in and day out, at every part of their park. We examine the day to day practices of Disneyland through the lenses of two important concepts within Organizational Communication, those being the Machine Metaphor, and Socialization processes. We examined artifacts, such as employee handbooks and onboarding and orientation packets that show the machine metaphor and different socialization processes in action, as well as utilizing relevant peer reviewed literature within the field to connect to the artifacts and synthesize a final conclusion to understand the organizations practices within the park and how they relate to the aforementioned concepts. Ultimately, our artifacts, literature and conclusion lead to recommendations for better organizational practices, those being more leniency on workers in terms of standardization to minimize employee burnout, while continuing the current socialization practices, as well as restructuring the outdated "Disney Look". This examination shows how organizations can be analyzed through a lens of communication, and applied to different concepts that relate to organizations, so as to synthesize recommendations for the organization, and bridge a gap between shortcomings within the organization.

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: Communication, Organizational Communication, Disneyland, Machine Metaphor, Socialization Processes

Shifting Narrative: Fantasy Theme Analysis of Kim Kardashian's Media Portayal

Olivia Kirsch
Project Mentor(s): Mark Meister, PhD

This presentation analyzes the shifting media portrayals of Kim Kardashian by focusing on three pivotal moments in her public life: the 2007 sex tape scandal, the launch of her KKW Beauty brand, and her involvement in criminal justice reform. Using Fantasy Theme Analysis (FTA) as the primary methodological approach, along with Kenneth Burke's theory of identification and Crenshaw's intersectionality theory, this analysis explores how Kardashian is alternately positioned as a protagonist and antagonist in media narratives. Coverage from prominent outlets such as *Forbes*, *CNN*, *The New York Times*, and *The New York Post* serves as the basis for examining how race, gender, and class influence public perception of Kardashian's evolving identity. These case studies demonstrate how the media constructs Kardashian's image in alignment with—or opposition to—dominant cultural values, including fame, entrepreneurship, and activism. Her transformation from a controversial celebrity to a self-made businesswoman and later to a social justice advocate reflects broader societal expectations of women in the public eye. This presentation illustrates how symbolic narratives influence collective understandings of celebrity and identity, and how media coverage serves as a powerful tool in shaping public discourse. Ultimately, the analysis underscores the complex ways in which intersectionality and media framing impact celebrity culture.

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: Rhetorical Criticism, Fantasy Theme, Communication, Analysis, Media Portrayal

Full Metal Jacket: The Sadness in Survival

Dax Kringle

Project Mentor(s): Eun Young Lee, PhD; Mark Meister, PhD

The hero narrative is prevalent in war movies. There is a singular hero who does something heroic when it comes to the movie. Stanley Kubrick's Full Metal Jacket is a look at the Vietnam War and how not every war movie has a hero. When you just need to survive there is nothing that makes you stick out more than the others. Needing to find meaning in a war sometimes its easier to understand the realities of what surviving means. It is not all glamours and when you are in a war a lot of the time your just another cog in the machine. You will find the heartbreak, depersonalization, and methods used by the marines to become a tool for your country. Looking through the aspects of war without a true hero can spark revelations that heroic war movies miss. By challenging this narrative, Kubrick presents a grim reality of war that rivals the narrative to encapsulate emotion, realism, and destruction that comes about in any war.

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)

Keywords: Rhetoric, Criticism, Narrative

How do Media Students get Their Media?

Devanee Lopez

Project Mentor(s): Mark Meiser, PhD

Media consumption habits have drastically evolved in the last decade, especially among students pursuing careers in media and journalism. This presentation explores how media students at Central Washington University engage with various platforms to stay informed and inspired, both academically and professionally. Drawing from a combination of surveys, interviews, and personal experience, this project highlights the primary sources students rely on—ranging from traditional news outlets and podcasts to social media platforms like X (formerly Twitter), Instagram, and TikTok. Additionally, the presentation will include an interview with Flystdesk, a campus advertising company, to better understand how targeted advertising and digital messaging influence what media students see and interact with daily. Special attention is given to how students differentiate between news for entertainment and news for information, and how their consumption habits influence their reporting styles, credibility standards, and career interests. With a background in sports journalism, student radio, and live broadcasting, I bring a firsthand perspective to understanding how emerging professionals in media are shaping and being shaped by the content they consume. The goal of this presentation is to contribute to the broader conversation on media literacy and adaptability in journalism education and to offer insight into how media programs can better prepare students for the shifting digital landscape.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)

Keywords: Media Literacy, Journalism Education, Student Media Habits, Social Media, News Consumption, Flystdesk, Advertising, Campus Media

Central Communication Agency

Hope Macduff

Project Mentor(s): Mark Meister, PhD

CCA stands for Central Communication Agency. This class is offered at Central Washington University. This class is under the communication department for any students that want to take the course. The class is student led and provides so many different opportunities for students to get hand on experience with working with clients. The mission of CCA is to foster a collaborative environment that encourages student growth, innovation, and success in the field of public relations. CCA aspires to advance the professional growth of CWU students and strong partnerships with local organizations. we aim to provide high-quality PR solutions that meet client needs and politely impact the community. I will be sharing about my experience with CCA and what the class has offered me. The experience I got working with a real-life client and helping a clothing brand grow. I will share about the different roles of the team and the clients we worked with. CCA has a lot of different services with we work and connect with all kinds of clients. Some of the ones we offer is media strategy, digital marketing, and social marketing. We use various media channels to achieve advertising and marketing goals for clients. Ensuring clear messaging across all social media platforms and campaigns. For social marketing we apply marketing strategies to thoroughly communicate client messaging to all audiences through changing consumer behavior. Central communication agency represents CWU, Ellensburg, and Kittitas County with all public relations needs. We aim to create a partnership with the community.

Presentation Type: Recorded (https://www.youtube.com/@cwusource5518)

Keywords: CCA Firm, Communication, Clients

Gilberto Martinez: Journey as a Public Relations Major

Gilberto J. Martinez

Project Mentor(s): Lindsey Myers, PhD

This presentation details my academic and practical development as a Public Relations major at Central Washington University. It will provide an overview of significant coursework, including **Intro and Advanced Public Relations Writing**, which honed my foundational writing abilities for the field, and **Global Public Relations**, which broadened my understanding of international communication practices. Furthermore, I will discuss my active participation in student media. As a writer for **Pulse Magazine**, I gained experience in journalistic writing and content creation. My role as an Account Executive and later as Firm Director for **Central Communication Agency**, our student-led PR firm, offered invaluable hands-on experience in client management, campaign development, and team leadership. This presentation will showcase the skills I have acquired through these diverse experiences and provide a comprehensive look into the opportunities available to Public Relations majors at CWU, supported by examples of my work.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)

Keywords: Public Relations, Communication, Journalism, Writing

Conflict Analysis: Examining How Power Dynamics and Leadership Styles, and Conflict Management Styles Influence Conflict

Emma Muhlbauer
Project Mentor(s): Joshua Nelson-Ichido, PhD

Conflicts can arise from even the smallest of disagreements. Conflict is frustrating, and many people believe that conflict is a negative taboo and prevents progress. Despite these misconceptions, conflicts can lead to growth and change. Power always plays a role in conflicts and is easily seen in a group setting. An example of power in a conflict could be status and power currencies. One's leadership style can impact goals; perceived incompatible goals are the primary sources of conflict. The conflict partners' conflict management styles can decide the structures of a conflict. Exploring conflict dynamics and examining personal conflicts allows for interpersonal growth and an understanding of the conflict partners' perspectives.

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: Conflict, Power, Leadership, Conflict Management Styles, Avoidance, Group Project

Study Abroad Japan Fall 2024

Brett Nunley, Alonzo Avila
Project Mentor(s): Steve Cook

From December 7th to December 22nd, our Intercultural Communications class from Central Washington University embarked an a trip to Japan to learn about the culture. The experience was memorable and is definitely recommended to students currently enrolled at CWU looking to satisfy general education credits for their degree program. I personally recommend traveling to Japan for anyone who's willing to experience a friendly, kind, and hospitable culture. Our class was there to take notes and reflect on what we learned during the quarter; we applied our knowledge and interacted with strangers who were extremely welcoming. We were in three different cities: Kyoto, Hiroshima, and Tokyo. During our time in each city, we went on excursions and were encouraged to explore each environment on our own. The language barrier was not a problem since we all had Google Translate to assist our communication and interactions with the locals. We went to UNESCO world heritage sites such as Kiyomizu and Byodoin Temples in Kyoto, Itsukushima Jinja Shrine on Miya-Jima island off the coast of Hiroshima, and Sensoji Temple in Tokyo. The scenery is extremely beautiful and filled with rich cultural history in the form of artwork as well as architecture. The kindness demonstrated by the people of Japan is humbling and it was an honor to have been a welcomed guest.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Byodoin Temple, Kyoto, Itsukushima Jinja Shrine, Hiroshima, Mt. Fuji, Tokyo

Low Context Anxiety Uncertainty Management In A High Context Culture

Brett Nunley, Alonzo Avila
Project Mentor(s): Josh Nelson-Ichido, PhD

When comparing cultures of the U.S.A and Japan; one must realize the significance of a high context culture and a low context culture when attempting to communicate efficiently. Japan is referred to as a high context culture where individuals don't necessarily go into grave detail. America, however, is a low context culture, where people prefer to be direct as opposed to indirectly. (The phrase "just give it to me straight" is common among Americans.) Failure to identify and recognize these distinctions before visiting a new country or encountering a different culture for the first time may result in ineffective communication followed by increased levels of uncertainty. The higher the level of uncertainty, one may feel a sense of unease; thus, inhibiting the person's ability to communicate due to social discomfort. This may result in a lack of desire to communicate or interact with people of the host country. The lower the level of uncertainty, the more likely anxiety is to increase. If the uncertainty is too high, one may begin to make assumptions and misinterpret the new cultural experience. However, if one can identify the characteristics of the new culture and manage uncertainty within a reasonable threshold; the experience should be a pleasant one. A misunderstanding can be disambiguated by comprehension of the context of which the other culture is speaking in. Effective and coherent communication is key for relationships to prosper. A trip to Japan can feel humbling from the honor of being welcomed through conversation with new people.

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: Anxiety Uncertainty Management, Low Context Culture, High Context Culture

NORTHMAN A Rhetorical Narrative Analysis

Henry Pitzer
Project Mentor(s): Eun Young Lee, PhD

This presentation analyzes how the History channels show "Vikings" portray the Norse culture and people in a romanticized way that shows a stereotypical modern view of Norse history while undermining the gritty and violent truth of the "Vikings". I will be comparing the TV show Vikings to the 2022 film "The Northmen" which was celebrated as a historical epic and praised for its historical accuracy and attention to detail on ancient Norse culture.

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: Rhetorical Narrative, Stereotyping, Norse History

EAN Holdings LLC. Organization Analysis as the Most Successful Car Rental Company

Ellena Takai
Project Mentor: Nicholas Temple, PhD

This organizational analysis explores EAN Holdings, LLC (parent company of Enterprise Rent-a-car, Alamo, and National car rentals) through the lens of organizational communication, employing the systems metaphor to understand the dynamic within the company and how Enterprise adapted to expanding and collaborating with other companies successfully. Using principles of hierarchical ordering and interdependence, the poster presentation will help understand and examine how EAN's structured yet adaptive communication flows support operational efficiency across its multilayered corporate and branch-level system. The analysis will also highlight how various subsystems, ranging from local rental branches to regional management and corporate headquarters, function in a coordinated manner, emphasizing the importance of a hierarchy system in communication. Furthermore, the poster will show an application of the cognitive model of decision making to explore how employees at different levels view information and make strategic choices. By viewing EAN Holdings as an open, responsive system, this poster shows how the combining structured decision-making processes and systems communication supports its reputation for high customer satisfaction. With my personal experience at one of the largest branches in Washington, I got to visualize all these aspects firsthand and will be more than capable to explain in depth information on this company using aspects and concepts I've learned from organization communication.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Systems Metaphor, Decision Making Process, Hierarchical Ordering, Interdependence, Cognitive Model

How My Little Pony Shapes Racial Attitudes: The Ideology of "White is Right"

Edith Vizcarra
Project Mentor(s): Eun Young Lee, PhD

This paper analyzes two exemplary episodes of My Little Pony: Friendship is Magic, the children's TV show aired on Discovery Family Channel (formerly known as the Hub) in 2011 and 2019 respectively. From a rhetorical criticism perspective, this analysis deploys ideology criticism to examine how races and cultures are presented in the show. Understanding the potential impact the media can have on children's ways to see the world, the following research question guided the analysis: How may these episodes shape racial attitudes in youth? This analysis unveils the ways in which these episodes reinforce the ideology of racial hierarchy through otherizing and the idea of assimilation.

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: Ideology, Racism, Race Coding, My Little Pony

Applying Foucault to “Fake News”

Nolan Watt
Project Mentor(s): Nicholas Temple, PhD

Present day politics have been ravaged by misinformation and genuine lies. Living in the age of information was hoped to be enlightening but may lead to our downfall due to confusion and the age-old paradigm of, if everything is so then nothing is so. The spread of the phrase “fake news” has led to a landscape where ill-informed individuals need not use critical thinking skills or evaluation when their perspective is presented with confounding information. A simple evoke of disbelief will stunt all progressive conversation and protect their ego. This and other factors have led to popular sentiment not acknowledging the power that is inherent in our use of language and someone who understood power very deeply was Foucault. Theories such as doctrine and discursive formations are helpful in explaining how “fake news” functions as a response and can give people the language that is necessary to fight back against what is arguably a faith based defense (in the sense of blindly accepting what is convenient and refusing to acknowledge that which is challenging). Ultimately you have to fight fire with fire so an intellectual approach on this front may further isolate those who are misinformed, discussions of recourse should keep this idea central and formulate simple and meaningful messages to combat misinformation.

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: Rhetorical Criticism, Power, Foucault, Politics

English

Legacy of Fantastical Writing, New Era’s rise

Hondo Acosta-Vega
Project Mentor(s): Ali Ünal, PhD

This project explores the remarkable legacy left behind by legendary fantasy writers, taking readers on an adventure through the imaginative worlds they created. From initial concept to the final written page, I’ve applied storytelling techniques from the works of authors such as J.R.R. Tolkien’ The Hobbit and Lord of the Rings, George R. Martin’s Fire and Blood, and Rick Riordan’s Percy Jackson and Roger Lancelyn Green’s King Arthur knights of the round table. By analyzing the work of these authors, I uncovered the magic, structure, and narrative techniques that make their stories so immersive and enduring. These writers didn’t just tell tales—they built entire universes, complete with rich histories, complex characters, and epic quests that have inspired generations of readers and writers alike. The goal of this project is to share and celebrate their stories, highlighting the qualities that elevate their work to legendary status. Through this deep dive into their narratives, I aim to understand what makes their writing so effective and influential. What are the elements that turn a fantasy novel into a timeless masterpiece? How do they construct worlds that feel both fantastical and real? This journey has not only deepened my appreciation for their genius but has also helped me discover my own voice as a fantasy author. By blending analysis with personal experience, I invite others to step into the world I’ve created—born from admiration and molded through careful study of the genre’s greatest minds. Enter my world of Pendragons.

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: Inspiration, Creative Writing, Dragons, Fantasy Writing, Idolization, Lineage, Literacy, Grammar, History, Expression, Medieval

The Semiotics of Disinformation on the Joe Rogan Experience

Jordan Cagle
Project Mentor(s): Dan Martin, PhD

The Joe Rogan Experience (JRE) is one of, if not the most, influential podcasts of all time. It has over two thousand episodes in its collection with hundreds of millions of views. It has come under fire in recent years for promoting disinformation and controversial topics (*On the Media)*. A list of the controversial topics include: COVID-19 misinformation, anti-vaccination sentiment, racist language (Colbjornsen). Despite this controversy it remains wildly popular, consistently finishing at or near the top of the podcast charts. It is important to understand how this podcast constructs meaning and knowledge then distributes this to its audience. How does the JRE disseminate disinformation so effectively? This project will use several different composition and rhetorical theories to map out the way that the Joe Rogan Experience is able to engage the audience and facilitate the spread of right-wing cultural touchstones. I will incorporate the work of semiotic modalities put forward by Bezemer and Kress and Cynthia Selfe to analyze the impact of sound, video, and environment on the perception of the audience. These semiotic modalities play a key role in the way that the audience receives and engages with disinformation. I will also examine Bawarshi's theory of genre and Gee's rules for learning and his theory of semiotic domains to examine how the host Joe Rogan interacts with the audience and facilitates audience interaction.

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: Misinformation, Disinformation, Semiotics, Multimodal, Genre, Podcast, Rhetoric, Composition, Ideology, Propaganda

Poetry and Empowerment in Islam

Stephanie Kerr
Project Mentor(s): Katharine Whitcomb

I will be presenting a creative performance in the form of a poetry reading. In this collection I hope to express the abundance of empowerment my religion, Islam, has given me. Before my conversion I, like many, believed some misconceptions about women in Islam but now I have gained confidence and discovered I am capable of more than I ever thought. In this community I have also met many Muslim women who feel the same sense of empowerment. I will be presenting six poems, four written in free verse, one in rhyming free verse, and one prose poem.

Presentation Type: Recorded (https://www.youtube.com/@cwusource5518)
Keywords: Poetry, Muslim Identity, Correcting Misconceptions, Feminism, Creative Performance

From Canterbury to the Conference: Chaucer's First 18 Lines Reborn

Charles X. Li, PhD; Tony Liang; Anika Saphiloff
Project Mentor: Charles X. Li, PhD

This presentation examines the phonological shift from Chaucerian Middle English to Modern English, focusing on the Great English Vowel Shift. Using the first 18 lines of Chaucer's *General Prologue* as a case study, the talk illustrates how vowel sounds in Middle English transitioned to those in Modern English. By analyzing specific words from these opening lines, the presentation demonstrates the vowel changes that marked the shift and their impact on pronunciation. It will conclude with a recitation of Chaucer's first 18 lines, intertwined line by line by their Modern English counterparts, offering a direct comparison between the sounds of Middle English and Modern English. This provides a clear, audible demonstration of how the Great English Vowel Shift shaped the English pronunciation over time.

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: Chaucer, Middle English, Great English Vowel Shift, Modern English, Pronunciation

From Old English Genitives to Modern English Possessives: Tracing Grammar Evolution Through Biogrammar and Grammatical Biology

Charles X. Li, PhD
Project Mentor: Charles X. Li, PhD

The presentation examines the linguistic evolution of the Old English plural and genitive forms--specifically the *-as*/*-es* mergers, his-genitives, and group-genitives--and their connection to the development of the Modern English plural -s and possessive –'s markers. By tracing these morphological shifts, the talk explores how these changes provide evidence for Grammatical Biology, illustrating grammar as an evolving biological system influenced by both genetics and cognitive functions. The analysis integrates the perspectives of Biogrammar, emphasizing how neural mechanisms (particularly in Broca's area and the FOXP2 gene) contribute to the processing of syntactic structures, and Grammatical Biology, focusing on the biological evolution of grammatical forms. The paper offers a bidirectional framework, linking neurobiological grammar processing and the evolution of grammatical structures as shaped by biological constraints, providing insights into the interaction between cognitive functions and language development.

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: Plural, Genitive, Possessive, Grammar Evolution, Biogrammar, Broca's Area, FOXP2, Grammatical Biology

Manastash Volume 35 Launch Party

Manastash Volume 35 Contributors
Project Mentor(s): Ali Ünal, PhD

Manastash is a student-run literary journal founded in 1990. Every year in May, an issue is printed presenting Central Washington University students' literary and visual work. Each year the journal revolves around a theme, and the theme for the 35th volume is Invisible Worlds. The theme is open to artist interpretation, and asks artists to explore the idea of realms of the unseen, the intangible, and the hidden aspects of existence, as well as the metaphysical, the subconscious, the supernatural, and the surreal parts of human experience. The journal features a collection of poems, fiction, short essays, and visual art.

Presentation Type: Live reading (May 14, 2:00pm–2:50pm, SURC Pit)
Keywords: Literary Art, Poetry, Prose, Visual Art, Fiction

Nathaniel Hawthorne's Scarlet Redemption

Zoe Prince
Project Mentor(s): Sarah Sillin

An oft misunderstood classic of literature, Nathaniel Hawthorne' *Scarlet Letter* tells the story of Hester Prynne, her minister and lover Arthur Dimmesdale, and their ruthless enemy, Roger Chillingworth. In the Puritan colony of Boston Massachusetts, 1642, Hester's child born out of wedlock earns her a scarlet letter, marking her forever as a flagrant sinner. In the midst of betrayal, shame, and superstition, Hester shines as an incredible testimony to fortitude. Though lauded as a beautiful romance, within the *Scarlet Letter* many readers miss the bitter musings of the author's narration, which constantly reproves the religious community while uplifting the object of their scorn, Hester. To Hawthorne, this is no mere historical fiction: it is a work of penance for a family fallen from grace. Hawthorne's *Scarlet Letter* is a compelling case for the art of close-reading as crucial for understanding, and should inspire readers to pull back the historical curtain, uncovering a dark and tragic history of men abusing their power. Drawing on his own culture's understanding of it, Hawthorne betrays a deep knowledge of and respect for the Bible, a book whose influence knew no bounds in the 1600s and 1800s alike. This context of biblical literacy lends a crucial lens through which to view Hawthorne's narrative: as a deeply symbolic magnum opus. *The Scarlet Letter* serves as the author's redemption for the sins of his brutally rigid Puritan forefathers through Hester Prynne, who redeems Hawthorne's name by exemplifying all the biblical attributes his ancestors had not.

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: American History, Religion, Literature, Close Reading

A Smear of the Quotidian: *Analyzing the Binary Hierarchy of Gender in Relationships through Four Contemporary Poets*

Sheila I. Richardson
Project Mentor(s): Katharine Whitcomb

In Western, Anglophonic culture, gender and sex are seen as a binary. The masculine and the feminine. Active and passive. Strong and weak. Queer theory, and cultures outside of the Western Anglophonic sphere, regard gender not as a binary but as a spectrum that does not align with factors like biological sex, sexuality, cultural identity, or existing power structures. However, Western Anglophonic literary culture continues to persist in adopting Gender as a foundational mythology. Using Caroline Levine's *Forms*, I will analyze the binary hierarchy of gender in sexual and romantic relationships told through a selection of poetry by four contemporary Western writers.

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: Queer Theory, Poetry and Poetics, Literary Criticism, Contemporary Poetry

Narrating the Other: Building Queer Worlds and Queer Communities

Sheila I. Richardson
Project Mentor(s): Maya Jewell Zeller

Worldbuilding is a foundational element of fiction. As a key piece in the construction of the narrative, worldbuilding is how writers construct an imaginary setting for their story to play out in. Speculative Fiction, such as Science Fiction and Fantasy, take worldbuilding quite literally. Authors of Speculative Fiction will create entire planets and civilizations that are worlds different than our own. Many of these worlds are based in Western histories and cultures, pulling from the familiarity Western readers will have of their own societies and histories, and they often rely on the foundational mythologies that Western Anglophonic society is built on — things like the gender binary, individualism, and the class structure. Queer worldbuilding is an intentional path towards creating the Other: a world that breaks away from the orthodoxy of Western society and engages community as the center of the universe. Building on a hierarchy of Creation, Geography, Population, and History, this presentation will walk the audience through creating a queer world through example and exercise using excerpts from authors such as Ursula K. Le Guin, Elizabeth Freeman, and Sheila Richardson's own work in progress novel.

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: Narratology, Queer Theory, Creative Writing, English Literature, Science Fiction, Fantasy

Literary Networks Everywhere: An Analysis of Literary Networks in Postmodern Poetry

Rachel Riffel
Project Mentor(s): Katharine Whitcomb

This paper explores the concept of literary discourse as a networked form, using Caroline Levine's theory of "networks" as expansive systems of meaning. Through the poetry of several postmodern poets and their texts such as Terrance Hayes' *American Sonnets for My Past and Future Assassin*, Anne Carson's *The Beauty of the Husband*, and Maggie Nelson's *Bluets*, this essay analyzes how contemporary poets use intertextuality, historical references, and classical forms not as rigid structures but as connective nodes in a broader literary web. These texts illustrate how poetry continues to participate in an evolving cultural and literary conversation that transcends time, geography, and genre to communicate common human experiences. Through this networked discourse, poets challenge hierarchical traditions and assert marginalized voices, while also engaging in an ongoing dialogue with the past. Literary networks provide a lens for understanding the interconnectivity of texts that perpetuate the enduring human desire to find meaning through shared cultural memory. This specialized discourse is foundational and expandable to the growing inclusivity of the literary canon and community.

Presentation Type: Recorded (https://www.youtube.com/@cwusource5518)
Keywords: Networks, Form, Postmodern, Poetry, Connection, Discourse

Reading Anne Brontë's Helen Huntingdon Through the Neurodivergent Lens

Kirsten Rohla
Project Mentor(s): James Seth, PhD

Representation matters, and it is a common practice to wonder whether the characters we read might reflect some aspect of ourselves, such as neurodivergence, regardless of when they were written. One such character is Helen Huntingdon, the protagonist in Anne Brontë's novel *The Tenant of Wildfell Hall*, published in 1848, who most closely aligns with autism spectrum disorder as it's described in the *Diagnostic and Statistical Manual of Mental Disorders, fifth edition* (DSM-5). This essay looks at primary source information in the form of letters written and interviews given by the family and friends of the Brontës, suggesting the prevalence of neurodivergence within the family, then compares those accounts with Helen Huntingdon's behavior and modern research on the heritability of autism and the plethora of traits within the DSM-5 diagnostic criteria. Though it is neither possible nor ethical to make a definite diagnosis on either the character or historical figures, it is possible to examine the plausibility. The primary purpose of this comprehensive view, then, is to explain how Anne Brontë would have been able to write such an authentic characterization of an autistic individual well before there was a name for the disorder, and to secondarily answer whether she had done so on purpose. An unintended result of this research also demonstrates historical evidence that counters the current perspective of some that neurodivergent characteristics are a modern contrivance.

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: Anne Brontë, *Tenant of Wildfell Hall*, Victorian, Autism, Neurodivergence, DSM-5

Dependency in Romantic Relationships: Bloom's Other in *Ulysses*

Lydia Smaciarz
Project Mentor(s): Christopher Schedler, PhD

James Joyce's *Ulysses* explores themes of love, grief, religion, culture, and identity while following the journey of Leopold Bloom, a husband and father who has a problematic sense of Self. Bloom's difficulty to find himself is prominently shown through his relationship with his wife, Molly, with whom he no longer has a healthy romantic relationship. Bloom reminisces on several memories with Molly which expose the reason for his lack of Self – his dependence on Molly. This presentation applies Jacques Lacan's concept of "The Mirror Stage" to Bloom's nostalgic memories of Molly in *Ulysses*. "The Mirror Stage" addresses the Self, the Other, and the Self's dependence on the Other to establish one's own being. In this case, Molly is Bloom's Other, and therefore, he relies on her for a whole sense of Self. The nostalgic episodes that Bloom has throughout the novel are not an escape to a more pleasurable time in his life, but rather a longing for a time where he had a firm sense of Self due to the conscious gaze of the Other, Molly. By the end of the novel Bloom has begun to detach himself from Molly and consequently regain a whole sense of Self without her consistent gaze. Exploring Molly as Bloom's mirror emphasizes that self-identity becomes problematic when there is excessive dependency in a romantic relationship.

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: Psychoanalysis, Literary Criticism, Identity, Relationships

History

“The Heroes Are the Ones We Left Behind:” Memories of World War II

Alicia Callahan
Project Mentor(s): Jason Knirck, PhD

As time continues to separate us from that of the “greatest generation,” the study of World War II memory proves critical in understanding whose story is remembered and passed down. Using the oral histories personally collected of twenty American veterans who served in either theater of World War II, their own memories are directly compared to what one may learn through media, school, or political speeches. Research includes nearly forgotten stories like American POW Wally King working with his German captors to escape the invading Soviet Union, the forgotten racism in the Pacific Theater as told through the eyes of Neal McCallum, and George Reitmeier’s experience at a displaced persons camp haunting him more than the sinking of his German-torpedoed ship, the S.S. Leopoldville.

The oral history of these men have proven that American World War II memory in the popular and public sphere (media and national leaders, respectively) has reduced the war to themes of bravery, patriotism, and duty for purposes of simplified entertainment or national unity in trying times. Consequently, while an attempt to honor veterans, the notion of the “greatest generation” has created such a narrow lens of WWII memory that veterans’ own stories have been forgotten due to their arduous experiences. The complex and harrowing memories of World War II veterans directly rival or complicate the accepted notion of fighting a “good war,” so their stories are neglected for their inability to further the notion of such.

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: World War II, Memory, Veterans, Military, History

Christain Science and Mesmerism: A Case Study

Natalie Hammill
Project Mentor(s): Daniel Herman, PhD

Most people in the United States are familiar with the denomination of Christianity known as Christian Scientists. What people are much less familiar with is the healing pseudoscience that helped inspire it: animal magnetism, also referred to as mesmerism. The main practitioners of Christian Science and mesmerism, Mary Baker Eddy and Phineas P. Quimby respectively, fall into a similar pattern, with one remembered and the other forgotten. The question therefore is why two similar movements went in such different directions. This essay posits that Mary Baker Eddy was able to popularize and permanently establish herself and Christian Science by combining her ideas with biblical ideology and forming an institution to support her. Quimby and his mesmerism lacked both factors, which led to their disappearance from the public consciousness. By exploring the history of Christian Science and mesmerism, this study hopes to find factors that lead to the rise and fall of new religious movements.

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: Religion, Religious History, Christianity, United States History

The “Problem of Motherhood”: State Policy and the Reality of Early Soviet Maternity

Danielle Hegarty
Project Mentor(s): Roxanne Easley, PhD

After the October Revolution of 1917, the new Bolshevik regime sought to reshape the lives of women, especially mothers, to fit the new socialist future. In line with Marxist thought, they attempted to draw mothers out of the home and into the public sphere. Through public work and reconnection with their “species being,” they sought to emancipate women from the gendered encumbrances of home, family, and maternity. Through legal reforms and social services, the Communist Party worked to relieve mothers of the double burden that divided their energies between public work and the home. Using legal documents, theoretical writings, Soviet publications, and personal accounts, this project assesses the theories and policies directed at women and the family and the objective realities faced by mothers in the Soviet Union in the decade after the revolution. It uncovers the impact of Soviet theory, policy, and practice on mothers’ experience of the socialist experiment, both positive and negative. The lives of mothers improved in terms of legal protections for working women and access to expanded state services, but the nation’s economic conditions and patriarchal traditions prevented many women from participating in this new vision of Soviet motherhood.

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: History, Soviet Russia, Women, Motherhood

African American Navigation of a Discriminatory Automotive Industry

Dylan Hollingsworth
Project Mentor(s): Lacy Ferrell, PhD

African American workers have struggled to achieve labor rights and recognition for over a century. The economic opportunities given to the Black community have been intentionally limited since the signing of the Emancipation Proclamation of 1863. Beginning around 1916, the Black community saw the doors of opportunity crack open in Detroit and other Northern cities. A resulting massive movement of people called the Great Migration saw thousands of African Americans migrating to the industrial North, fleeing the Jim Crow racism and lack of economic opportunity in the American South. One place that provided the Black community with greater opportunities was the Ford Motor Company in Detroit. Ford hired thousands of these newcomers, making him one of the largest employers of Black workers in the country. The Ford Motor Company provided limited opportunities that for some enabled upward mobility in an industry that seldom hired Black workers. However, many African Americans found their economic and social freedoms limited. There were divisions within the African American community about the benefits of these jobs and how they could improve their quality of life. However, what united the Black community in Detroit was the desire to create a better life for themselves and their families. Division within the community often stemmed from disagreements on how to capitalize on these new economic opportunities and navigate what could often be a hostile and racist industry.

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: African American Studies, Labor History, Race Relations, Automotive Industry, Ford Motor Company, The Great Migration

The Soviet Invasion of Afghanistan from a Russian Perspective

Emily Kissel
Project Mentor(s): Roxanne Easley, PhD

Soviet leadership presented the December 1979 Soviet invasion of Afghanistan as an essential action to protect national interests, maintain communism, and enforce the Brezhnev Doctrine. The occupation was first presented by Soviet officials as an act of "internationalist duty" to defend the faltering People's Democratic Party of Afghanistan (PDPA) against opposition to the revolution. Although there was some official and popular backing initially, the war exposed the USSR's true objectives, which included gaining access to more regional power. The Politburo and military were uneasy about the legitimacy of the war, as evidenced by internal papers and dissident voices like Anatoly Chernyaev and Colonel Tsagolov. Due to a lack of preparation for guerrilla warfare in Afghanistan's terrain, the struggle became significantly harsher and prolonged than anticipated. The Soviet population became more and more disillusioned as the number of victims increased and worldwide condemnation—especially from the United States—intensified. The lack of assistance and social stigma experienced by Afgantsy veterans upon their return from the war fueled rebellion at home. Gorbachev's perestroika and glasnost further revealed the war's shortcomings and damaged popular confidence in Soviet leadership. The Soviet Union's international reputation and internal unity were severely damaged by the war's political, economic, and human consequences. In the end, the war in Afghanistan represented the wider waning of Soviet authority and legitimacy, which directly led to the fall of the USSR in 1991. Now, most Russians view the invasion as an unnecessary intervention that sparked the collapse of the Soviet Union.

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: Soviet Union, Women, Domestic Policy, Foreign Policy, Economy, Oppression, Motherhood

The Battle of Moscow 1941

Allen McQuade
Project Mentor(s): Melissa Jordine, PhD

The German Army was diminished after the string of unbroken victories at the start of Operation Barbarossa. The loss of men and machines had become undeniable, and it sapped the offensive strength of their order of battle. The supply lines were at a breaking point and the underdeveloped road and rail system in Russia further exacerbated the problem. The diversion of strength to encircle and capture Kiev cost the Germans precious time before they could restart the offensive. The weather hindered the movement of men and machines and despite the protests of the commanding generals to high command, they were told to press on. The Russians faced the most mobile, technologically advanced army in the world. They were able to survive long enough to learn the lessons necessary to defeat the German strategy in the Battle of Moscow. It was steadfast leadership of Zhukov and his innovative tactics along with the unwavering Soviet civilian and soldier and their sacrifice that ultimately led the Red Army to victory. The Soviet Army was helped by the defense to the last man of many units, and gained the time necessary to complete defensive fortifications around Moscow. This also gave the Russians time to organize new reserve armies and to produce the much-needed equipment to turn to the offensive.

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: World War Two, Operation Barbarossa, Operation Typhoon, Eastern Front, Nazi, Soviet, Wehrmacht

Revealing the Legacy of Racially Restrictive Covenants in Yakima County

Camree Nilsen
Project Mentor(s): Josue Estrada, PhD

Since Fall of 2024, I have been working on a research project at the Washington State Archives, Central Branch, first as a volunteer, and now as an employee. Our focus for this project is uncovering racially restrictive covenants that historically discriminated against individuals who were not of the Caucasian race. While such covenants were used nationwide to marginalize communities of color, my research centers specifically on their impact in Yakima County during the mid-20th century. This work is part of a broader statewide initiative involving multiple institutions, including Central Washington University, the University of Washington, and Eastern Washington University. Our shared goal is to identify and document these restrictive covenants in order to raise public awareness about the depth and persistence of institutional racism in housing and land use practices. A key outcome of this work has been the establishment of the Covenants Homeownership Account Act, which seeks to provide reparative assistance to those still affected by the legacy of these policies. In my presentation, I will highlight findings from both residential neighborhoods and cemeteries, spaces that reveal how deep and pervasive these restrictions were. Though no longer legally enforceable, these covenants have left lasting generational harm. By confronting this history and its consequences, we can work toward meaningful restoration and justice.

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: Yakima County, Racially Restrictive Covenants, Mid-20th Century

The Allied Invasion of North Africa as the Precursor for the Liberation of Western Europe in World War II

Zach Rubino, Allen McQuade, Alicia Callahan
Project Mentor(s): Melissa Jordine, PhD

During WWII, 1942 marked the peak of Nazi Germany's military dominance and the limit of their expansion. Prior to The United States' entry into World War II in late 1941, Great Britain and the Soviet Union stood alone against the Nazi juggernaut and absorbed a massive number of casualties. The Soviet sacrifices did not go unnoticed by the Western Allies as they fastidiously prepared to invade Western Europe and relieve the beleaguered Red Army in the East. U.S. military planners were overly ambitious with their plans to invade Europe, as they were inexperienced and unprepared to take on the Germany in their current state. British military leaders convinced U.S. military planners that an ad-hoc invasion mainland Europe would be disastrous and set the Allies back significantly. It was decided to invade Vichy held French North Africa to give test the green American troops with their first combat experience in the European theater. The invasion code named Operation Torch, occurred on November 8, 1942 and was the largest invasion force assembled in recorded history until that time. The American and British troops that landed in Morrocco and Algeria were exerted with difficulties but managed to establish a beachhead and continued inland, aided by excellent weather and light resistance from a questionable French foe. The lessons learned from this invasion would be applied by Western Allied military planners towards their ultimate goal of invading Western Europe to reopen a second front against Nazi Germany and bring destruction to the Nazi regime.

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: Allies, Invasion, North Africa, Europe, World War II

Showdown at the Kremlin: Lenin and Stalin's Conflicting Opinion on Ethnic Incorporation into the Soviet Union

Caleena Wyman
Project Mentor(s): Roxanne Easley, PhD

The Bolshevik Revolution saw to an upheaval of culture, politics, and science in Russia. The multi-ethnic empire, spanning from the Baltic Sea to the Pacific Ocean, saw an opportunity to completely remake itself into a Marxist state. To solidify the people, and retain its massive population, the Bolsheviks needed to establish a way to recognize the ethnicities (nationalities) and incorporate them into the larger Soviet cultural apparatus. Vladimir Lenin's policies clashed with the desires of Joseph Stalin, the former wanting to entirely eliminate the Russian designation. Lenin's indigenization of national administration and regional autonomy ignored the Russian nationality entirely, hoping in turn that Great Russian Chauvinism would die alongside it. Instead, the omission of Russian as a nationality paved the way for Stalin to promote the Russian ethnicity as the ideal Soviet model. As the Bolsheviks established the federation of republics, the domestic policy increasingly pushed out the ethnicities, using "practical policy" as an excuse to oppress the people not falling in line with Stalinism as the Soviet Union approached World War II.

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: Soviet Union, Nationalities, Bolshevism, Domestic Policy, Culture, Lysenkoism, Great Russian Chauvinism

Music

Mariachi Del Centro, Festival

Eliasib Alvarado, Arturo A. Meza, Eunice Reyes Valdovinos
Project Mentor(s): Nikolas Caoile, DMA

The Mariachi Del Centro used the grant funding to attend the 25th annual Mariachi Northwest Festival in Wenatchee, Washington. It was held from March 26-29, 2025. This cultural event featured and highlighted student/professional performers at Wenatchee Highschool. Participation allowed the Mariachi Del Centro to connect with peers statewide, bettering their musical skills and cultural appreciation. Overall, the grant promoted cultural enrichment, education, and musicality for the students and their communities.

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: Culture, Community, Music, Representation, Pride, Performance, Tradition, Growth, Celebration, Opportunity

Personal Preference or a Matter of Reverence? A Discussion Around Changes in Liturgical Music Since Vatican II (Liturgical Music Changes Since Vatican II)

Kathryn Amdahl
Project Mentor(s): Mark Samples, PhD

Liturgical music in the Catholic Church has been a way for individuals to express reverence for God ever since the Church was founded around 2,000 years ago. Despite the intended purpose of reverence, liturgical music has also been a source of many personal opinions. When Vatican II was completed in 1963, drastic changes quickly took place in the church. Instruments such as percussion and electric guitar were now allowed, vernacular languages other than Latin were acceptable, and composers were given permission to compose in whatever manner reached congregations. These changes left many feeling like tradition was abandoned in favor of newer ideas.

In this presentation, I analyze two modern examples of these changes; I look at two "Glorias" from *Mass of St. Kilian* (2021) by Curtis Stephan and *Heritage Mass* (1978) by Owen Alstott to show that Vatican II changes had a significant effect on the sound of worship in the Catholic Church. I utilize *Sacrosanctum Concilium,* which is a primary source document published by the Second Vatican Council in 1963. This document presents the aforementioned sanctioned changes for the church to implement and understand. I argue that each of these modern Mass settings has a unique type of musical beauty which may be difficult for the pre-Vatican II Catholic generations to accept but is nonetheless acceptable and within the parameters of church documents and teaching.

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: Music, Catholicism, Vatican II, Liturgy, Religion, Music Analysis, Sacred Music

Premiering a Co-composed Piece for a Global Audience

Thomas Brain, Aidan Cadigan
Project Mentor(s): Jiyoun Chung, DMA

Valley of the Winds is a piano trio composed for flute, bassoon, and piano, inspired by the ever-present winds of Ellensburg— an elemental force that embodies a wide range of characteristics. Depending on the season and time of day, the Ellensburg wind can be playful, harsh, or gentle, and these qualities are captured across three cyclic movements, each representing a distinct season. Spring introduces blustering, unpredictable gusts that whip through trees with the energy of impending storms. Summer and fall follow with soft, calming breezes that drift through the fields, offering reprieve under the sun's heat. In contrast, winter brings stark, desolate winds that bite the skin and stir the quiet of snowy landscapes. We selected this unique instrumentation—two woodwinds and piano—to mimic the character of the wind, utilizing the flute and bassoon's contrasting timbres to explore a varied tonal palette. The cyclic form, with recurring themes and a return of the spring motive in the final movement, reflects the natural rhythm of seasonal change. This work represents a culmination of our studies at Central Washington University, where we have grown as composers through chamber writing, performance in ensembles, and mentorship from Dr. Jiyoun Chung and other faculty. Our experience has prepared us to share this piece at The Walden School, an opportunity we are deeply honored to pursue. To complement the premiere, we are creating a multimedia mood board that draws on poetry, photography, painting, and music to deepen the audience's connection with the work's natural and emotional landscape.

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: Contemporary Music, Music Composition, Networking

CWU Horn Club 2025 Northwest Horn Symposium Performance and Presentation

Julia McConnachie, Ellie Brower, Alec Chinnery, Quentin Chamberlain, Alex Coon, Chone Ewell, Jordyn Gribble, Lucy Jacky, Gabrielle Kosoff, Sadie Papp, Joshua Quintana, Lillian Record, Tori Seward, Jaeden Tellvik
Project Mentor(s): Jeffrey Snedeker, DMA

The CWU Horn Ensemble will give a performance featuring music for 14 CWU Horn Club members led by our director, Dr. Jeffrey Snedeker. This performance represents a concert that the ensemble performed at the Northwest Horn Symposium, a regional professional conference hosted by the Northwest Horn Society in April 2025 in Eugene, Oregon. The invited program includes a varied repertoire that stretches both the individuals and the ensemble as a whole. Our program contrasts with the programs of the past several years, which have focused on standard horn ensemble repertoire and experiences. The repertoire is diverse, but a common thread is that these pieces push the boundaries of what our ensemble can do. The program includes an assortment of Renaissance dance music, which is non-standard repertoire for horn ensemble; two pieces by the ensemble's director, Dr. Snedeker, that incorporate improvisation into a group setting: *Ostinati*, where ensemble members are challenged by improvising as a group, as accompaniment, and as soloists, and *Natural Horns,* a piece written for cow horn, ram horn, kudu horns, and conch shells; and concludes with an arrangement of Abreu's Latin jazz hit *Tico Tico* featuring two student soloists. The CWU Horn Club is grateful to have received grants from OUR and foundry10 to make the conference performance possible.

Presentation Type: Performance (May 14, 9:00am–4:00pm)
Keywords: Music, Performance, History, Improvisation

Archiving Donna E. Nylander Collection

Magnolia Wren Sandell
Project Mentor(s): Elizabeth Brown

In 1957 Donna Nylander (1930-2019) moved to Ellensburg, Washington, looking to dedicate herself to her most impassioned calling, education. She taught at Hebeler Elementary, Central Washington State College (soon to be Central Washington University), and was engaged in various civic activities around town. It was sometime in the early 1970's when she noticed there were very few groups and activities around town dedicated to children, especially concerning the dramatic arts, and thus in 1976 founded the Ellensburg Children's Musical Theatre (ECMT) in conjunction with the local Community Schools Program. She would end up putting on more than 20 plays from 1976 to 2015, and after her passing in 2019 many items and ephemera were donated to Ellensburg Public Library. Assembling these materials into a coherent collection relies on interpreting archival strategies to apply them to the specifics of this unique collection. This presentation will discuss applying that process to the Nylander collection donated to the Ellensburg Public Library, along with fascinating stories from her work. This collection is being processed and will be open to the public this spring.

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: Ellensburg, Washington State History, Kittitas, Children's Theatre, Archives

Philosophy and Religious Studies

An Ethical Failsafe for the Development of Moral Patiency in Artificial Intelligence

Abigail Goodell
Project Mentor(s): Gary Bartlett, PhD

In November of 2022, ChatGPT was released and introduced our population to what Large Language Models (LLMs) are capable of. ChatGPT, and more recently GPT-4, have demonstrated their ability to pass the Turing Test and become a more convincing imitation of human conversation by the day. Given the rapid growth of the AI industry in recent years, we must not get caught up in the excitement of progress and must think critically about the limitations we may need to place on AI's progress. We are unprepared should AI develop into technology we have a moral obligation to. Whether an AI can evolve into a moral patient remains to be seen; however, to continue to develop AI that may warrant moral status is highly unethical if we are unprepared or unwilling to fulfill any moral obligation we may owe to that AI. Should such restrictions upon AI growth fail to keep AI from warranting moral status, we must be prepared with a plan to fulfill our obligations to such moral patients, as there are a plethora of potential consequences we need to avoid. This ethical failsafe is a necessary precaution if we wish to continue on the path of AI development, as being caught unprepared could have devastating consequences to human lives or to developed moral patients.

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: Ethics, Artificial Intelligence (AI), Moral Patiency, Moral Obligation

Metametaphysics and a New Understanding of Objects

Adam Klausman
Project Mentor(s): Gary Bartlett, PhD

When making ontological claims, three distinct schools of thought emerge: realism, anti-realism and semi-realism. The realist will say that claims about objects are ontologically true, meaning that an assertion about an object is true if such an object exists in nature. An anti-realist believes that assertions about objects are not ontologically true, and their correctness is based on linguistics and tradition rather than ontological truth. However, both views have problems that make them unfavorable, with the realist having to explain the existence of macro-objects beyond human conception and an anti-realist having to explain the functionality of seemingly arbitrary linguistic correctness. While there is no clear answer, a compromise may be found in semi-realism, which holds that there is a vague and indeterminate overlap in ontological truth and correctness when making claims about objects. While this is seemingly an unsatisfactory answer, it can be demonstrated as the most logical and desirable viewpoint for humans to adopt when our linguistics is analyzed and taken into account. Furthermore, this viewpoint can be improved upon when our linguistics are analyzed and modified to further increase overlap between ontological truth and correctness.

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: Philosophy, Ontology, Metaphysics, Metametaphysics

Entheogenic Assistance in Dying (EAiD)

Asher Zachman
Project Mentor(s): Matthew Altman, PhD

Transformative experiences change us personally and epistemically. As the end of one's mortal story, death (as in the process of dying) is the ultimate transformative experience of one's life. Subultimate transformative experiences are characterized by their comparatively lesser effects on one's personality and beliefs, though they are still more final and significant than general transformative experiences. Despite important differences in connotation, the term entheogen (producer of inspiration by a god) is functionally synonymous with psychedelic (pertaining to the manifestation, visibility, and clarity of being—or *mind-altering*). Both of these terms refer to compounds that can induce an existential state known as ego death, ego loss, or ego dissolution when consumed in *heroic doses*. Following the second wave of the psychedelic renaissance, ego death as the subultimate transformative experience has once again become a theoretically available option for terminal patients suffering from existential crises. Coming alongside existing frameworks for end-of-life care such as palliative and hospice care, Entheogenic Assistance in Dying (EAiD) offers a unique medical pathway to addressing the existential elements of total pain that existing end-of-life methodologies do not sufficiently account for. In accordance with the right to healthcare, the right to revelation, and the State's responsibility to develop, terminal patients have the right to pursue Entheogenic Assistance in Dying (EAiD), and the State has an obligation to make this process safe and available.

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: Death, Medical Ethics, Transformative Experience

Theatre Arts

Dramaturgical Approaches to Watching for Sasquatch—An Environmental Play of Plays—Written by Ramón Esquivel

Marlin Absetz, Valerie Parra, Nautica Schoof, Hattie Tow
Project Mentor(s): Natashia Lindsey

When thinking of theater and the work it entails, most people think immediately of the actor, then they might go through the designers who create the lights, sounds, sets, costumes, and props, and maybe they get to the technicians that do a lot of the groundwork of these designs, but that's about where the layperson's knowledge ends. A dramaturg is an emerging role in theater that is not a designer or actor, but is still just as important. The dramaturg works in questions, and uses them to aid the playwright, the director, and the designers in making collaborative decisions that are in service of the play. Dramaturgy is also about creating generative discomfort, in which questions like 'Why this play here? Why now? What does this have to do with us?' are used in order to drive the creative process towards making a work that serves its community, not just entertains it. This project was a collaboration of four theater students doing dramaturgical work together for the first time. Because of the broad and far-reaching work dramaturgs do, dramaturgy is not easily defined as one thing, or not one thing. In this project, the dramaturgical work consisted of conducting and compiling research in order to gain further context on the play, and if this play were to be produced, that research and context would then be handed to the designers in order to inform the decisions that they make.

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: Dramaturgy, Theater Studies, New Play Dramaturgy, Emerging Playwright, Activist Theater, Environmentalism

Journey Into the Shadows: Rod Serling's *Twilight Zone,* its Creation, Impact, and Legacy

Aidan Beerbower
Project Mentor(s): Emily Rollie, PhD

Maybe you've heard people say, "it feels like we're living in *The Twilight Zone",* but what does that really mean? *The Twilight Zone* is an anthology television series aired on CBS from 1959 to 1964 and explored the fantasy, horror, and science fiction genres. Initially created in response to an ongoing battle between television writers and the networks/sponsors regarding censorship, *The Twilight Zone* received positive response in its initial run, but it really gained popularity later. With reruns beginning in 1961 (before the show had completed its run), a movie in 1983, three reboots (in 1985, 2002, and 2019), a theme park attraction in 1994, a play in 2017, and references sprinkled throughout pop culture, one thing is clear: people cannot get enough of *The Twilight Zone.* Despite all these iterations, I have noticed that many younger people are less familiar with *The Twilight Zone.* I love *The Twilight Zone,* and my goal with this project is to create an accessible, engaging space in which everyone can learn and talk about this show, especially if they've never seen it before. Building on my research into the show and its iconic creator, Rod Serling, I've created Journey into the Shadows, a social media series where I post videos sharing information gathered in my research and discussing key episodes of the classic *Twilight Zone.* This presentation will summarize my research and feature my videos to further share them with the world and to invite younger audiences to engage with this significant show.

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: Television, Pop Culture, Censorship, Social Media

How to Defy Gravity Like Elphaba, Sustainably!

Francesca Corso
Project Mentor(s): Emilly Rollie, PhD

Elphaba from the hit musical, Wicked, is thought to be one of the most challenging female characters to play on Broadway. The character requires an actor to perform for 2+ hours while belting (a particularly challenging technique) through 7 out of the 10 songs she sings, while running around the stage screaming, wearing hats that are 5 pounds, dresses that are 30 pounds and flying in the air- and for 8 performances a week, sometimes two in one day. My project examines how an actor is able to accomplish such feats while not hurting themselves, vocally, physically and mentally. I want to know specifically how these actors sustain the character over the course of 6 months or more. Using interviews with Actors who have played Elphaba in the past and present, in standby, understudy, and full-time roles. This presentation will summarize what I have learned from these actors and demonstrate how I have used their insight to create a resource for other aspiring actors sharing the tools these professional actors recommended and their advice for sustaining a professional career in the arts.

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: Sustainability, Wicked, Theatre, Performance, Broadway

Anti-Authoritarianism: The History of Jewish Comedy

Simon Quintero-Sallee

Project Mentor(s): Emily Rollie, PhD

Jewish people have dominated the American comedy scene since the mid-century; From standup, to stage performance, to screen acting. With Jewish people either immigrating to America for their safety, or surviving how they could in Europe, the diaspora grew, and Jewish comedy expanded and morphed through an American lens. In Germany and the surrounding countries, as Jewish people were placed in concentration camps, Jewish comedians within these camps and ghettos emerged. This created multiple versions of Jewish comedy—through an American lens, and through a European lens, through various other intersectional lenses of identity—The Self, The Community, The Religion. Under the third reich in the mid-century, Jewish people managed to use comedy to laugh amongst the devastation. As early 20th century German theatrical theorist Bertolt Brecht is quoted, "Will there be singing about the dark times? Yes, there will be singing—about the dark times." These comedians focused their material on the detriment of their situation and found that by 'poking fun' at *themselves*, they were able to essentially 'beat the Germans to the punch.' Jewish comedy is inherently anti-authoritarian in its approaches to humor and the ways in which it steals power back from the oppressor. How is Jewish comedy being used as an anti-authoritarian tool today just as it has been for thousands of years of Jewish survival? How do Jewish people continue to persevere through performance, and how can these students feel empowered to do the same?

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: Jewish History, Comedy, Authoritarianism, Performance Studies, Theatre

Dust

Simon Quintero-Sallee

Project Mentor(s): Emily Rollie, PhD

Clothes convey meaning, which often depends on the ways they're constructed, how they are "read" by an audience, and how they fit on our bodies. In theatre and performance, costumes are the clothes characters wear to convey their place in the world of the play, carefully created and curated to offer subtle messages to the audience about the character. Onstage and off, clothes communicate much about the wearer.

However, how do we also account for changes and transitions in the body or the wearer? What part do clothes play in that transition?

Dust is a forty-minute solo performance following a transguy as he navigates the complicated relationship between himself and his clothes. Set in his college bedroom, throughout the performance, he unpacks boxes full of clothes he's collected since high school as he discovers and evaluates his evolving relationship to femininity and the complicated history of the closet. This story first began for my Acting V course last year, where we studied solo-performance and how to use it as a tool to create theatre that *we* want to see. This performance has been workshopped for the better part of a year since that class, in an effort to share more diverse, complex, and authentic stories of the transgender experience. *Dust* invites an audience to witness how complicated the transgender experience can be, in a world where we are continuously being slotted into binaries and demonized by those who've never had to stand in their closet and wonder why we *are*.

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: Transgender Studies, Gender Studies, Performance, Masculinity, Femininity, Androgyny, Theatre, Solo Performance

Not Just Joy: The Significance of Inside Out and Inside Out 2 Through Performance

Cate Shelton-Jenck
Project Mentor(s): Emily Rollie, PhD

This project examines how *Inside Out* (2015) and *Inside Out 2* (2024) contribute to conversations around mental health and emotional development. Both of the films challenge the idea that emotions like anger, sadness, and anxiety are inherently negative. Instead, they frame these feelings as essential tools for processing life experiences and forming identity. Combining research and creative performance practices, this project explores how the *Inside Out* franchise empowers audiences, especially younger ones, to embrace emotional complexity. To explore this idea in creative practice, I have created a narrative solo performance inspired by the films' emotional philosophy and the creators' intent of making the films. The solo performance centers around a phone operator guiding a caller through a personal crisis. As the story unfolds, it becomes clear that the caller is actually the operator's younger self. Rather than retelling and recreating *Inside Out,* this solo performance uses comedic storytelling, physical movement, and theatrical design to build on the films' legacy, exploring how the emotions we hide may actually help us. It invites audiences to rethink emotional maturity, not as the absence of struggle, but as the ability to live alongside it.

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: Mental Health, Emotions, Performance, Storytelling

College of Business

The College of Business has presentations from the following departments and programs:

- Accounting
- Business Administration
- Economics

Accounting

A Study of Class Size and its Impact on Student Academic Performance at Central Washington University

Coleman Ortega
Project Mentor(s): Tennecia Dacass, PhD

Student performance is a metric of high interest for institutions of higher learning, though determining what factors influence student performance can be challenging. Many variables are linked to student success, with the university having varying control of these factors. One classroom variable under direct control of the university is class size, and there is a broad body of work examining its influence on student success. Academic research on class size has produced varying results; some studies correlate a smaller class size with better learning outcomes, while others have argued that class size alone does not significantly impact student performance. As enrollment rates continue to decline in recent years, CWU will likely be interested in increasing class sizes as a cost savings strategy. This not only allows for a greater number of students to be serviced by the school's existing faculty but may also reduce costs per student for the university. This project provides a descriptive analysis of the relationship between class size, class cap, and student performance using class GPA from Central Washington University. Though we are not able to make causal claim, this study highlights the potential factors influencing student performance and creates a good foundation for future causal discussions. Preliminary findings have shown a negative impact on GPA as class sizes rise at CWU, though the overall effect varies across academic college and campus. By understanding these relationships, CWU can look to provide an optimal learning environment for its students while maximizing use of its faculty and facilities.

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: Student Performance, Class Size, GPA

Business Administration

Increasing the All-Gender Restrooms Signage, Reducing Restroom Inequality

Liz Burt
Project Mentor(s): Susan Kaspari, PhD

Many individuals struggle when they are faced with using a gendered restroom, whether it be they feel uncomfortable or they don't want to label themselves by simply walking into a bathroom. CWU has taken steps in making these individuals more comfortable by including all-gender restrooms around campus, both single and multi-stall, however they are difficult to find. The all-gender restrooms are often located at the back of buildings, and some buildings don't have all-gender restrooms at all. To help improve the ability to locate the all-gender restrooms, signs with a QR code to the campus map will be placed on these signs near the gendered restrooms to help people better locate the all-gender restrooms across campus. People can scan this QR code to pull up the map which will show them the CWU campus and where each all-gender restroom is located across the entire campus. The map updates to now include all the all-gender restrooms on campus to the map will make it a much smoother process to locate each restroom on campus. The information on the map includes the floor and room number of each restroom and the icon on the map shows the general location in each building. All these changes create a safer and more comfortable environment for our students, faculty, and visitors that helps foster a more diverse community.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Diverse, All-Gender, Reducing Inequality

Improving Efficiency at a Fruit Processing Warehouse

Olaf Camacho
Project Mentor(s): Ana Tonseth

I collaborated with a team on a process improvement project at a warehouse, aiming to reduce incorrect pallet shipments of product, reduce order picking times, develop a Standard Operating Procedure (SOP), and create an implementation plan. We used the Lean Six Sigma methodology to develop our project. We broke down the project in 5 phases. In the first phase, **Define**, we created a problem statement to help us understand the problem we were trying to solve, we concluded that order inaccuracy and slow processing times were causing shipping delays and customer dissatisfaction. We diagram a process map to identify the workflow, value and waste in the process. In the second phase, we **Measured** the issue. We gathered data by observing the receiving and shipping operations, focusing on how pallets were moved through the warehouse. Once we captured the data, we **Analyze**d it, by performing a root cause analysis using the 5 Whys and a Fishbone Diagram. Then we moved onto the **Improve** phase, we proposed and tested countermeasures and redesigned the process. We compared the new process map and timing against the original to confirm improvements. Finally, in the **Control** phase, we introduced follow-up packets and checklists to ensure the new process became a part of daily operations. The project successfully reduced both incorrect shipments and order picking times, while establishing a sustainable standard for future operations.

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: Process Improvement, Efficiency, Low Customer Satisfaction

Economics

Gaze Aversion: Door Placement's Effect on Classroom Attendance

Hayden Hobbick
Project Mentor(s): David Zuckerman, PhD

Choice architecture is everywhere and unavoidable; unsuspecting inputs can have subtle but meaningful impacts on everyday decisions. One such factor is classroom door placement; a door positioned at the front versus the back of the classroom leads to very different experiences for a student entering a few minutes late. This experiment investigates whether door placement affects student attendance patterns at Central Washington University. To answer this question, we collect attendance data from faculty across several different departments, professors, and buildings for the duration of the 2024-2025 CWU Winter Quarter. We match attendance records with data on classroom door placement. Using linear regression analysis, we test for the impact of door placement on classroom attendance and late arrivals, controlling for several course-specific factors (e.g., class attendance policy, whether the class is upper- or lower-level, number of credits, time of day, etc.).

If a correlation is found between door placement and attendance patterns, it would highlight the role of an overlooked environmental design factor in shaping career and academic success. Conclusive evidence could also help inform classroom design aimed at improving attendance. Additionally, the findings would provide insight into how students behave under the combined factors of reputational concerns and the gaze of their peers.

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: Economics, Behavioral Economics, Psychology, Choice Architecture, Classroom Design

Empirical Analysis of 2024 ESG Scores in S&P 500 Companies

Kaelan Kavanaugh, Erdenetuya Batgerel
Project Mentor(s): Toni Sipic, PhD

In recent years, Environmental, Social, and Governance (ESG) factors have emerged as critical metrics for evaluating corporate performance beyond the traditional financial indicators. This shift reflects a growing recognition among investors, consumers, and regulators that long-term business success is linked to responsible environmental practices, ethical governance, and positive social contributions (Deloitte, 2023). The rise of ESG values have been accompanied by the development of sophisticated rating systems, such as the S&P ESG scores, which provide numerical assessments of company performance across key dimensions. These scores offer a comprehensive framework for analyzing corporate behavior, encompassing an overall ESG score, as well as specific scores for environmental and social performance. By leveraging these metrics, stakeholders can gain deeper insights into how companies align with sustainability goals and societal expectations (S&P Global, 2023). This research project aims to investigate the increasing importance ESG factors by analyzing S&P ESG ratings data for companies operating in the United States. The study will specifically focus on three critical dimensions of ESG performance: the overall ESG score, the social score, and the environmental score. Furthermore, the research will explore potential relationships between ESG scores and other relevant variables, such as industry sectors, year founded, and state-specific capabilities, along with the underlying factors influencing these relationships.

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: ESG, Economics, Business, Sustainability

Student Price Index: A Recalculation of Weights Using Updated Student Expenditure Data

Ryder Moss, Ian Seibel
Project Mentor(s): David Zuckerman, PhD; Yurim Lee, PhD

Our project analyzes student spending patterns at Central Washington University using data from a Fall 2024 student expenditure survey. With 404 participants, this survey provides insight into how students allocate their budgets across categories such as groceries, transportation, housing, and other essentials. The results are used to determine updated category weights for the CWU Student Price Index (SPI), which measures changes in the cost of living for students in Ellensburg over time. This project is the continuation of the existing SPI project that has been going on for several years. Understanding these spending patterns helps assess affordability issues students face and provides a localized measure of inflation specific to their experiences. Additionally, we compare student expenditure patterns to national spending trends to highlight differences in cost structures and priorities. This research offers an important tool for tracking student financial well-being and contributes to broader discussions on the cost of living for college students.

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: Survey Analysis, Spending Habits, Price Index, Inflation

Central Washington University Student Price Index Project 2024

Amneet Pawar, Cole Smith, Yurim Lee, PhD

Project Mentor(s): Yurim Lee, PhD

The Student Price Index (SPI) project at Central Washington University (CWU) provides a student-focused measure of inflation by tracking the cost of living for college students in Ellensburg, Washington. Unlike traditional consumer price indices, the SPI is based on data collected through campus-wide student expenditure surveys, enabling the creation of a tailored basket of goods that reflects the unique spending habits of CWU students. Items tracked in the SPI include groceries, tuition, school supplies, recreation, transportation, housing, and internet costs, with monthly price collection and ongoing adjustments to basket weights to ensure accuracy. Based on the data collected for 2024, both coffee and gasoline showed significant volatility, highlighting their importance in the overall cost of living for students. Coffee prices experienced consistent inflation throughout the year, with annual inflation reaching its peak at 38.82% in May 2024. This steep increase reflects the growing financial burden on students for this essential item, especially as monthly inflation surged by 4.68% in August 2024. The consistent rise underscores the increasing cost of discretionary goods in the student price basket. Gasoline prices demonstrated more erratic trends, with sharp fluctuations throughout the year. Annual inflation rates plummeted by 42.35% in September and October, following a striking mid-year spike, where March 2024 saw an annual inflation of 11.34%. Monthly inflation mirrored this volatility, peaking at 10.47% in February but dropping dramatically by May (-35.11%). These trends in coffee and gasoline prices provide valuable insights into the fluctuating cost burdens faced by students.

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)

Keywords: Inflation, Gas, Coffee, Prices Increasing, Supply and Demand

Board Diversity and Corporate Digital Inclusion: Assessing the Impact of Governance Heterogeneity on Narrowing the Digital Divide

Bobi Vladimirov

Project Mentor(s): Toni Sipic, PhD

Digital inclusion is increasingly recognized as a critical dimension of corporate social responsibility. Yet, the role of board-level diversity in shaping company-led efforts to bridge digital divides remains underexplored. This study investigates whether demographic and experiential diversity on corporate boards influences the scope and effectiveness of digital inclusion initiatives, particularly in regions with historically low access to technology. Drawing on a global sample of more than 200 publicly traded firms across multiple sectors, we merge board composition data (gender, nationality, and professional background heterogeneity) with firms' Environmental, Social, and Governance (ESG) scores and detailed digital inclusion metrics—such as investments in infrastructure for underserved communities, training programs to build digital literacy. We employ multivariate regression and propensity-score matching techniques to isolate the impact of board diversity from confounding factors, including firm size, industry, and overall ESG performance. Preliminary results suggest that companies with more diverse boards allocate significantly greater resources toward universal access projects and digital skills development, and they report narrower gaps in connectivity in low-access regions. These findings highlight the importance of inclusive governance structures for fostering corporate strategies that "leave no one behind," and they offer actionable insights for policymakers and investors aiming to promote equitable digital transformation worldwide.

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)

Keywords: Board Diversity, Digital Inclusion, Governance Heterogeneity, Digital Divide, ESG Metrics, Corporate Social Responsibility, Connectivity Gaps, Digital Literacy, Inclusive Governance

College of Education and Professional Studies

The College of Education and Professional Studies has presentations from the following departments and programs:

- Aviation
- Curriculum, Supervision, and Educational Leadership
  - Accessibility & Disability Studies
- Engineering Technologies, Safety, and Construction
- Family and Consumer Sciences
  - Apparels, Textiles, and Merchandising (ATM)
  - Child Development and Family Science
  - Hospitality, Tourism, and Event Management
- Health Sciences
  - Clinical Physiology
  - Nutrition
- Information Technology Management
- Military Science
- Sport and Movement Studies

Aviation

Language, Discourse, and Identity Kits in the CWU Aviation Program

Audrey Reid
Project Mentor(s): Paul Martin, PhD
In this SOURCE presentation, I will examine how the CWU aviation program is a discourse community and discuss what an identity kit looks like in the CWU aviation community. According to John Swales, a discourse community has a specific objective, intercommunication tools, genres, participatory mechanisms, jargon, and processes for training novices and and gaining expertise. James Gee defines an identity kit as "the appropriate costume and instructions on how to act, talk, and often write" for a particular community. The identity kit for aviation requires knowing specific languages and behaviors and valuing things like safety, reputation, competency and respect. In this presentation, I will examine each of the six characteristics for a discourse community in the CWU aviation program and outline the characteristics and importance of our “identity kits.”
Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: Aviation, Discourse Community, Identity Kit, Language, Writing, Behavior

Curriculum, Supervision, and Educational Leadership

Accessibility & Disability Studies

Navigating Accessibility: Evaluating Airline's Websites for Accessibility Compliance in Canada and the U.S.

Hannah Davis
Project Mentor(s): Naomi J. Petersen, PhD
This project examines the accessibility standards of major airlines operating in the United States and Canada, focusing on how effectively they describe and publicly advertise their accessibility services. Specifically, it evaluates whether airlines meet, exceed, or fall short of the minimum requirements established by airline regulators and the Americans with Disabilities Act. Airlines are required – at baseline - to meet minimum standards that support passengers with disabilities in a dynamic and ever changing environment. Given the variability of airline service models (like full service on one end to ultra low cost on the other), expectations may not always be clear from the consumer (travelling public) perspective because of the range of service offered by the industry. This paper will look at airline’s websites and investigate if their publicly facing accessibility resources are transparently meeting industry minimum standards and best practices.
Presentation Type: Recorded (https://www.youtube.com/@cwusource5518)
Keywords: Aviation Accessibility, ADA, Airline Regulations and Compliance

Apparel for All: How Adaptive Fashion can Create an Inclusive and Accessible Society

Dylan Gilbert
Project Mentor(s): Naomi Petersen, PhD

The fashion industry, long celebrated for its innovation and artistry, has historically overlooked the needs of people with disabilities—contributing to a lack of access to clothing that is both functional and expressive. This research investigates the social and systemic consequences of that neglect, such as isolation, financial hardship, and reduced autonomy. At the same time, it highlights emerging efforts to close this gap through inclusive design and adaptive technologies. Drawing from interdisciplinary literature and the voices of disability advocates, the study explores how innovations like RFID-enabled tags, Braille labeling, and augmented reality fitting tools are reshaping how disabled consumers interact with fashion.

Yet the issue extends beyond technological fixes. A truly inclusive fashion industry requires a deeper cultural shift—one that begins with education. Through project-based learning, future designers can gain hands-on experience in understanding and addressing the diverse needs of wearers, moving beyond performative inclusion toward meaningful representation. This research argues for a multi-faceted approach: one that includes increased government support, collaborative design practices, and industry-wide accountability. By embracing these changes, fashion can evolve into a platform that empowers all bodies and identities—not just a privileged few.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Adaptive Fashion, Inclusive Design, Assistive Technology

Learning About the Term Visitability, by Using the Video Game SIMS

Angela Kyle
Project Mentor(s): Lynn Swedberg

What is visitability; and can I use this knowledge in my life today? You can! I will present three tiers of ways you can create an accessible and visitable space in your home. Each tier will increase the value of your home as a homeowner. As a renter, you lack the ownership to make changes to the property; however, you have control over your furniture placement. In the video game SIMS, you can create a home, set up furniture and appliances, and move items around within your living space to create your ideal virtual home. I am asking: how can you make your living space more inclusive for others, today? Learn about choices you may want to consider when it is time to purchase a home that you may not have considered. Learn how to be more inclusive and have a living space that is ready for whoever knocks on your door (check the peephole first).

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Visitability, Accessibility, Inclusivity, SIMS Video Game, Virtual

Engineering Technologies, Safety, and Construction

LumiLink

Anela Apuhin

Project Mentor(s): Lad Holden

In this project, a multi-wireless communication system was developed using Bluetooth Low Energy (BLE) and ESP32 microcontrollers to create an interactive game. The objective was to design a system where multiple ESP32 devices communicate wirelessly, controlling LED indicators that light up randomly. Players compete to deactivate the LEDs as quickly as possible, demonstrating real-time responsiveness and efficient communication between microcontrollers.

The system was implemented using a central ESP32 microcontroller that acts as a coordinator, managing communication with 3-4 peripheral ESP32 devices. BLE technology was chosen for its low power consumption and ability to facilitate reliable short-range communication. Custom firmware was developed to establish connections, send commands, and process user interactions.

Testing involved evaluating the latency of BLE transmissions, power efficiency, and the accuracy of event synchronization between devices. Results indicated that the system successfully maintained low-latency communication, with response times suitable for real-time gaming applications. The project highlights the feasibility of BLE in interactive multi-device applications and provides a foundation for further improvements, such as expanding the network size or integrating additional sensors for enhanced gameplay.

This work demonstrates the potential of wireless microcontroller networks in interactive applications, offering insights into BLE's capabilities and limitations. Future innovations may explore optimizing communication protocols or adapting the system for different use cases beyond gaming.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)

Keywords: Bluetooth, Embedded Systems, Microcontroller, Multi-Wireless Communication, Technology

Attendify

Carson Biermanski
Project Mentor(s): Lad Holden

Currently, the process for attendance taking limits the time that would be better spent on engagement in learning activities. Streamlining this process would allow teachers to focus on delivering quality education and improving student learning outcomes. This project will automate the attendance taking process by implementing both an RFID and an IR sensor for detecting the ID value of a student. When a student enters the attendance taking zone, designated by an IR sensor, the RFID sensor will automatically record the tag value on their CWU ID.

The project uses an Explorer 16/32 Development Board with a PIC24FJ128GA010 microprocessor to communicate with both the MIKROE 1434 RFID Click Board and MIKROE Proximity 2 Click Board. These Click Boards are installed on the MikroBus headers found onboard the Explorer 16/32. The 1434 communicates with the microprocessor through the SPI communication protocol and the Proximity 2 communicates through the I2C communication protocol.

This data has many uses, including attendance and participation grading, as well as long term data analysis. By implementing this product into the classroom, it will offer several advantages. Firstly, the need for manual attendance taking will be removed, allowing educators to focus on providing quality education. In addition, it will provide increased security by removing the possibility of proxy attendance in many cases. Finally, the digital records will allow teachers to conduct analysis of attendance data. Ultimately, this project will provide classrooms with fast and reliable automation of attendance taking procedures, making the classroom environment more efficient and organized.

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: RFID, IR, SPI, I2C, C, Microprocessor, Attendance, Optimization

Automatic Transfer Solutions

Alarick Blankenship
Project Mentor(s): Lad Holden

An automatic transfer switch (ATS) is an essential device used in electrical power systems to ensure uninterrupted power supply by automatically transferring load from a primary source of power to a generator or another backup source of power. The ATS system monitors the incoming voltage on the primary source using a current sensor transformer. When the sensor detects loss of power or instability on the line it will shut off the primary source and switch to the secondary source. The system will continue to monitor the primary source of power until it has been restored, once the primary source is ready the ATS will once again perform a switch, turning off the secondary source and moving the load back to the primary source. This transition is as seamless as possible to minimize downtime and protect sensitive equipment. My ATS system incorporates a microcontroller system and relays to facilitate the logic required for the switch to function. The goal of the system is to improve efficiency by minimizing manual intervention and providing safe energy metering and management system.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Automatic Transfer Switch, Microcontroller, Energy Metering, Uninterrupted Power

TCP/IP Integration for Advanced Microprocessors Labs

Jacob Boswell
Project Mentor(s): Lad Holden, Jeff Wilcox

This project provides a practical guide for developing a custom Ethernet TCP/IP device using Microchip hardware and software tools. By leveraging the PIC32MX microcontroller and the LAN8470 PHY daughterboard, developers can implement core Internet protocols such as ARP, ICMP, TCP, and HTTP to enable network communication. Utilizing Microchip's MPLAB X IDE and Harmony framework, this design outlines how to configure the TCP/IP stack and integrate applications like DHCP for device discovery. The project walks through the process of hardware and firmware setup necessary to bring the PIC32MX based microcontroller online to allow for internet-based protocols such as HTTP to function. This device will use network initialization and IP acquisition, this implementation demonstrates how embedded systems can host HTTP services and become visible on LAN (local area networks). Whether you're building a smart sensor, industrial network, or learning embedded networking, this guide demonstrates a method for embedding TCP/IP functionality into the PIC32MX microcontrollers using Microchip solutions.

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: LAN, TCP/IP, Ethernet, HTTP, Internet, Microchip

Air Quality Monitor and SMART Plug

Hayden Burger
Project Mentor(s): Lad Holden

I have created a device that monitors the quality of ambient air and displays a current air quality status. Additionally, if poor air quality is detected the device automatically energizes an outlet to turn on a fan or vent dependent on the application of the device. This device utilizes a Microcontroller specifically, a PIC24FJ64GU205 Chip to convert the returned values of a series of Air Quality sensors, displaying the values on an LCD display as well as engaging a relay when poor air is detected. This project consists of transforming 120 volt Alternating Current wall power to three usable Direct current voltages 12 Vdc, 5 Vdc, and 3.3 Vdc to ensure proper function of its components. The Air quality sensors monitor the ambient air for common pollutants such as Volatile Organic Compounds, Hazardous Gasses, and the presence of smoke. This device is intended for both home and laboratory applications to ensure that any person utilizing this device is not exposed to harmful ambient air.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Air Quality, Electronics, Microprocessors, Automation, Instrumentation, AQI Sensors, Relays, Transformers, Volatile Organic Compounds (VOCs), Home and Laboratory Applications

AuraLock: A Bluetooth Low Energy Smart Lock System

Christopher Covés
Project Mentor(s): Lad Holden, Jeff Wilcox

The AuraLock is a secure, wireless smart lock system that utilizes Bluetooth Low Energy (BLE) technology to create an intelligent, proximity-based access control solution. Designed around a PIC24FJ128GA010 microcontroller and integrated with the RN4020 and RN4870 Bluetooth modules. The AuraLock communicates with a custom key fob, called OmniKey, using BLE's low-power protocol. The system operates by scanning for unique device identifiers (UUIDs) and assessing signal strength (RSSI) to determine the proximity of an authorized user. Once authenticated, it triggers a mechanical unlocking mechanism using DC motors. This project showcases BLE's advantages, including low energy consumption and secure short-range communication. It also supports profile-based configurations for personalized house control settings, making it adaptable to individual user preferences. This abstract outlines the design, implementation, and real-world use cases of AuraLock, demonstrating BLE's role in modern, secure, and energy-efficient smart home devices.

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: Bluetooth Low Energy, Smart Lock, Embedded Systems, Proximity Detection, IoT

USB Communication Microcontroller Labs

Trevor Davis
Project Mentor(s): Lad Holden

In its current form, the communication protocol labs for Advanced Microcontrollers have not been updated to the latest iteration of Microchip Technology's development software MPLABx and Harmony. This project is aimed to give students the ability to create their own USB HID (Human Interface Device) devices using the tools and resources available through the Electronics Engineering Technology department. As a byproduct of revamping the labs to current software, students will also get experience with the latest hardware available through Microchip, specifically making use of the Curiosity 2.0 Board which utilizes the PIC32MZEFM144 Microcontroller. By modernizing and updating these labs, students gain practical, hands-on experience with embedded systems development while utilizing industry standard tools. The outcome of this project offers an improved educational experience and prepares students for practices used in the industry.

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: Microcontroller, USB, Communication, Education, HID

RC Baja Suspension and Steering

Slade Edwards, Cody Enloe
Project Mentor(s): Charles Pringle, PE; John Choi, PhD

The objective of this project is to design and build a functioning RC car that can compete in the RC Baja competition. The project was split between two people; however, this paper will mainly focus on the suspension and steering part of the car. The car will be tested and compete in competitions like slalom, sprint, and baja. These challenges test the speed, turning, and handling on rough and flat terrain. To determine the design decisions multiple matrices were produced along with several analyses completed to ensure that structural parts have correct dimensions and that the correct materials were selected. The drop test and Baja race will both be tests on suspension and steering handling. The sprint is based on the fastest straight-line travel. So, the car successfully completed multiple 40ft runs while at 15mph with a 5in deviation. The slalom is similar to the sprint but focuses more on the turning and handling of the car. The car passed several tests allowing it to turn 180 degrees in 10in. To guarantee success in the design, the control arms material and deflection tests were done, which resulted in the arms not deflecting more than 1/36in while under a 5lb horizontal load. Lastly, to support the car during the Baja race the suspension completed many tests so that it doesn't deflect more than an inch while dropped from 2ft. All requirements, analysis, design matrices are made to ensure project success.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Suspension, Steering, Baja, Slalom, Sprint, Analysis, Decision Matrices, Test

RC Baja Chassis and Drivetrain

Cody Enloe, Slade Edwards
Project Mentor(s): Charles Pringle, PE; John Choi, PhD

The objective of this project is to design and construct a drivetrain and chassis for an RC Baja car alongside the partnering project "RC Baja" by Slade Edwards which is responsible for the steering and suspension. The drive train must reliably propel the vehicle to speeds that allow it to be competitive in baja competitions and the chassis must protect and provide mounting structures for the various onboard systems. Together the systems must remain lightweight and allow for the vehicle to be highly maneuverable. To determine critical materials, manufacturing methods, and noncritical materials, decision matrices were used to compare various methods. Critical dimensions of the chassis and drivetrain were developed using various static analysis methods. Iterations of designs were modeled in SolidWorks to determine necessary geometry ensuring compatibility between all systems. The project resulted in a vehicle with a system of compatible sub-assemblies that together create a capable off road baja car. The decision matrices resulted in a critical material selection of 6061 T6 aluminum for the chassis, a main manufacturing method of milling for the chassis, and a non-critical material choice of PLA+ for various components. The vehicle was able to accelerate to 15 meters per second in an average of 5 seconds. The chassis deflected 0.4 centimeters when dropped from a height of 60 centimeters. The front bumper was able to deflect 2.4 centimeters resulting in energy absorption of 20%. These results were successful as they are within the limits specified by the project requirements.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Drivetrain, Chassis, Baja, RC, Protect, Reliably

RC Baja Drivetrain & Chassis

Trevor Finnern, Devin Mooney
Project Mentor(s): Bill Reichlin; Charles Pringle, PE; John Choi, PhD

The objective of this project is to design a drivetrain and chassis for a Radio-Controlled Baja Car using skills acquired in the Mechanical Engineering Technologies curriculum. The vehicle has been designed with a fixed all-wheel drive system, paying homage to Baja design concepts and addressing the team's engineering merit goal of developing a vehicle capable of high performance in adverse conditions as outlined in the requirements section of the full *RC Baja Drivetrain & Chassis* report. The project consisted of three phrases following the academic schedule of Central Washington University. The first phase was design which entailed the creation and theoretical validation of components to build the vehicle. This phase utilized engineering concepts such as Statics, Dynamics, Mechanics of Materials, Materials Science, and Mechanical Design to determine whether the parts would both fulfill their intended function, and survive expected stresses and forces encountered during operation. Following design, construction began using practical skills like Machining and 3D Printing to manufacture components. Finally, the vehicle was assembled and tested to determine that the design meets the project requirements, and functions as intended. The final vehicle weighed 12 lbs. with a maximum top speed of 40 mph, meeting the vehicle requirements. The offroad performance was also successful as the fixed gearing prevented one wheel from free spinning in the event of the vehicle getting high centered. The project resulted in the creation of an All-Wheel-Drive RC Baja Vehicle that is a culmination of many different engineering disciplines.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: All-Wheel Drive, High Performance, Engineering Concepts

RC BAJA DRIVETRAIN & CHASSIS

Lupe Gonzalez, Austin Taylor
Project Mentor(s): Charles Pringle, PE; John Choi, PhD

The objective of this report is to document the RC Baja car senior project sequence entailing the design, manufacturing, and testing of the drivetrain and chassis systems of the car to be entered in the ASME RC Baja competition. Project structuring began with a preliminary analysis/design phase where engineering disciplines including statics and mechanics of materials were utilized to determine critical stresses and reaction forces within the components. Following this portion, manufacturing is completed through initial design matrices that sought to identify the best course of action to bring a design to fruition where metrics regarding cost, feasibility, and strength were evaluated for each approach to arrive at a solution. Subsequently the manufacturing was completed through the utilization of manual manufacturing methods including a lathe, vertical mill, bandsaw, and MIG welder in conjunction with automated methods such as 3D printing, laser cutting, and CNC machining. Testing of the device was then completed following assembly of the car to ensure that it was able compete in the ASME Baja Competition. This entailed conducting testing to ensure the car met specified requirements. The car was able to reach a speed of 25 mph in five seconds. Deflection tests were then completed where the chassis/roll cage displacement both remained under 1/16" while subjected to a 25lbf static load. Results from the project were satisfactory as the functionality of the team's design allowed the car to perform well in the ASME competition.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Design, Manufacturing, Testing

Automated Garbage Bin

Cade Haller
Project Mentor(s): Lad Holden

This project focuses on developing an autonomous garbage bin that can transport itself to the curb for collection and return to its original location. The system is controlled by a National Instruments myRIO 1900 microcontroller. It includes two DC motors with encoders for precise movement. Navigation is achieved using line-following IR sensors, ensuring the bin follows a predefined path, while ultrasonic sensors detect obstacles and adjusts movement accordingly. To determine when the bin has been emptied, the system utilizes myRIO's built-in accelerometer, triggering the return sequence upon detecting a change in motion.

The projects software is developed within LabVIEW for the ability to control the robot. A motor driver regulates and helps control the high-current motors. Lithium-ion batteries will ensure consistent performance, provide sufficient power for all components, and enhance the overall reliability of the system. The Automated Garbage Bin enhances waste collection efficiency by automating the transport process, reducing manual labor, and minimizing human intervention. Additionally, the system is designed for scalability, with potential applications in smart city infrastructure and automated waste management solutions.

Rigorous testing and simulations will validate the system's performance, ensuring reliable navigation, obstacle avoidance, and return-to-home functionality. This project aims to demonstrate an effective and innovative approach to automating routine waste collection, contributing to advancements in smart automation and robotics.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Automation, Robotics, myRIO, LabVIEW, Sensors, Waste Management, Navigation, Obstacle Avoidance

E Bike Speed Controller System

Laith Issa
Project Mentor(s): Lad Holden, Jeff Wilcox

The idea of this project is to monitor and regulate the speed of a wheel using an IR sensor as a detector and a twist throttle that controls how fast the wheel goes. The essential parts of the project are the microcontroller chip, a 5V twist throttle, a 12V DC motor, an IR sensor, and an OLED display. The motor is connected to the microcontroller using a motor driver. Also, the twist throttle works as an ADC input and is connected to one of the chip ADC pins. The IR sensor is connected to the chip GPIO pin and functions as a detector that counts the number of revolutions per minute (RPM) of the wheel. When the user twists the throttle, the wheel begins to spin, and the IR sensor, placed next to it, sends a signal pulse to the chip. Then, it'll count the time between each pulse to calculate the RPM of the wheel and display the number on the OLED screen.

The system is powered by a 12V lithium-ion battery (the battery voltage must be compatible with the motor). The chip/Microcontroller is programmed in a way that allows the microcontroller to receive inputs from the throttle and IR sensor, then convert them into RPM values.

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: Microcontroller, IR Sensor, Twist Throttle, ADC Input, Lithium-Ion Battery

R/C Baja: Drivetrain and Chassis

Olivia Kuykendall, Evelyn Sanjuan
Project Mentor(s): Jeunghwan 'John' Choi, PhD; Bill Reichlin; Lupe Gonzales; Austin Taylor; Devyn Smith

Students were tasked with creating an RC car to compete in an annually hosted Baja Car competition. This competition includes several events, including the straight-line sprint, slalom race, and vehicle vs. vehicle race. Additionally, the car must conform to the regulations provided by Remotely Operated Auto Racers (ROAR). The overall project was split between two engineers: one worked on the drivetrain and chassis and the other on the steering and suspension. The scope of the following report covers the development and construction of the drivetrain and chassis. The components of the vehicle were designed in the first quarter of the senior sequence, manufactured in the second quarter, and tested in the final quarter. The chassis was rigid to provide a stable platform that components could then mount to. The drivetrain provided forward or reverse motion. Analyses were conducted to find dimensions and decision matrices were used for material and configuration. The matrices resulted in additive manufacturing, like 3D printing, utilizing PLA and machined aluminum. SolidWorks helped design these parts for creation. The final vehicle met ROAR regulations and succeeded in testing requirements. The car reached 20 MPH in less than 5 seconds during the acceleration test, accelerating over a 3-foot distance. Upon being dropped from a height of 3 feet, the car did not deflect further than .1" and sustained no permanent deformation. Under a 20lb force, the chassis returned to its original state with deflection less than .1".

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: 3D Printing, RC Car, ROAR, Chassis, Drivetrain

PEARL- PLC Emergency Alert & Response Lights

Yiressy Lopez
Project Mentor(s): Lad Holden

PEARL is an entirely visual and tactile fire detection system with a doorbell feature based off a Allen Bradley 1769-L30ER Programmable Logic Controller (PLC), PEARL stands for PLC Emergency Alert & Response Lights, and was created as a concept accessible home panel for users with hearing difficulties. PEARL uses analog module 1769-IF4XOF2 and digital module 1769-OW8 & 1769-IQ16 as inputs and outputs, different sensor circuits which read temperature and smoke are connected to inputs to read the fire status, as well as a pushbutton to read the doorbell status. PEARL will flash different lights depending on the situation and will be paired with a vibration device.

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: Fire, Warning, Sensors, Visual, Tactile, Audio les, Fire Alarm, Control Panel

Colt's Hand

Colt Mallett

Project Mentor(s): Lad Holden

A personalized prosthetic hand that is made to perform a basic power grip to interact with objects and surroundings. Made with 3D printed parts, electronics, and fishing wire. This prosthetic hand is designed to interact with the user's body to initiate its gripping functionality. Accomplished by using small DC motors in the palm to drive the fingers of the prosthetic hand, sensors to detect when the prosthetic has a specific force to prevent overexertion, a sensor to detect a signal from the user's body to force interaction from the prosthetic hand, and a microcontroller to allow proper communication between the electronic devices.

Development: Explorer 16/32 development board.

Software: Fusion 360, MPLABX, and MCC (MPLAB Code Configurator).

Hardware: INA219 current sensor, conductive cord stretch sensor, N20 DC Motors, and PIC24FJ128GA010.

Most of the development was completed on the Explorer 16/32 development board.

The 3D printed parts were made on Fusion 360. The code for the PIC24FJ128GA010 microcontroller was created on the MPLABX IDE alongside MCC.

The body input signal utilizes the conductive cord stretch sensor. When the cord is stretched its resistance value rises, thus changing the output value of the voltage divider circuit it is connected to. The PIC24FJ128GA010 microcontroller takes the signal from the voltage divider circuit and will activate the N20 DC motors. The N20 DC motors current is read through the INA219 current sensor, and the motor output is limited by its current levels.

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)

Keywords: Prosthetics, Electronics, Instrumentation, DC Motors, Microcontrollers

Cat Litter Ammonia Detector

Josue Maqueda

Project Mentor(s): Lad Holden

Ammonia buildups in indoor spaces, especially around cat litter boxes, can cause unpleasant odors and potential health issues for both pets and owners. For cat owners, this device helps maintain a healthier home environment by displaying when it's time to clean the litter box and/or improve ventilation. Excessive ammonia can lead to respiratory hazards among potentially other health hazards, the sooner it can detect NH3, the sooner it allows owners to take quicker action to create a safer environment for both humans and animals. The circuit uses a MQ-137 gas sensor to measure ammonia concentration and an HW-201 IR proximity sensor to determine when the area is unoccupied, activating the gas sensor only when needed to conserve energy. This project develops an embedded system using Microchip Studio for programming a ATMEGA328P microcontroller to monitor ammonia levels efficiently. The system integrates an MQ-137 gas sensor for ammonia detection and an IR proximity sensor simultaneously working together then, data is displayed on a small OLED display, allowing users to easily check air quality within the litter box.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)

Keywords: Ammonia, MQ-137, Gas Sensor, IR Sensor, Cat

Lower Limb Prosthetic Improvements

Emma McCabe
Project Mentor(s): Andy Lambert, LCPO; Charles Pringle, PE; John Choi, PhD; Trevor Finnern
Lower limb prosthetics are often very costly as many insurance companies don't cover repairs/replacements within 5 years of receiving the product. This proves to be quite costly for patients as lower limb prosthetics are subject to large amounts of repeated stress in a high impact zone. This results in necessary repairs/replacements with in the 5-year period which typically isn't covered by insurances making these prosthetics less accessible to most people all because of cost. It would be invaluable for the industry to have protective options for patients who cannot personally afford repairs or replacements. This paper describes a baseline evaluation of a 3D printed insert made from TPU, including analysis, product testing, and quality metrics to test the product. Specifically, the analysis' done to determine the efficiency of the design, consisted of mechanics of materials, material sciences, as well as statics. This helped determine the material used, thickness of the insert, cost efficiency of the manufacturing, and longevity. These quality metrics learned in the analysis' were used to assess and benchmark protective alternatives to prioritize specific requirements. These requirements include a longevity of 5 years or more with an insert that weighs less than one pound and a thickness less than .56" that can hold up to 864 lbs. This will be done though additive manufacturing (3D printing) making the manufacturing process the most cost efficient to help alleviate the price barrier for prosthetic patients.
Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Lower Limb Prosthetics, Additive Manufacturing, Accessibility

BATCON-24

Nathan Mears
Project Mentor(s): Lad Holden
This project presents the development of a modern battery management system using the Microchip Explorer 16/32 board, MCC IDE, and the PIC24FJ128GA010 microcontroller. Designed to ensure the efficient operation and safety of an 18650 lithium-ion battery, the system features a relay for disconnection to protect against overcurrent and overheating. The MIKROE BATTMON Click module, equipped with the STC3115, serves as the primary fuel gauge, monitoring the battery's state of charge and health for precise energy management. To maintain thermal stability and optimize performance, an RTD temperature sensor is integrated for real-time temperature monitoring. The synergy of these components results in a robust and intelligent battery management solution, meeting the demands of modern energy storage systems. This project delves into hardware and software integration, highlighting its scalability and potential applications in renewable energy, electric vehicles, and portable electronics.
Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: Battery Management System, Explorer 16/32 Development Board, PIC24 Microcontroller

Reconstruction of the ATLAS Robot

Aidan Miller
Project Mentor(s): Jeff Wilcox

Migrating an ATLAS robot's programming from LabVIEW 2019 to LabVIEW 2018 involves overcoming several technical hurdles due to the differences in the software versions. LabVIEW, a popular visual programming tool in robotics, has evolved with new functions and enhancements in recent versions, which may not be fully compatible with older editions. Consequently, porting the code requires addressing issues related to deprecated functions, library inconsistencies, and potential communication mismatches between the robot's hardware and the software. The process involves adjusting the original code to be compatible with the LabVIEW 2018 framework without compromising the robot's performance. This paper explores the detailed steps of adapting the ATLAS robot's system to the older version of LabVIEW, focusing on the challenges encountered and the solutions implemented, including code optimization and hardware troubleshooting. The study concludes that while the migration is complex, it is entirely feasible, allowing the robot to function as intended within the LabVIEW 2018 environment.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Robotic, Optimization, LabVIEW 2018, LabVIEW 2019

RC Baja Steering and Suspension

Devin Mooney, Trevor Finnern
Project Mentor(s): Charles Pringle, PE; John Choi, PhD

The objective of this project is to fully design and construct a car that will be able to fulfill the requirements of the RC Baja Competition which includes three objective races; the slalom race, the baja race, and the sprint race. This project was split into two parts, one of the parts is the suspension and steering that is described in this report and the other part is the drivetrain and chassis accomplished by the other engineer in the report "RC Baja Drivetrain" by Trevor Finnern. This project includes several analyses and decision matrices to determine design for parts of this car. The main structural components within the suspension and steering setup had analyses to determine the strength of material needed and the overall dimensions. The baja race was able to test the capabilities of the car and is used to determine the effectiveness of the designs that were chosen. The car's parts were tested using an Instron machine to determine conformity to the requirements. The a-arm achieved a deflection of less than .1 in. with an 80 lb. axial buckling load. Furthermore, the a-arm deflected less than .1 in. with a 30 lb. perpendicular load placed at the center of the a-arm span. This was all done to make sure the vehicle was able to successfully complete the course with no detrimental failures under the conservative expected loads.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Baja, Steering, Suspension, Slalom, Strength, Race, Sprint

RC Baja Buggy: Steering and Suspension

Samuel Patterson, Marshall Riley
Project Mentor(s): Charles Pringle, PE; John Choi, PhD

The objective of this project was to design, construct, and test an RC baja buggy to compete in a slalom race, drag race, and Baja course for the ASME Baja competition. The project was split into two parts, the suspension and steering, and the chassis and drivetrain. This report, "RC Baja Buggy: Steering and Suspension", focuses on the suspension and steering portion of the vehicle, with Marshall Riley constructing the chassis and drivetrain. The project was completed over three quarters: fall, winter, and spring quarter. Fall quarter focused on the design of the vehicle utilizing analyses and decision matrices to determine the best way to satisfy the design requirements. The parts were then designed in SolidWorks, ready for manufacturing in winter quarter. During winter quarter, all the components were manufactured, and the final vehicle was then assembled. Spring quarter involved the testing of the final design, to ensure that all the design requirements had been satisfied. The final design and assembly of the vehicle proved to be quite successful. The vehicle was able to complete a complete 180 degree turn within a radius of 3 feet, which enabled tight cornering on the slalom and baja courses. The vehicle also has a ground clearance of greater than 2 inches, leading to excellent offroad performance. The control arms did not buckle more than .01 inches from a 10-pound load and did not deflect more than 0.1" under a 20-pound load. In summary, the completed vehicle met or exceeded all design requirements.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: RC, Suspension, Steering, Vehicle, Design, Construction, Testing, SolidWorks

Energy Flow Manager

Darius Riggins
Project Mentor(s): Lad Holden

The Smart Grid Power Monitoring and Control System is designed to optimize energy consumption in both residential and industrial settings. This project integrates multiple engineering principles to ensure safe, efficient, and reliable operation. The system consists of a voltage sensor, current sensor, solid-state relay (SSR), Arduino Rev3 microcontroller, and a load (lightbulb). The primary goal is to monitor power usage in real-time and control energy distribution to reduce overall consumption.

The Arduino Rev3 microcontroller is coded to view the voltage and current sensor data in real time and manage the SSR with the code have a power threshold to send a signal to turn the SSR off and on, enabling control of the power supply to be connected loads. The system is designed to analyze energy consumption patterns and adjust power distribution, accordingly, ensuring efficiency.

By implementing this system, energy providers and consumers can gain valuable insights into their power usage while enhancing grid stability. The project will also serve as a foundation for further advancements in smart grid technology, demonstrating the feasibility of integrating intelligent energy management into modern electrical networks.

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: Energy Monitoring, Power Control, Arduino, Sensors, SSR

RC Baja: Drivetrain & Chassis

Marshall Riley, Sam Patterson
Project Mentor(s): Charles Pringle, PE; John Choi, PhD

The RC Baja vehicle project aimed to design and construct a remote-controlled vehicle that could complete the slalom, drag, and obstacle course competitions. The primary objective was to address the engineering challenges of balancing speed, weight, and durability while making a vehicle that could navigate complex terrains. To achieve this objective, the project utilized extensive research, computer-aided design (CAD), and rapid prototyping specifically used to develop the drivetrain and chassis components. The other half of the project, steering and suspension components, was done by Sam Patterson, "RC Baja Buggy: Steering and Suspension." The team used materials that would optimize weight without sacrificing strength. The components, such as the motor and gears, were chosen based on set performance metrics. There was rigorous testing done with multiple trials to evaluate these metrics based on the vehicle's speed, reliability, and handling. The results from these tests show that the final RC Baja vehicle can reach a maximum speed over 25 mph and accelerate to a speed of 20 mph in under 6 seconds. Overall, the RC Baja vehicle project demonstrated all the engineering principles learned throughout an engineering curriculum and showed the effectiveness of working with a teammate to develop a new project.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: RC, Chassis, Drivetrain, Construction, Testing, Vehicle, CAD, Gears

HOTAR

Jedidiah Roche
Project Mentor(s): Lad Holden

HOTAR is a *Head Orientated Two Axis Robot* that will track a user's head movements to direct the orientation of a robot. It uses a Texas Instruments C2000 LaunchPad XL TMS320F28027F microcontroller and BNO085 9-DOF orientation sensor. The ultimate aim is to mimic basic head movement in the human by successfully controlling two servo motors to add pitch and yaw functionality. The system reads real-time orientation data from the BNO085 sensor, which combines accelerometer, gyroscope, and magnetometer data through a sensor fusion algorithm to generate accurate quaternion-based orientation values.

The microcontroller translates sensor data into corresponding PWM signals that drive the servos, thus positioning the robot's "head" in the desired orientation. This project will utilize the TMS320F28027F microcontroller, a member of the C2000 Piccolo family. The exchange of information between the microcontroller and the BNO085 takes place using the I²C protocol that allows for reliable and secure orientation feedback with minimal wiring complexity. Texas Instrument's Code Composer Studio (CCS) serves as the integrated development environment (IDE) for developing and debugging the embedded software. This project shows a successful merging of embedded systems, sensor fusion, and actuator control onto a compact platform. It demonstrates the capabilities for effective but straightforward head-tracking robotics that can serve as a foundation for more complex applications, such as humanoid robotics, telepresence systems, or interactive art installations. The system is designed to be low-cost, modular, and expandable, offering a scalable foundation for further advancement in vision tracking, machine learning, or additional degrees of freedom.

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: Robotics, Embedded Programing, Circuit Design

RC Baja: Suspension and Steering

Evelyn Sanjuan, Olivia Kuykendall
Project Mentor(s): Jeunghwan "John" Choi, PhD; Bill Reichlin; Austin Taylor; Lupe Gonzalez
Senior engineering students that chose their senior project on the RC Baja car,
were tasked to design and build an RC car that will compete in the RC Baja competition. The RC car will be tested in three different categories: the slalom, the sprint, and Baja race. The students were divided into groups of two, one engineer was responsible for the suspension and steering system. The second engineer focused on the chassis and drivetrain. This engineer focused on the suspension and steering system of the vehicle. The primary methods of manufacturing the components for the vehicle was 3D printing and the CNC machine, 3D printing allowed for the complex components to be manufactured while minimizing human error. The engineer chose to use one servo for the front suspension which allowed for a rear wheel drive. The suspension and steering design began with completing analyses and decision matrices for components to comply with the requirements set by the engineer. Once designed and verified, the RC car manufacturing phase begun. The vehicle was completed at the end of winter quarter with testing beginning at the start of spring quarter. During the turn test, the vehicle turned at least 180-degrees within a 2ft radius. The vehicle did not experience any damage or deformation from a 3ft drop and the deflection of the arms was less than 0.50". These results demonstrate that the suspension and steering system satisfy the necessary requirements.
Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: RC Baja, 3D Printing, SolidWorks

JCATI Carbon Fiber Recycler – Mechanical Components

Devyn Smith, Aislinn Williamson, Hannah Woody
Project Mentor(s): Charles Pringle, PE; Bill Reichlin
Carbon Fiber composite is a high-strength and lightweight material used primarily within aerospace applications. When manufactured, there is waste from trimming excess material caused by the molding process. A machine was needed to process the material's waste trimmings to recycle it into reusable carbon. This machine and project is sponsored for yearly improvements by the Joint Center for Aerospace Technology Innovation (JCATI). The current improvements made involve 2 material conveyance systems, and minor mechanical components. The report focuses on the mechanical components of the machine. A device was needed to provide tension to the two ANSI 100 chains. Another device was needed to open the oven door so that the conveyance systems can move material through the oven. To solve these problems, one chain tensioner was specified and a second utilized additive manufacturing design. Additionally, an oven door opening mechanism was designed where Statics and Mechanics of Materials analyses produced a strong and functional design. CAD software was utilized to ensure fitment with existing components. After completing the design, machining, welding, and additive manufacturing were used to manufacture the various components. Upon completion of assembly, the various systems were tested for requirement compliance. The project was successful. The oven door opening was measured at 18 inches. The chain tensioners successfully provide tension and are adjustable. The chains no longer ride up on the sprockets. Each device can withstand a side load of 20 lbs. with a deflection less than $1/16^{th}$ of an inch. These parameters successfully meet all design requirements.
Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Carbon Fiber, Recycling, Oven, Chain, Tensioner, Aerospace

CounterGuard: Pet E-Collar

Ella Spakes
Project Mentor(s): Lad Holden, Jeff Wilcox

CounterGuard is an innovative wearable device designed to prevent pets from jumping on counters using infrared (IR) detection. The system includes two primary components: a stationary IR emitter and a pet-worn collar. The IR emitter features a microcontroller and an LED screen that displays behavior statistics. The collar integrates an IR receiver, piezo speaker, vibrating motor, microcontroller, and an internal temperature sensor that automatically shuts off the system if overheating is detected. When the collar enters the IR emitting field, it responds by triggering an audio or vibrating alert to redirect the animal's behavior. The collar is powered by a rechargeable lithium polymer battery, while the IR emitter is powered by a universal AC/DC wall adapter. The display system logs events using a real-time clock (RTC) module, recording data such as number of occurrences, time of day, and duration. CounterGuard is designed to be a non-harmful training tool for pet owners to reinforce boundaries in the home. This project is designed for expansion and provides the groundwork for the continued design and development of the product.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: E-Collar, Infrared Detection, Wearable Electronics, PIC Microcontroller, Real-Time Clock, Behavior Deterrence

Irrigation System

Jazmine Tapia
Project Mentor(s): Lad Holden

Automated irrigation systems optimize water usage and reduce manual intervention, making plant care more efficient. This project focuses on designing and implementing a microcontroller-based irrigation system using the PIC16LF15356 on the Explorer 8 development board. The system monitors soil moisture levels and automatically activates a water pump through a relay module, ensuring plants receive adequate hydration without overwatering.

The PIC16LF15356 microcontroller is placed in J13 on the Explorer 8 board, and the MSSP1 module is configured for I2C communication, utilizing RC3 (SDA) and RC4 (SCL) for data transmission. A moisture sensor (hydrometer) measures soil moisture levels, and when dry conditions are detected, the microcontroller triggers the relay to power the water pump. This system enhances water conservation and minimizes human effort in plant maintenance.

This project was inspired by personal challenges in maintaining plant hydration and aims to provide a practical and cost-effective solution for both home and agricultural applications. Future improvements include integrating additional environmental sensors for more precise control, expanding automation capabilities, and potentially implementing remote monitoring via wireless communication.

By leveraging embedded systems and sensor-based automation, this irrigation system demonstrates an innovative approach to improving plant care while promoting sustainable water usage.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Automated Irrigation System, Microcontroller-Based PIC16LF15356, Explorer 8 Development Board, Soil Moisture Sensor, Water Pump, Relay Module, I2C Communication, Sensor-Based Automation

RC Baja Suspension and Steering

Austin Taylor, Lupe Gonzalez

Project Mentor(s): Charles Pringle, PE; John Choi, PhD; Chris Berkshire

This project is a joint effort with project partner Lupe Gonzalez who is the lead on the drivetrain and chassis systems. This side of the joint project focuses on the suspension and steering systems. Traditional suspension systems in RC vehicles lack adaptability to varying terrains, leading to reduced stability, inefficient shock absorption, and compromised handling performance. To address these limitations, an active suspension system was developed for a 1/10-scale, 7 lb. custom-designed RC Baja car, dynamically adjusting damping and ride height based on real-time terrain feedback. The objective was to improve vehicle control, reduce body roll, and enhance overall maneuverability through an electronically controlled adaptive suspension system.

The system utilizes a SuperScale2020 module to process input from onboard accelerometers and gyroscopes, enabling real-time suspension adjustments. This features lower control arms attached to shocks, which connect to servo-actuated upper arms, allowing dynamic ride height and damping modifications. Performance evaluation includes deflection tests, drop tests using high-speed cameras, and turn radius tests to assess handling improvements.

Testing results demonstrated that the system successfully maintained vehicle stability within 0.25 inches over uneven terrain and absorbed 68% of the impact forces from 2-foot drops, limiting forces to the chassis. The active suspension system adjusted stiffness within 100 milliseconds. Additionally, the steering system achieved a minimum turning radius of 3 feet, meeting performance targets. These findings suggest that active suspension could significantly enhance small-scale vehicle performance and could provide valuable insights into large-scale passenger vehicle applications, improving ride comfort and reducing suspension wear.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)

Keywords: System, Active Suspension, Steering, RC Baja, Adjustment, Servo, Chassis

Composite Rocket Body Production Method

Colin Thomas (thomascoli@cwu.edu)

Project Mentor(s): John Choi, PhD; Charles Pringle, PE

The objective of this project is to create a replicable method of creating rocket body tubes for the CWU Rocketry club. The chosen method being to use a vacuum assisted resin transfer system to pull resin into a thin layer with fiberglass as a frame, wrapped around a PVC pipe to make sure it is cylindrical. To ensure the final product was of good quality, the materials were first recreated as tensile specimens and underwent tensile, compressive, and deflection tests to ensure it has enough strength to function as a rocket body. Following this, the manufactured tubes were tested for relative cylindricity by placing them in a lathe and rotating the part with a measuring device at multiple points. Finally, a sub-scale rocket was launched to obtain data from a real flight, with that data being compared to a similar off the shelf model rocket. The resulting body had a 15% reduction in costs compared to the off the shelf model with no statistically significant difference in performance. Through these methods it is shown that even if this method cannot match a professional factory's standards of quality, it is more than enough for use by the Rocketry Club at a far lower cost per body produced.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)

Keywords: Resin Molding, Rocketry, Composites

Rocket Payload Capsule

Alexandro Vargas, Jobe Kirner
Project Mentor(s): Lad Holden

This project includes the designing and building of a rocket flight capsule which will be capable of safely retaining four miniature astronaut representations while collecting several points of data through instrumentation techniques. Upon a successful landing of the system, a transmission will occur through radio frequency, containing all relevant rocket and landing site data to a receiver at the designated landing site. The payload bay will contain a space for the four “astronauts”, as well as the radio, the battery, and the payload circuit. The following data will be collected and sent: Temperature of the landing site, read by a MCP96000 Thermocouple. The maximum apogee reached, read by a MPL3115 Altimeter. The maximum velocity, landing velocity, and flight orientation, all read by an ISM330DHCS Accelerometer. As well as the time of landing.

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: Rocket, Circuit, Instrumentation

JCATI Carbon Fiber Recycler – Conveyor System

Aislinn Williamson, Devyn Smith, Hannah Woody
Project Mentor(s): Charles Pringle, PE; John Choi, PhD

The Joint Center for Aerospace Technology and Innovation (JCATI) Carbon Fiber Recycler has been a project consistently improved upon by students to increase the functionality. The overall system still lacked key operations in conveyance from one end of the system into the oven itself. This report focuses on the conveyor system developed for use between the shredder and the oven to resolve the discontinuity of material transport. Additionally, team members worked on associated individual projects considering chain tensioners and oven door operation, and inner-oven conveyance. To solve the discontinuity of material flow, a telescoping conveyor was developed through analyses in statics, dynamics, heat transfer, and mechanics of materials. CAD software was used in design of components and to ensure components would fit together. Construction followed using mostly subtractive processes, bending breaks, and welding to manufacture the required components. Assembly of the components utilized fasteners and welding. Testing of this device included speeds for both the rotational belt and telescoping drive to transport material or extend at the required speeds. Speeds met the design requirements of one foot per minute and 2.4 inches per second respectively. The retention of material was also tested to determine the systems conveyance effectiveness. This was done by measuring the mass of carbon fiber before and after running through the JCATI system. Retention of the material was measured to be 95% retention after the telescoping conveyor ended.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: JCATI, Carbon Fiber, Recycler, Telescoping, Conveyor

JCATI Carbon Fiber Recycler – Oven Conveyance System

Hannah Woody, Devyn Smith, Aislinn Williamson
Project Mentor(s): Charles Pringle, PE; John Choi, PhD; Bill Reichlin

Carbon Fiber is a material that has been utilized today within Aerospace Technology. A need to recycle and find reuse for this material was needed to enhance aerospace innovation. The project was to improve the current Carbon Fiber Recycler system. A conveyance system was required to transport Carbon Fiber material through and out of the oven. Other project partners Devyn Smith and Aislinn Williamson enhanced mechanical components on the Recycler and created a conveyance system from the shredder into the oven, respectively. The full Carbon Fiber Recycler assembly consists of a grinder, shredder, and oven. Multiple analyses were conducted to ensure the success of the conveyance system before construction began. Material fatigue due to high temperatures was calculated as well as tension and torque requirements needed for the conveyance system design choices made. The conveyance system was first assembled outside the oven to ensure proper alignment and that the device worked properly. Holes were then created on one side of the oven and conveyance system was mounted and installed onto the inside of the oven floor. Conveyance system was wired through a push button switch and pre-geared motor. Through testing done the conveyance system operated at a minimum of 1 foot per a minute and shaft deflection did not exceed 0.125 inches vertically. The device's intent to convey Carbon Fiber Material through and out of the oven was successful allowing for more improvement to be made within Aerospace Technology.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Aerospace Technology, Carbon Fiber, Conveyance System

Family and Consumer Sciences

Apparel, Textiles, and Merchandising

Verdant

Mariana Benitez
Project Mentor(s): Andrea Eklund

Verdant was created to exemplify the boldness of 1960s mod fashion with modern silhouettes for a playful aesthetic. My inspiration was drawn from the vibrant colors and unique silhouettes of style icons Pricilla Presley and Twiggy (Dame Lesley Lawson). The design process began with researching different period fashions. I was drawn to the use of sharp lines and bright colors from the 1960's. Multiple variations of mod dresses were sketched before finalizing on the design you see today. The draping technique was used to create the design, which allowed an organic visualization of the flowy a-line silhouette with a square neckline. A yoke inspired bodice piece was incorporated to create a modern clean look. The main textile is a 100% cotton dobby weave, which provides structure and depth due to the weave. The neck and armholes feature an all in one facing for a clean finish. Notions include an invisible zipper, hook and eye, and all purpose thread. This is one of three designs for my spring collection. My collection can be seen at the 29th Annual CWU Fashion Show brought to you by the Apparel, Textiles & Merchandising program in conjunction with the Theatre Department on June 7th at 3pm in Milo Smith Theatre. More information on ticketing can be found at @cwu_atm.

Presentation Type: Fashion Show (May 15, 11:30am–12:00pm). Poster (12:00pm–12:30pm)
Keywords: Retro, Playful, Bold

Past-due

Gerardo Castillo

Project Mentor(s): Andrea Eklund

"Past-due" is a design that speaks to the resilience of marginalized communities. A perspective told through my own experience, where I often have to weather the storm in a selfless endeavor dedicated to my family. Past-due advocates for Hispanic heritage in a climate where the roots of the working class seem to have been forgotten. The concept was born by marrying a powerful message with the beauty of detail found in fashion. A look defined by denim, a resilient fabric encased in glass beads mimicking water, because no matter the weather, we don't quit. After digitizing the design on Adobe Illustrator, I used model measurements and flat patterning techniques to construct a set of coveralls tailored to the model. Multiple fittings allowed me to narrow down the fit by editing the pattern pieces to better mold to the body. For a sense of individuality, I incorporated a custom kimono-style sleeve hiding details in subtlety. The application of embellishments by beading can be found rooted in Hispanic heritage, dating pre-Hispanic times. 100% cotton Japanese denim is used for the exterior construction of the entire garment, lined with 100% silk for breathability, and embellished with glass beads. This is one of three designs for my spring collection. My collection can be seen at the 29th Annual CWU Fashion Show brought to you by the Apparel, Textiles & Merchandising program in conjunction with the Theatre Department on June 7th at 3 pm in Milo Smith Theatre. More information on ticketing @cwu_atm.

Presentation Type: Fashion Show (May 15, 11:30am–12:00pm), Poster (12:00pm–12:30pm)

Keywords: Fashion, Culture, Heritage, Apparel Design

Tailored Intent

Tyler Christensen

Project Mentor(s): Andrea Eklund

"Tailored Intent" is designed to give the aesthetics of elegance and sophistication mixed with streetwear and patchwork. Using suiting fabrics and patchwork art, this look provides the opportunity to have a casual or formal look. This design mixes in my love for streetwear and my newly discovered passion for business core elements. Patchwork and upcycling have been an interest of mine for years, and this design incorporates this interest with my newly discovered interests. The concept was initially created via sketching, then taking my model measurements, and using slopers with the slash and spread method. New techniques used were patterning palazzo pants, pleating, and slip stitching for a more intricate design. The textiles used are 100% polyester rib knit and 100% wool suiting. Zippers, buttons, thread, and twill tape were used in the design. This is one of three designs for my spring collection. My collection can be seen at the 29th Annual CWU Fashion Show brought to you by the Apparel, Textiles & Merchandising program in conjunction with the Theatre Department on June 7th at 3pm in Milo Smith Theatre. More information go to @cwu_atm.

Presentation Type: Fashion Show (May 15, 11:30am–12:00pm). Poster (12:00pm–12:30pm)

Keywords: Poise, Commanding

Lencia

Rosalinda Mendoza

Project Mentor(s): Andrea Eklund

Lencia was created to give the wearer confidence while showcasing a lightweight denim textile and original artwork. The lightweight denim makes the design suitable for day or night and provides a softer aesthetic. The design features a center front zipper to add visual interest, a front P and back hand drawn design to represent and connect to the other pieces in my collection. representing my collections name, and the length of the sleeves and shorts were chosen to add a casual summer feel. The design process began by researching beachwear styles and interpreting styles to include denim and my original artwork. Slopers were slashed and spread to create patterns. A sample was fit on my model to ensure a perfect fit. Adjustments were made to the patterns, and the final garments constructed. Up-cycled jeans from goodwill were seam ripped and flattened, which allow maximum use of fabric for cutting out my pattern pieces. Notions included 2 zippers, all-purpose thread, interfacing, and a button

This is one of three designs for my spring collection. My collection can be seen at the 29th Annual CWU Fashion Show brought to you by the Apparel Textile & Merchandising program in conjunction with the Theatre Department on June 7th at 3pm in Milo Smith Theatre. More information on ticketing found at @cwu_atm.

Presentation Type: Fashion Show (May 15, 11:30am–12:00pm). Poster (12:00pm–12:30pm)

Keywords: Summer, Denim, Up-cycling, Fashion, Design

Storm

Emily Messinger

Project Mentor(s): Andrea Eklund

Storm is inspired by my love of the ocean and marine animals. The bright colors and the movement of aquatic life has always been a fascination. The process of creating this design started with sketching ideas and concepts before narrowing it down to this final design. The draping technique was used and a pattern created from the draping. A sample was constructed and fit to my model and final adjustments to the pattern were made. Once the fit was finalized the final construction was completed. The textiles used include 100% polyester satin-crepe, 100% polyester satin-organza, and 100% polyester plain weave lining. Notions include thread, an invisible zipper, button, and Capiz shell beads. This is one of three designs for my spring collection. My collection can be seen at the 29th Annual CWU Fashion Show brought to you by the Apparel, Textiles & Merchandising program in conjunction with the Theatre Department on June 7th at 3pm in Milo Smith Theatre. More information on ticketing go to @cwu_atm.

Presentation Type: Fashion Show (May 15, 11:30am–12:00pm). Poster (12:00pm–12:30pm)

Keywords: Fashion, Art, Design

Cuata

Meli Rivera Garcia

Project Mentor(s): Andrea Eklund

Cuata is a tribute to my twin sister, who has always been a consistent source of love and support for me. This design is part of a larger collection that explores the ways I experience love as a trans and queer person. Through this line, I want to challenge the misconception that being trans is rooted in self-hatred. Instead, Cuata, and my collection, celebrates the many forms of love that trans people are capable of. This specific design is dedicated to my sister's unwavering support and how deeply loved I feel knowing she is always in my corner.

The design incorporates materials that are both personally and culturally significant to me. With the help of my mom, I wove a custom textile inspired by the petates my grandmother once made from dried palm leaves. This process not only honored my family's traditions but also gave me a moment to connect with my mom and share something her mom once shared with her.

To bring the design to life, I used techniques such as pleating, sewing darts, draping, and flat patterning. The finished garment features a blend of materials: vegetable tan leather, a sheer 100% cotton lawn, and handwoven textile.

This is one of three designs for my spring collection. My collection can be seen at the 29th Annual CWU Fashion Show brought to you by the Apparel, Textiles & Merchandising program in conjunction with the Theatre Department on June 7th at 3pm in Milo Smith Theatre. More information on ticketing @cwu_atm.

Presentation Type: Fashion Show (May 15, 11:30am–12:00pm). Poster (12:00pm–12:30pm)

Keywords: Apparel, Textiles, & Merchandising

Western Flare

Elliotte Wood

Project Mentor(s): Andrea Eklund

Western Flare was created to inspire confidence in the in women with a bold and feminine aesthetic. The inspiration is drawn from my time on Central Washington University Equestrian Team. Through my experience on the team and interactions with the horses, it inspired me to create a design that combines my passion for country culture with my love of pink. I originally created these designs in the fall of 2024 and am now bringing them to life on the runway. The process to create the designs was taking my model measurements, flat patterning the pants, draping the corset, sewing the sample, fitting the sample on my model, adjusting the patterns from the fitting, and creating the final garments. Design details include a back yoke design, separate curved waistband, western front pockets, heart back pockets, front fly zipper, flare cut hem panels, princess seams, boning, lining and a separating zipper. Textiles for both garments include 100% cotton twill weave denim, 100% cotton pile weave corduroy, 100% cotton plain weave, and 100% polyester satin weave. Notions used include a regular zipper, a separating zipper, boning, thread, interfacing, and one button. This is one of three designs for my spring collection. My collection can be seen at the 29th Annual CWU Fashion Show brought to you by the Apparel, Textiles & Merchandising program in conjunction with the Theatre Department on June 7th at 3pm in Milo Smith Theatre. More information at @cwu_atm.

Presentation Type: Fashion Show (May 15, 11:30am–12:00pm). Poster (12:00pm–12:30pm)

Keywords: Equestrian, Feminine, Fashion Show

Junebug

Audrey Young

Project Mentor(s): Andrea Eklund

Junebug is an exploration in flat patterning and draping techniques, advanced design and technical skills, and perfecting fitting and styling on a real body. For this project I took inspiration from bugs, as well as 90's grunge and fantasy movies, including The Dark Crystal, Coraline, The Nightmare Before Christmas, and Beetlejuice. The process in making this design involved taking my model's measurements. Then I draped the bustier top on a dress form that closely matched her measurements. I used pattern blocks to flat patter the skirt, creating two patterns for the two layers of the skirt. A sample was constructed and fit on my model and adjustments were made to the pattern and a final fitting was created. Once the final adjustments were made the final garment was constructed. 100% cotton plain weave fabric is used for both skirts and features an invisible zipper on the underskirt. The top textile is up-cycled denim with a satin lining. This is one of five designs for my spring collection, *Entomophilia,* which can be seen at the 29th Annual CWU Fashion Show brought to you by the Apparel, Textiles & Merchandising program in conjunction with the Theatre Department on June 7th at 3pm in Milo Smith Theatre. More information on ticketing at @cwu_atm.

Presentation Type: Fashion Show (May 15, 11:30am–12:00pm). Poster (12:00pm–12:30pm)

Keywords: Fashion, Art, Design

Child Development and Family Science

Childhood Experiences Impact on Academics and Barriers Faced by College Students

Victoria Enk

Project Mentor(s): Helen Fann, PhD

Existing studies have shown associations between Adverse Childhood Experiences (ACEs) and mental and physical health outcomes. In fact, ACEs are the culprit of 25% to 30% of all psychiatric disorders in adults within the United States. Health concerns can impact academic performance; previous research also found ACEs negatively impacted academic performance. Newer research suggests there are protective factors that can buffer against the adverse effects of ACEs. This current study looks at the impact of ACEs on academic performance, barriers, protective factors (PACEs), and the associations among the variables. A survey was used to collect data regarding participants' experiences with ACEs and the potential impact it had on their academic performance. We ran bivariate correlations to test the relationship between our variables. Some of the hypotheses were supported such that we found significant negative relationships between PACEs and barriers, ACEs and PACEs, and a significant positive relationship between ACEs and barriers. Results also indicated GPA did not have a significant relationship with ACEs, PACEs, and barriers. Limitations of the study included our operationalization of academic performance differently, as well as how the variables were recoded. Future studies should consider extending research to include a longitudinal study, tracking experiences during childhood to see the impacts of ACEs later in life, such as college students. This study has implications for supporting children who experience ACEs growing up with the impact it has as the children get older.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)

Keywords: Adverse Childhood Experiences, Protective Factors, Barriers, Academic Performance, College Students

Hopistality, Tourism, and Event Management

Accessibility in Hotel Guestrooms: Current State and Future Solutions for An Inclusive Experience

Nicole Gillespie
Project Mentor(s): Naomi Jeffery Petersen, EdD
Accessibility barriers within the tourism and hospitality industry continue to limit the experiences of individuals with disabilities. This project investigates the accessibility of hotel rooms, specifically focusing on Hotel Windrow in Ellensburg, Washington, and comparing the promises made online regarding accessibility with the actual accommodation provided. Through an in-depth analysis of double queen-style accessible and non-accessible rooms, this study evaluates the hotel's compliance with the Americans with Disabilities Act (ADA) and hospitality industry standards. A comprehensive accessibility audit, coupled with a staff interview, reveals strengths such as clear floor space and low-height controls, as well as weaknesses like inadequate shower features and vague language to describe accessible room features. The findings indicate the need for more precise communication of accessibility information and the implementation of consistent and industry-specific audits. Recommendations for improvements in accessibility and communication are provided to enhance the experience of guests with disabilities, ensuring that the hospitality industry can meet the needs of all guests.
Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Accessibility, Access, Hospitality, Hotel, Inclusive

Navigating Sustainability Challenges at Large-Scale Events

Huyen Nguyen, Ngan Nguyen
Project Mentor(s): Carla Jellum, PhD
Applying sustainability principles to large-scale event management is crucial due to high waste production, increased carbon emissions and excess resource consumption. In the USA, festivals alone produce over 23,500 metric tons of waste annually and transportation accounts for nearly 60% of an event’s carbon footprint (UNEP, 2023; Collins et al., 2009). This study assessed participant perceptions of large-scale event sustainable practices, examined current sustainable strategies in event management, and proposed suggestions for more effective sustainability practices. A questionnaire, administered in both English and Vietnamese, was distributed via social medial platforms (Instagram and Facebook) and was sent to CWU students in two classes. Of the 51 responses that were collected, results suggest that there is a strong awareness and support for sustainability (85%), yet there remains disconnect between attendee expectations and actually noticing sustainability in practice at large-scale events. To bridge the gap between sustainability ideals and practice, management recommendations are provided, such as enhancing awareness, incentivizing participation, and integrating sustainability more visibly and seamlessly into event planning.
Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Sustainability, Events, Carbon Emissions, Attendee Awareness

Health Sciences

Impact of Aging on Diaphragm Thickness and Respiratory Function: Comparison with Peripheral Skeletal Muscle

Colton B. Hart; Kylie R. Roozen; Bo A. Warner; Robert C. Pritchett, PhD; Ana P. Freire, PhD; Leonardo J. D'Acquisto; Jared M. Dickinson, PhD

Project Mentor(s): Jared M. Dickinson, PhD; Ana P. Freire, PhD; Robert C. Pritchett, PhD; Leonardo J. D'Acquisto

Aging is associated with a loss of muscle size and strength, termed sarcopenia. However, less understood is the impact of advancing age specific to the size and structure of the diaphragm, the primary muscle regulating breathing. PURPOSE: Determine the impact of aging on the size and function of the diaphragm and identify how any impact compares to that of peripheral skeletal muscle. METHODS: Ten young (5M, 5F; 22±1yr), ten older (4M, 6F; 68±3yr) healthy individuals volunteered for this study. Lying supine, ultrasound images of the right hemidiaphragm were obtained to determine diaphragm thickness (end expiration, maximal inspiration). Images of the thigh were obtained to determine thickness of the vastus lateralis. Inspiratory muscle strength was evaluated using maximal inspiratory pressure (MIP) and thigh muscle strength was assessed using peak isometric force. RESULTS: Thigh muscle thickness was ~35% lower in older (3.14±0.42cm) compared to younger adults (4.86±0.89cm) ($P<0.05$), peak isometric force during leg extension was 36% lower in older (129±54Nm) compared to younger adults (201±59Nm) ($P<0.05$). Diaphragm thickness after exhalation was not statistically different ($P>0.05$) between older (0.193±0.053cm) and younger adults (0.176±0.031cm), nor was maximal inspiratory diaphragm thickness (older = 0.363±0.109; younger = 0.354±0.085cm) ($P>0.05$). However, MIP tended ($P=0.1$) to be lower in older (77±32cmH_2O) compared to younger adults (100±18cmH_2O). CONCLUSION: These preliminary data suggest that age-related changes to the structure and function of the diaphragm may differ from those in peripheral skeletal muscle. It is interesting to speculate the role of exercise as a potential strategy for preservation of diaphragm thickness.

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)

Keywords: Diaphragm, Skeletal Muscle, Sarcopenia, Respiratory Function, Maximal Inspiratory Pressure

Efficacy of Synchronous Telemonitoring Care Compared to Cell Phone Application on Smoking Cessation Rates in a Low-Middle Income Country: A Pilot Randomized Trial

Rhodes Van Houten, Isis Grigoletto, Bruna Medina, Mário Faustino, Milena Ferreira, Tainá Lopes, Francis Pacagnelli

Project Mentor(s): Ana Paula Freire, PhD

Introduction: Smoking is a chronic disease, being the leading cause of preventable death worldwide. The use of technology has been a strong ally in cessation programs, but research analyzing efficacy of different modes of smoking cessation telemedicine on adherence rates is limited, especially in low- to middle-income countries. Therefore, investigating the efficacy of different technological intervention modes is clinically relevant.

Aims and Methods: To evaluate the effectiveness of synchronous telecare compared to use of a cell phone application on smoking cessation rates, withdrawal syndrome, and levels of anxiety and depression via the Wisconsin Smoking Withdrawal Scale (WSWS) and the Hospital Anxiety and Depression Scale (HADS). Questionnaires and the Fagerström Test for nicotine dependence were used to collect data on smoking habits. The participants were randomly divided into two groups: the Synchronous Telecare Group (STG) and the Application Group (AppG).

Results: This is a parallel pilot randomized control trial design, developed with 51 smokers [STG (n=29); AppG (n=22)]. There were no significant differences between groups at baseline. Analysis of WSWS and HADS scores revealed no significant differences between groups following intervention. No differences were found between groups in abstinence rate (p=1.000) or relapse frequency (p=0.43). The AppG presented an abstinence rate of 44.83% with an average relapse frequency of 1.0 ± 1.11. The STG presented an abstinence rate of 45.45% with an average relapse frequency of 0.79 ± 1.08.

Conclusions: Both STG and AppG showed similar cessation rates, withdrawal syndrome symptoms, and levels of anxiety and depression after the intervention.

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)

Keywords: Smoking Cessation, COVID-19, Telemedicine, Mobile Applications, Middle-Income Country

Clinical Physiology

Enhancing Quality and Credibility of Online Information for Primary Ciliary Dyskinesia: A Systematic Global Analysis

Ethan Grant; Vasiliki Gkatzou; Dagan Brett; Fiona Skinner; Hailey McNeill; Mark Elkins; Myrona Goutaki; Ana Paula Freire, PhD

Project Mentor(s): Ana Paula Freire, PhD

Primary Ciliary Dyskinesia (PCD) is a rare disease, and accurate, accessible online information is critical for patients. With two-thirds of individuals seeking health information online before consulting providers, concerns arise regarding the quality of web-based content. This study systematically evaluates online information about PCD based on consistency, credibility, quality, and readability. We selected 25 countries representing the world's ten most spoken languages, considering income level, population, and internet access. Using a Virtual Private Network (VPN), we searched "Primary Ciliary Dyskinesia" and analyzed the first 10 web pages per country. Evaluation criteria included consistency with PCD Foundation guidelines, Journal of the American Medical Association (JAMA) benchmarks for credibility, DISCERN scoring (5-point scale) for quality, and Flesch Reading Ease for readability. Two extractors independently collected and reviewed data. Thus far, 10 website sets from the United States have been analyzed. Professional organizations published 50% of the web pages. The average DISCERN score was 3.3 ± 0.94, indicating moderate quality with some notable gaps. The Flesch Reading Ease averaged 19.4 ± 21.9, correlating with a U.S. grade level of 13.03 ± 4.1, suggesting content is generally too complex for the average reader. Common issues noted in JAMA benchmarks included lack of author attribution and disclosure. Overall, credibility and readability can be improved for web-content on PCD. Improving these aspects is essential to support patient understanding and informed decision-making.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)

Keywords: Primary Ciliary Dyskinesia (PCD), Rare Disease, Health Information Quality, Online Health Resources, Patient Education, DISCERN Method, Website Credibility

Sex Differences to Standing on an Anti-Gravity Treadmill

Ali Kilmer, Marcus Manzardo, Amelia Stehr, Ella Jenson
Project Mentor(s): Tim Burnham, PhD; Eric Foch, PhD

The air pressure of the anti-gravity treadmill lifts the participant upward, reducing body weight (BW) up to 80%. This may provide enough pressure to increase venous return to the heart, leading to an increase in stroke volume and a decrease in heart rate. This is known as the baroreceptor response. Research in microgravity environments suggests that males and females may respond differently to unweighting. **PURPOSE:** Examine the sex differences in physiological responses to standing at 3 different levels of bodyweight: 100, 60, and 20%. **METHODS:** Fourteen subjects (7 male, 7 female),19-43 years, who ran at least 5 miles/week volunteered for the study. Each subject stood for 3 minutes under 3 conditions in a randomized order: 100%, 60%, and 20% of bodyweight. Oxygen consumption, heart rate, energy expenditure and O_2/ pulse were recorded. O_2/pulse was used as a surrogate for stroke volume. **RESULTS:** No significant differences ($p > .05$) were found when reducing bodyweight from 100 to 20% in heart rate, oxygen consumption, O_2/ pulse, or energy expenditure. However, heart rate dropped in males by 10 beats from 100-20% BW but had no change for females (males 82.7 > 72.7 bpm) Females (83.2 >82.9 bpm). This suggests the baroreceptor response is stimulated more in males while unweighted. **CONCLUSION:** While non-significant, heart rate did decrease while standing from 100% to 20% bodyweight in males but not in females. This might mean a sex difference in baroreceptor response, but further research is need before a definite conclusion can be reached.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Anti-Gravity, Baroreceptor Response, Unweighted

Running on an Anti-Gravity Treadmill: Physiological and Perceptual Responses

Marcus Manzardo, Ali Kilmer, Amelia Stehr, Ella Jensen, Robert Pritchett
Project Mentor(s): Tim Burnham, PhD; Eric Foch, PhD

The Anti-gravity treadmill is a conventional treadmill enclosed in a flexible chamber. This chamber seals around the waist and can be inflated with air. The air pressure lifts the participant upward, reducing body weight (BW) up to 80%. **PURPOSE:** Investigate the effects of BW reduction on physiological and perceptual responses while running. **METHODS:** Fourteen subjects (7 male, 7 female), 19-43 years, who ran at least 5 miles a week, volunteered to participate. Each subject ran at a speed that elicited an RPE of 11 “Fairly Light”, under 3 conditions in a randomized order: 100%, 60%, and 20% BW. **RESULTS:** Heart rate dropped significantly from 100% to 20% bodyweight (148>119 bpm) $p = .001$. RPE significantly decreased $p = .0002$, Oxygen consumption dropped significantly by 35% $p = .03$, energy expenditure decreased significantly by 38% $p = .005$. O_2/pulse decreased 22% but was not significantly different $p = .25$. **CONCLUSION:** Reducing BW from 100% to 60% to 20% while running on the Anti-gravity treadmill, resulted in significant reductions in heart rate, RPE, oxygen consumption and energy consumption. These reductions occur because a decrease in BW, decreased the physiological demand and the resulting RPE response. The Anti-gravity treadmill may have value for athletes rehabilitating from lower body injury by reducing impact and stress. This treadmill may have utility for those with orthopedic issues who cannot exercise at full BW. Running at reduced BW, reduces physiological and perceptual responses, and may be a useful tool in the rehabilitation of athletes or clinical populations.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Anti-Gravity, Run, Unweighted

Quality of Reporting and Validity of "Usual Care" interventions in Chronic Obstructive Pulmonary Disease Clinical Trials: A Systematic Review

Hailey McNeill, *Italo Ribeiro Lemes, Bo Warner, Jacob Crumb, Nathan Herde, Ryan Galindo, Marceli Rocha Leite, Ethan Grant, Mark Elkins, Francis Lopes Pacagnelli, Rafael Zambelli Pinto*
Project Mentor(s): Ana Paula Freire, PhD

"Usual care" is a term that can refer to a variety of control conditions in clinical trials. The lack of standardization of usual care groups can lead to several problems for clinical decision-making. Reviewing what the term "usual care" refers to in trials involving people with chronic obstructive pulmonary disease (COPD) will establish opportunities to improve the reporting and validity of usual care interventions in such trials. The aim of the study was to identify the most common types of "usual care" interventions used for COPD randomized control trials. In addition, to determine the extent of which usual care treatments are reported and comply with COPD guideline recommendations. We conducted a systematic review. Two investigators screened all titles/abstracts, full text articles, and independently extracted data. We extracted study characteristics, type of usual care described, and classification of usual care components as validated or unvalidated comparators. Descriptive statistics are reported for quantitative and categorical data. Results showed that 233 studies were analyzed with 304±802 participants in each study, among 51 different countries (51% from Europe). The most common forms of usual care were; educational programs used in 72 studies (30%), continued care with patient's doctor/ general practitioner used in 66 studies (28%), and adhering to published guidelines used in 48 studies (20%). Out of these studies, 119 (51%) reported using COPD guideline recommendation for usual care groups. We conclude that nearly half of usual care definitions didn't adhere to COPD guidelines, and characteristics varied widely among studies.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: COPD, Usual Care, Standard of Care, Randomized Clinical Trials

Impact of a Work-Integrated Learning Program Using a Podcast

Sarah Sieckowski; Jacob Crumb; Kelly Pritchett, PhD; Robert Pritchett, PhD
Project Mentor(s): Ana Paula Freire, PhD

The objective of this research was to explore the impact of a Work-Integrated-Learning (WIL) initiative using podcasts as a tool for undergraduate students in health and rehabilitation sciences. A survey-based study was conducted at the Health Sciences department of Central Washington University. Undergraduate students were recruited and randomized into one control and one WIL group. The WIL group participated in a 12-week podcast internship, engaging in research, content development, social media management, and podcast production. Meanwhile, the control group continued with their regular coursework. All participants completed an online survey assessing self-efficacy, confidence, satisfaction, and learning engagement. The intervention included training in research methods, health communication, podcasting, and social media engagement, with students contributing to content development and audience engagement. The podcast featured health professionals discussing topics such as kinesiology, nutrition, and public health. Results from the Student Outcomes Survey revealed that the WIL group showed increased satisfaction and self-efficacy. Results showed that 100% of the WIL group reported developing problem-solving skills, compared to 66.66% in the control group. Self-efficacy and learning engagement also increased in the WIL group, with 100% reporting confidence in completing work at the final assessment, compared to 66.66% in the control group. Regarding learning engagement, 100% of the WIL group were inspired by health sciences content, compared to 83.33% in the control group. The study suggests that podcast-based WIL initiatives can effectively enhance digital literacy and communication skills in health science education, with the need for further research to assess long-term benefits.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Work-Integrated Learning, Podcast, Healthcare Education

Physiological and Perceptual Responses to Three Different Wheelchairs

Bo Warner; Zack Sundt; Ali Kilmer; Amelia Stehr; Rayann Davis; Ella Jensen; Jacob Cruz; Olorunfemi Ayodele; Robert Pritchett, PhD; Karen Roemer, PhD; Tim Burnham, PhD
Project Mentor(s): Tim Burnham, PhD; Robert Pritchett, PhD; Karen Roemer, PhD

Human propulsion of a handrim wheelchair puts an increased strain on the upper body musculature, in part because mechanical efficiency is reported to be quite low 11% (Veeger 1992, Van der Woude (2001). Wheelchair propulsion can be influenced by several factors including overall mass, frame and wheel characteristics (Sagawa, 2010). Due to this, there are a variety of handrim wheelchairs that have been developed and designed for specific sports. Some of these sports include wheelchair basketball, rugby, tennis, and wheelchair triathlon. These different chairs may have different and physiological outcomes depending on their design and purpose. **PURPOSE:** Examine the physiological differences between 3 different purposed wheelchairs (Everyday, Court, Race). **METHODS:** 7 able bodied (non wheelchair bound), recreationally active, healthy people, between the ages of 18 and 43 years were recruited as subjects. Each subject wheeled each chair for 4 minute bouts at both 20W and 40W. Heart rate, oxygen consumption, respiratory exchange ratio, efficiency, and both full body and upper body RPE were collected. **RESULTS:** There were no significant differences ($p>.05$) between chairs for heart rate, VO_2, efficiency. Efficiency at 20W was quite low for all chairs (10%) but improved to 11.8% at 40W. At 40W the race chair showed the highest heart rate and RPE (both full and upper). **CONCLUSION:** No significant differences were found in the variables between chairs in this preliminary investigation. More data needs to be collected to determine the physiological differences between the 3 chairs.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Wheelchair, Efficiency, Handrim, Treadmill, Physiological

Nutrition

Prevalence of Diabetes Related to Acculturation, Dietary Quality, and Sedentary Lifestyle in Mexican Americans: National Health and Nutrition Examination Survey, 2011 to 2018

Kivima Acevedo
Project Mentor(s): David Gee; Katy Williams; Kathaleen Briggs-Early, PhD
Objective: This study examined the prevalence of diabetes in Mexican American adults (MA-adults) and how risk factors like acculturation, dietary quality, and sedentary lifestyle contribute to the rising rates of diabetes, using the National Health and Nutrition Survey (NHANES) 2011 to 2018 data.
Methods: We analyzed the NHANES data for MA-adults and Non-Hispanic Whites (NHW) (n = 10670). We analyzed the association of diabetes and its risk factors (dietary habits and sedentary lifestyle) by acculturation levels. Diet quality was assessed using the Healthy Eating Index (HEI), which quantifies how closely the diet follows the Dietary Guidelines for Americans. **Results:** MA-adults exhibited substantially higher rates of diabetes (12.8%) compared to NHW (8.75%). Key risk factors contributing to the prevalence of diabetes included age (60+), body mass index (BMI)($\geq$ 25 kg/m$^{2)}$, and low educational attainment (high school education). Highly acculturated MA-adults had poorer diet quality (HEI = 50.4). Low acculturated MA-adults had a higher diabetes prevalence (18.2%) despite having the highest diet score (HEI = 55.4). MA-adults had higher diabetes rates at all levels of sedentary lifestyle compared to NHWs, particularly those reporting over eight hours of sedentary lifestyle.
Conclusion: Acculturation, sedentary lifestyle, and diabetes prevalence among MA-adults did not show a linear relationship. Diabetes risk was partially explained by age, BMI, and low educational attainment (high school education). A low sedentary lifestyle had the lowest prevalence of diabetes among MA-adults. Low-acculturated MA-adults had the highest Healthy Eating Index (HEI) scores, reflecting better dietary quality compared to their more acculturated counterparts.
Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Mexican American, NHANES, Diabetes, Acculturation, Sedentary Lifestyle

Fueling Habits, Risk for Disordered Eating, and Exercise Dependence in Male Recreational and Competitive Cyclists

Kimberly Biladeau
Project Mentor(s): Kelly Pritchett, PhD, RDN, CSSD; Robert Pritchett, PhD
Pressures to maintain a higher power to mass ratio, manipulate body composition, and meet specific training demands for the sport of cycling may negatively affect fueling practices. Thus, potentially leading to disordered eating (DE)/eating disorders (ED), and exercise dependence (EXD). ***PURPOSE:*** The purpose of this study was to examine fueling habits, risk of DE, and EXD in male recreational vs. competitive cyclists. ***METHODS:*** Male cyclists (n=189), between the ages of 18-40, participated in a cross-sectional study through an online Qualtrics questionnaire. Questions included self-identification as either a recreational or competitive/professional cyclist, exercise behaviors, history of injury, and carbohydrate intake during training and races. Questions included validated questions from the Disordered Eating Screen for Athletes (DESA-6) and Exercise Dependence Scale-21 (EDS-21) questionnaire. ***RESULTS:*** 29.1% cyclists were at risk for DE based on the DESA-6. 86.2% were non-dependent symptomatic for EXD, and 3.7% were at risk for EXD. 34.4% of cyclists reported not fueling with carbohydrates during races, and 24.9% reported not fueling during training lasting >1 to 2.5 hours. While 41.8% didn't meet the recommendations for carbohydrate intake when training > 2.5 hours, and 25.4% didn't meet recommendations during races lasting >2.5 hours. ***CONCLUSION:*** These findings highlight a concerning prevalence of risk for DE, symptoms of EXD, and suboptimal fueling habits in recreational and competitive cyclists. Therefore, emphasizing the need for education/interventions from a Registered Sports Dietitian to promote adequate fueling for training and races.
Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Male, Cyclist, Recreational Cyclist, Competitive Cyclist, Disordered Eating, Exercise Dependency, Fueling Habits

Risk of Disordered Eating, Exercise Dependence, Body Weight Satisfaction and Fueling Habits in Masters Cyclists

McKenna Longtain
Project Mentor(s): Kelly Pritchett, PhD, RDN, CSSD; Robert Pritchett, PhD
Introduction: Masters athletes (aged 41–65) represent a growing demographic in endurance sports. While there are many benefits of engaging in regular physical activity, the associated training demands and competitive involvement may also increase the risk of disordered eating (DE) and exercise dependence (EXD). This study examined the prevalence of DE risk, EXD risk, body weight dissatisfaction, and fueling habits among Master cyclists. **Methods:** A total of 212 Masters cyclists (95 female, 117 male) completed a cross-sectional survey that included the Disordered Eating Screen for Athletes (DESA-6) and the Exercise Dependence Scale-21 (EDS-21). Additional questions were asked about body weight satisfaction, carbohydrate intake during training and races, and self-identified performance level. **Results**: The DESA-6 identified 51.6% of female and 32.5% of male cyclists as at risk for DE. The EDS-21 classified 74.7% of females and 79.5% of males as non-dependent symptomatic for EXD. Additionally, 80% of female and 87% of male cyclists reported dissatisfaction with their weight in the past three months. **Conclusion:** The current study suggests that there is a high prevalence of DE risk, EXD symptoms, and body dissatisfaction among Masters cyclists. The results demonstrate a need for further research, preventative education, routine screening, and support systems to further support the health of Master cyclists.
Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Masters Athlete, Cycling, Carbohydrate Intake, Body Satisfaction, Disordered Eating, Exercise Dependence

Reducing Saturated Fat Content in Japanese Cheesecake by Replacing Butter With Vegan Butter and Vegetable Oil

Tianyi Mao, Jocelyn Manzanarez
Project Mentor(s): Tafere Belay, PhD

This study aimed to create a modified Japanese Cheesecake with reduced saturated fat while maintaining the original taste. In the U.S., excess saturated fat intake has become a concern since it increases the risk for atherosclerosis and cardiovascular disease by raising the low-density lipoprotein concentration in the blood. There are three versions of Japanese Cheesecakes made for this study by using the recipe from Runaway Rice with either vegetable oil, unsalted butter, or vegan butter. Sensory tests involved 30 judges and 6 tests in two days. Day 1 included two Extended Triangle Tests and an Overall Preference Test comparing all variations. Day 2 was intensity tests on tenderness, chewiness, and moistness. Objective tests measured height, penetration force, and moisture content. The result showed no significant differences in preference and all intensity tests for vegetable oil and vegan butter compared to the control. The extended triangle test found a significant difference between the control and vegetable oil but not vegan butter. Objective test results showed no significant difference in moisture, but the control was significantly different from vegetable oil in height and from vegan butter in penetration force. Overall, vegan butter is a great alternative to reduce saturated fat in Japanese Cheesecakes, as judges were not able to tell the difference from the control.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Japanese Cheesecake, Saturated Fat, Butter, Vegetable Oil

Focus Group Interview: Perspectives of Virtual Dietary Counseling Method's Post COVID-19 Pandemic

Maria Mendoza, Delaney Cobbs
Project Mentor(s): Nicole Stendell-Hollis, PhD; Katy Williams; Tafere Belay, PhD

In response to the prevalence of morbidity and mortality, studies to avert these conditions in a cost-effective and accessible manner are also increasing. Developing new methods to provide nutrition education that are more accessible is critical to reaching individuals who may experience socioeconomic barriers impacting their ability to access healthcare. The purpose of this study is to examine the perceptions related to different methods of dietary counseling. This qualitative research study will examine the perceptions related to different methods of dietary counseling (telephone calls, Zoom meetings, or face-to-face visits). Focus group one contained provider participants (n=7) which were all RDNs currently working in the Wenatchee area, Washington. Focus group two hosted patient participants (n=6) located from the Wenatchee Valley area. Semi structured interviews were performed asking subjects about any personal experiences related to receiving or providing nutrition education, positive or negative, as they participated in telehealth. Following the thematic analysis, three main themes were discovered: the adaptability of telehealth, nuanced perceptions of telehealth, and barriers to effective virtual care. Telehealth as a dietary counseling method is complex and offers a combination of strengths and weaknesses. For the improvement of nutritional care via telehealth, future research should assess the importance of specific applications and developing formalities related to virtual care.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Telehealth, Dietary Counseling Methods, Nutrition Education, Rural, Nutrition Care

Produce Prescription Program in a Rural Medicaid Population

Lupita Silva-Garcia
Project Mentor(s): Nicole Stendell-Hollis, PhD, Tafere Belay, PhD

Kittitas County residents experience higher rates of food insecurity, limited access to healthy foods, and are more likely to live in food deserts than other Washington state residents. As a result, patients using Medicaid in Kittitas County may face increased risk of poor health outcomes. This study evaluates whether a Produce Rx program in Kittitas County can enhance overall health, decrease healthcare utilization and costs, and improve nutrition self-efficacy for patients using Medicaid with diet-related conditions. In this three-year collaborative project, participants receive weekly boxes of fruits and vegetables (FVs) from Community Supported Agriculture (CSA) partnerships at a local food bank, along with nutrition education such as weekly newsletters, monthly skill sheets, quarterly cooking demonstrations, and monthly tastings of FVs. In collaboration with community partners from the food and healthcare systems, we analyzed data and evaluated the first-year cohort of the study (n=12). Early findings suggest that there is no statistically significant difference in FV intake between pre- and post-intervention; however, the mean FV intake at baseline (2.5 ± 0.62) and endline (2.66 ± 0.95) is higher than the national average for U.S. adults, suggesting clinical significance. No significant associations were found in perceived health outcomes or food security at baseline and post-intervention. These results may have been impacted by the small sample size. As these findings reflect only the first year of the initiative, further analysis of data from years two and three will help determine long-term program impact.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Nutrition Intervention, Produce Prescription Program, Medicaid Patients, Rural Health

Effects of Adding Allulose to Fortune Cookies to Reduce Sugar Content

Rocio Luz Valdovinos-Lopez
Project Mentor(s): Tafere Belay, PhD

Allulose is a rare sugar found naturally in small quantities in certain fruits, which has a similar taste and mouthfeel to regular table sugar but with significantly fewer calories. The focus of this study was to interchange the sugar content in fortune cookies for 25% allulose that would represent a “good source” of reduced sugar as allulose as 0.4 calories per gram whereas table sugar has 4 calories per gram. Also, there was a 50% allulose that would represent an “excellent source” of reduced sugar of a fortune cookie. Twenty-seven judges were recruited from Central Washington University’s campus to participate in the sensory evaluation of these fortune cookies using a 9-point hedonic scale with each test. Panelists could almost not differentiate ($p < .05$) between the reference (“R”) fortune cookies and the 25% variation of fortune cookies upon completion of a Duo-Triangle Test. Extended testing of Preference, Tenderness, Sweetness, and Flakiness indicated further that the variable made an acceptable comparison to the control. Objective evaluation of Diameter, Moisture Content, Color Analysis, and Compression Force indicated that the fortune cookies exhibited similar physical properties. There was, however, a difference in Penetration force (texture) between the products suggesting that the control fortune cookies resulted in a more flakiness product. Data was analyzed using ANOVA and Tukey’s LSD. Overall, the 25% allulose produced as a “good source” of reduced sugar proved to be an acceptable product in comparison to the control of fortune cookies.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Experimental Food Research Study

Characteristics Contributing to the Risk of Diabulimia in Adults Living in the United States

Danielle Van Hout
Project Mentor(s): Nicole Stendell-Hollis, PhD; Tafere Belay, PhD; Kelly Pritchett, PhD
Type 1 Diabetes Mellitus (T1DM) is an autoimmune disorder characterized by damaged pancreatic beta cells that accounts for approximately 5-10% of individuals with diabetes. This leads to dysregulation of blood glucose levels, prolonged hyperglycemia, and a dependence of exogenous insulin. Due to the complexity of diabetes, individuals with T1DM have an increased risk of eating disorders, as well as diabulimia, which is currently underrepresented in research. Diabulimia is characterized by the restriction or omission of insulin to lose weight leading to many metabolic complications. This study assesses the factors contributing to the risk of diabulimia in adults using the Diabetes Eating Problem Survey-Revised (DEPS-R). This observational study involves a Qualtrics survey distributed via various social media outlets, and flyers placed on the CWU Ellensburg campus. Participants had to be 18 years or older, diagnosed with T1DM for more than one year, and live in the U.S to qualify. The 30-question survey included the DEPS-R to screen for diabulimia and demographic data. There were 112 participants included in analysis. The mean age of the sample was 29.89 years which included 42 (37.2%) males and 68 (60.7%) females. Of the sample, 43.8% were at risk for diabulimia. Gender ($p=0.532$), age ($p=0.458$), BMI (0.111), diabetes education ($p=0.869$), and HbA1C ($p=0.158$) were not significantly associated with risk. However, a previous eating disorder diagnosis ($p=<0.001$), insulin restriction ($p=<0.001$), and race ($p=<0.001$) were significantly associated with risk. In conclusion, study results indicated a need for frequent screening, increased education, and increased research in males.
Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Diabulimia, Type 1 Diabetes Mellitus, DEPS-R, Eating Disorder

Information Technology Management

Organizational Change Analysis of Central Washington University Dining Services

Betony Burch
Project Mentor(s): Elizabeth Fountain
The larger and longer running any organization is, the more likely it is to develop inefficiencies which go unnoticed in daily operations. Such organizations can benefit from thoughtful analysis. Potential opportunities for improving efficiency may be identified. As a sizable department within the greater university structure, by necessity Central Washington Dining Services is administratively complicated. The department has different functional units, operates across multiple shifts every day, and employes over 250 student employees in addition to student staff.

Through review of university publicly released data, personal interviews, and academic research, Dining Services is analyzed utilizing the Bolman & Deal's Four Frames, the 7-stage Strategic Management Process, and SWOT. From that analysis, multiple recommendations will be made, with consideration of the pros and cons of each. The most viable recommendation will then be expanded on utilizing Kotter's change model.
Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: IT Management, Business Process Management, Strategic Management, Organizational Analysis, SWOT, Four Frames

Innovation of Sustainable Technologies: The Future of Energy Conserving Hardware in Data Centers

Brooke Cruz
Project Mentor(s): Susan Rivera, PhD

The US is confronting a growing energy demand crisis, with analysts projecting a 2.4% rise in data center energy consumption by 2030. Data centers are major energy consumers, with primary usage concentrated in IT equipment and extensive cooling systems. While Power Usage Effectiveness (PUE) remains the leading metric for assessing energy efficiency, it is limited to assessing total facility energy and IT energy use without accounting for environmental and social impacts.

Supplementary metrics of data center energy consumption include Water Usage Effectiveness (WUE) and Carbon Usage Effectiveness (CUE), which measure water use and carbon emissions, respectively, per kilowatt-hour (kWh) of IT energy use. These metrics provide insight into the environmental cost of energy sources, however, are limited by variability based on geographic location, energy grid composition, and a lack of standardization. Emerging technologies like the COOLERCHIPS (Cooling Operations Optimized for Leaps in Energy, Reliability, and Carbon Hyperefficiency for Information Processing Systems) program aim to enhance the energy performance of data centers by improving microchip efficiency and optimizing hybrid cooling systems that use both air and liquid coolants. These innovations show promise in reducing energy metric scores, but a more integrated framework is necessary to capture the complexities of sustainable data center operation. This review explores the pressing issue of data center energy consumption in the U.S., critically examines current and emerging efficiency metrics, and emphasizes the need for more holistic, adaptable solutions. As digital infrastructure expands, prioritizing energy and environmental efficiency is vital to ensuring sustainable growth in large-scale industries.

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: Sustainability, Data Centers, Energy Consumption, Digital Infrastructure, Artificial Intelligence (AI)

Robots Replacing Humans in Workplace (Aviation)

Malika Daniyar
Project Mentor(s): Hideki Takei, DBA

Many people have lost their jobs as a direct result of robotics. However, after learning more in depth about this topic, particularly in aviation, I don't believe that people will be able to be replaced by robots. Indeed, there are a number of jobs that can be replaced by robots, such as cashiers, but since the aviation sector is so important to our safety, I think robots can be used in it for tasks like autopilots. However, they cannot completely replace workers in the aviation industry, notably those in the lowest-paying positions, like ramp agents.

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: Robots, Human-beings, Employment, Aviation

Global Trends in AI-Driven Product Development: A Cross-Country Analysis

Shilpa Dhananjayan

Project Mentor(s): Hideki Takei, DBA

Artificial Intelligence (AI) is transforming industries and accelerating global innovation, yet its benefits remain unevenly distributed. A nation's AI readiness is its capacity to adopt and implement AI technologies—plays a crucial role in economic growth and technological advancement. Key determinants of AI readiness include digital infrastructure, data accessibility, government policies, research and development (R&D) investment, and workforce development. This study examines the relationship between AI readiness, AI adoption, innovation, R&D investment of a nation, Digital Infrastructure Index (DII) and Human Capital Index (HCI) using a Random Forest regression model. Findings reveal a strong correlation between AI adoption and innovation ($r = 0.80$), emphasizing the need for a conducive environment to drive innovation. R&D spending also contributes to innovation ($r = 0.65$), reinforcing the notion that nations investing in research and development gain substantial benefits. Digital infrastructure emerges as the strongest predictor of AI readiness ($r = 0.961$), highlighting the critical role of government investment in fostering innovation. However, maximizing its benefits requires well-designed policies and market integration strategies. These findings highlight the critical role of strategic investments in fostering AI-driven innovation. Strengthening digital infrastructure and labor policies can enhance AI preparedness and technological competitiveness. Future research should explore optimization strategies for resource-constrained economies and the long-term impacts of AI-driven growth.

Presentation Type: Recorded (https://www.youtube.com/@cwusource5518)

Keywords: AI Readiness, AI Adoption, Innovation, R&D Investment, Digital Infrastructure, Human Capital Index (HCI), Random Forest Regression, Government Policies, Technological Competitiveness, Economic Growth

Optimizing Cybersecurity Through AI Predictive Analytics and Human Expertise

Cathy Mae Dutong

Project Mentor(s): Hideki Takei, DBA

As cybersecurity threats evolve in complexity and scale, the reliance on artificial intelligence (AI) has become increasingly prevalent across both public and private sectors. This study examines the dual role of AI-driven predictive analytics in strengthening organizational cybersecurity, while addressing the ongoing need for human oversight. Through a mixed-method approach, combining survey data from cybersecurity professionals with an extensive literature review, this research analyzes AI's capacity to detect emerging threats, the systemic challenges associated with AI integration, and the indispensable role of human expertise in interpreting AI outputs. Findings indicate that while AI enhances proactive threat detection, its efficacy is limited by false positives, system incompatibility, and skill gaps within existing cybersecurity teams. This paper proposes the **AI-Cybersecurity Optimization Framework (AICOF)** as a strategic model to guide organizations in harmonizing automation and human expertise, fostering a more resilient cybersecurity posture. The findings underscore the importance of continuous learning, ethical oversight, and cross-disciplinary collaboration in ensuring the long-term success of AI adoption in cybersecurity.

Presentation Type: Recorded (https://www.youtube.com/@cwusource5518)

Keywords: AI, Cybersecurity, Predictive Analytics, False Positives, Automation, Human Expertise

CWU's Electronic Management: A Success Story in Sustainable Practice

Srijita Gurung
Project Mentor(s): Susan Rivera, PhD
Purpose: This research examines how Central Washington University (CWU) manages electronic waste (e-waste) to promote economic, environmental, and equitable sustainability practice. In February of 2024, Computer Support Services (CSS) started a computer reconciliation project which is vital due to Windows 10 sunsetting after October 14, 2025, and no longer receiving software support. This project tracks and documents the life of electronic assets, with a focus on the role of Surplus and IT Asset Disposal (ITAD) companies. **Method:** The primary research methods involve interviews, online research of active devices and their specifications using tools like Microsoft Intune, Configuration Management, and physical reconciliation to find misplaced and unused devices. **Results:** CSS reconciliation project strategy includes tracking devices for reuse or recycling. We found three hundred unused devices during physical checks in storage closets. Reusing these devices instead of purchasing new ones saved the university approximately $240,000, helping reduce waste and support economic sustainability. Devices rendered obsolete by CSS are transferred to the Surplus and Asset Management Department, which plays a significant role in CWU's e-waste management by providing methods of reuse to the community. Devices that cannot be repaired, reused, or refurbished are recycled using a validated ITAD company. **Conclusion:** This research highlights the importance of sustainable practices within the e-waste disposal process at a state-supported regional higher education organization. The project team identified economically feasible methods to increase electronics recycling, including service learning and community outreach.
Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: Electronic Management, Sustainable Practice

Building Career Pathways: Investigating the Potential for a Cooperative Education Program for Graduate ITM Students at Central Washington University

Liam Holland
Project Mentor(s): Susan Rivera, PhD
This research examines the feasibility of introducing a cooperative education (co-op) program at the master's level in the Central Washington University (CWU) ITM Department. Methods included a review of existing co-op programs, analysis of interviews with past co-op students, and an examination of survey data on student interest in graduate-level cooperative education. The study aims to identify key elements of effective co-op programs and assess demand for such programs. The analysis of current co-op models offers insights into program structure, industry engagement, and student success. The 2019 NACE Internship & Co-op Survey found that 50.2% of co-op students receive job offers from their co-op employers, highlighting the impact of co-op programs on employability (National Association of Colleges and Employers, 2019). Interviews revealed the long-term benefits of co-op programs for students, employers, and institutions, supporting the proposal for a co-op program at CWU. Survey results showed strong student interest, with 74% of respondents expressing interest in participating in a co-op program. These findings provide a foundation for developing a graduate-level co-op program that enhances career readiness and student outcomes. The findings also support the integration of a co-op program into the CWU ITM Department.
Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: Cooperative Education, Work-integrated Learning, Graduate Education, Career Readiness, Student Success

Cybersecurity Training and Awareness

Kelvin Kipchirchir
Project Mentor(s): Hideki Takei, DBA

Cybersecurity threats are constantly evolving, with human error accounting for over 80% of data breaches. This research evaluates the impact of cybersecurity training on employee awareness and organizational security posture. Data was gathered through employee surveys and phishing simulations to measure knowledge improvement, compliance rates, and incident reduction before and after training implementation. The study found that well-structured training programs significantly enhance employee knowledge, decrease phishing susceptibility by up to 30%, and reduce overall security incidents. Additionally, organizations that implement regular, interactive cybersecurity education methods such as simulations and hands on experience saw up to 70% reduction in risks related to human error. This shift not only improves compliance with security policies but also fosters a proactive cybersecurity culture. The research recommends that organizations establish ongoing training and reinforcement mechanisms to strengthen the human firewall and sustain improvements in their cybersecurity posture. Ultimately, the findings underscore the importance of continuous education as a strategic defense against ever-changing cyber threats.

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: Cybersecurity, Awareness, Human Error, Training, Risk Reduction, Policy Compliance, Phishing Simulations, Organizational Security

Managing Projects Remotely in COVID-19 Pandemic

An Hong Phuc Nguyen
Project Mentor(s): Hideki Takei, DBA

This research explores the impact of digital tool utilization and top management support on remote project management outcomes during the COVID-19 pandemic. The rapid shift to remote work necessitated by the pandemic compelled organizations to adapt their communication and project management practices, highlighting the importance of both effective leadership and appropriate technology (Byrnes et al., 2021). Due to the arising challenges posed by the lockdown, this study examines the correlation between leaders' support, and the selection and implementation of project management software to identify if project management was effective. By analyzing existing literature and drawing on relevant studies, this paper provides insights into optimizing leadership strategies and technology integration to achieve successful project delivery in a remote work environment. Key factors such as the ease of use of digital tools, the mitigation of miscommunication, and the alignment of software solutions with organizational needs are considered. Ultimately, this research contributes to a better understanding of how organizations can navigate the challenges and opportunities presented by remote project management.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Remote Project Management, COVID-19 Pandemic, Digital Platforms

Engaging CWU Students in Creation of a Project Management Club

Jayma Schell, Austin Stewart
Project Mentor(s): Laura Williamson

A project management (PM) club can be a game-changer for student career success, especially for those looking to build leadership, organization, and teamwork skills. The PM club could serve as an avenue to build the following student skills:

Students gain hands-on experience in planning, executing, and managing projects. Learn to use PM tools like Trello, Asana, Microsoft Project, etc. PM skills are in demand across industries—engineering, business, tech, and healthcare.

Exposure to the PMP/CAPM certification paths gives a head start. Connect with like-minded peers, faculty, and industry professionals. Opportunities to meet guest speakers, attend workshops, or visit companies. Build relationships that could lead to internships or job offers. Students can take on roles like project lead, event coordinator, or treasurer. Learn how to manage teams, resolve conflicts, and delegate tasks. Build confidence and communication skills.

Understand the variety of roles within project management (e.g., PMO analyst, scrum master). Gain insights from professionals through Q&As or mentorship programs. Competitions, certifications, and achievements add value to your academic journey. Some clubs get sponsorship or recognition from PMI (Project Management Institute). It helps students turn theory into impact, build a strong portfolio, and stand out in the job market. This Source project would document the process for creating the club, with initial results presented.

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: ITM (Information Technology Management), Project Management, Leadership, Collaboration, Communication, Organization, Time Management, Strategic Planning, Execution, Risk Management

CySER Ethics in AI – Balancing Innovation and Privacy

Madison Silvan, Sam Hermenet, Ayden Mooney, McKenzie Manley, Martin Heimann
Project Mentor(s): David Douglas, Ed.D; JonCharles Tenbusch

AI is in all areas of our lives and causes a multitude of ethical dilemmas. AI's ease of use, quick data analysis, and ability to answer difficult questions make it a valuable tool in work, school, and life. With that comes risk in the form of privacy and ethical and legal concerns. The continual evolution of AI causes issues within the legal and regulatory systems that struggle to stay relevant and applicable. Through this project, we have examined Washington state and federal law and research databases and have analyzed the privacy policy within the Microsoft 365 Suite. We are students within the CWU ITM Cyber major, participating in VICEROY Northwest Institute for Cybersecurity Education and Research (CySER), with one of us working at the CWU IS Service Desk. Discussion will surround current laws, ethical considerations, and cybersecurity issues. Additionally, information will include balancing data collection, privacy concerns, and views and information on current and future legislation. Information will be given on how to think critically and ethically with the use of AI.

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: Artificial Intelligence, Ethics, Privacy, Cyber Security, Relevance, Misinformation and LawsSport and Movement Studies

Promising Prospects for a Fulfilling Future: A Literature Review of Pacific Northwest Agritech Solutions

Edyn Totten
Project Mentor(s): Susan Rivera, PhD
We are amidst a global mobilization towards efforts to combat the harmful effects of climate pollution. To this end, there are innumerable strategies that we can and should research, develop, and implement. Regenerative agriculture prevails as one of the strongest of these strategies, and the growing industry of agritech presents an opportunity to facilitate its implementation. Though technology has long since been a part of agriculture, agritech as it is colloquially understood today has naturally evolved out of precision agriculture. For the purposes of this research, agritech is defined as the application of modern technology to agricultural practices, including but not limited to the use of robotics, data analytics, and artificial intelligence. Further, a focus on what solutions are most effective and feasible in a familiar Pacific Northwest region increases the efficacy with which we can prescribe solutions to similar climates. Further, this information could potentially elucidate which differences stand between applying these solutions elsewhere. Identifying, assessing, and discussing our agritech solutions could play a part in encouraging a widespread adoption of regenerative agriculture and reducing the threat of climate pollution.
Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Agritech, Regenerative Agriculture, Data Science, IOT, Pacific Northwest, Washington, Oregon, Idaho

Military Science

Sustainability and Climate Progress within Today's Military

Jakob McInerney, Madison Vandenberg
Project Mentor(s): Tamara Caulkins
The purpose of Military Science Leadership (MSL 402) class is to prepare ROTC students to lead soldiers as an officer in the United States Army. During this class, we learned one of the greatest threats our military faces today is the effects that Human Induced Climate Change is bringing on our planet. This is contributing to many natural processes around the globe and causing them to occur faster than ever before in human history. Examples of these include more frequent extreme temperatures (hot and cold), extreme weather events (floods, hurricanes, tornados, rain, hail, snow, etc.), melting of Arctic ice, and rising of sea levels. The impacts of these are changing the way that the military needs to operate. Furthermore, the opening of previously untraversable areas in the Arctic Sea to travel has created new security concerns that will need to be addressed. The military is investing heavily to adapt to these changes as well as becoming more sustainable as an organization. As an ROTC program, there are several steps we are taking to implement our own sustainability programs. We began by planting willow branches to create shade for fish around the pond at Helen McCabe Park in collaboration with the Kittitas Environmental Education Network (KEEN). This improves habitat for native fish populations, and the addition of trees helps to trap and store carbon dioxide, keeping it out of our atmosphere. Also, we have adopted the stream at McElroy Park in Ellensburg and have committed to keeping it clean monthly.
Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Military, Sustainability, Climate Change, Tree Planting, Fish Habitat, Stream Cleaning

Sport and Movement Studies

Resilience Through Dance

Hailey Samarel
Project Mentor(s): Taylor Bir
This presentation showcases a dance piece that I have created over the time span of a few years. In 2021, I was diagnosed with an autoimmune disease that changed everything for me. During this extremely difficult period in my life, the most challenging part was being away from dance. Dance is my ultimate passion, and so it hurt to be disconnected from that. I was only able to be out of bed for a certain amount of time everyday which was not for very long. So, every night I would get out of bed and choregraph tiny sections of this solo. I could only tolerate a few minutes at a time, but I kept persevering every day. Before I knew it, I had created this solo over the time span of one year. This piece explores me finding myself through dance again after having that privilege be taken away from me. It elaborates on my favorite aspects, concepts, elements, and qualities within dance. Creating this piece was one of the only things that kept me going. As time has gone on, I have kept this dance close to my heart. I feel that this piece is ready to see the light of day and I am excited to finally get to present it after all of these years. I remember being in bed wondering if I was ever going to be able to fully dance again, but here I am today showcasing this piece that is literal representation of that.
Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: Dance, Resilience, Hope, Passion, Overcoming, Strength, Perseverance

CLI Intensive and Choreographing View

Kieran Smythe
Project Mentor(s): Gabrielle McNeillie
At this intensive, I will be taking classes from experts in the field of street-style dance forms. over the 4 day period, I will be attending a set amount of classes per day, along with lectures and discussions. This is important to me because I want to learn more about what it is like to work in the professional field of dance in the future and how I can implement this information here at Central. CLI Dance Conservatory is a pre-professional dance program that offers both intensive and full-time training. The program offers training with some of the top choreographers and teachers in the field. Some of the teachers that I will work with have done national commercials and own studios, Along with traveling around the world to teach and compete with their dance groups. This is important to me because I want to learn more about working in the professional field of dance, and how I can implement this information during my time here at Central.
Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: Dance, Choreography, Process, Intensive

College of the Sciences

The College of the Sciences has presentations from the following departments and programs:

- Anthropology
- Biological Sciences
- Chemistry
- Computer Science
- Craft Brewing
- Cultural and Environmental Resource Management
- Environmental Studies
- Geography
- Geological Sciences
- Law and Justice
- Mathematics
- Physics
- Political Science
- Primate Behavior and Ecology
- Psychology
- Sociology

Anthropology

Analysis of 80 Paleontological Specimens From the Klucking-Beck Collection

Austin J. Baird

Project Mentor(s): Patrick Lubinski, PhD

Drs. Edward Klucking and George Beck were CWU professors from 1925 – 1994 and they had an extensive collection stored away on campus. Many vertebrate fossils in their collections have never been identified and have little to no location data attributed. I analyzed a sample of 80 specimens using comparative modern skeletons in the CWU Zooarchaeology Lab and paleontological publications. Many consisted of mammal remains from unknown species with a mix of mineralized and non-mineralized bones. Identified specimens included 27 mammoth or likely mammoth, 2 camelid (*Titanotylopus* sp. and unknown), 3 large bison, 3 gar scales from the Bridger Formation, bighorn sheep from Ginkgo, and a rhinocerid mandible.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)

Keywords: Bones, Camelid, Edward Klucking, George Beck, Fossils, Mammoth, Mammal, Paleontological, Zooarcheology

Early Holocene Stone Tool Technology: Sanders Site Kittitas Country, WA(45KT315)

Jesse Garoutte, Spencer Mitchell, Avery Goodall, Madalyn Hagen

Project Mentor(s): Steven Hackenberger, PhD; Patrick McCutcheon, PhD

The Sanders Site (45KT315), excavated in the 1970's by CWU, is located on the Yakima Army Training Center. We are interested in the stone tool technology found in the lowest components of the site dated between 4,000 and 10,000 years ago. The earliest/lowest levels of the site contain large amounts of chert fragments (debitage), some of which were produced by heat treatment. Heat treatment is the intentional and controlled heating of lithic raw material that makes the material's fracturing more predictable when being flaked into a stone tool. We are investigating three questions: (1) Can we find evidence of an oven where stone was baked, and can radiocarbon assay date bone directly associated with heat treated stone 4-10K levels/strata (Levels 20-35, Strata 4-7), (2) What proportion of the stone is heat treated, and can we identify the reductions stage when the stone is baked? And (3) How does the early appearance of heat treatment in the early occupation compare with other early sites in the region? The project, supported through Garoutte's CWU Dr. Corrine Farrell Scholarship (and supplemented by OUR and Provost awards), is helping us document perhaps some of the earliest evidence of heat treatment in the Pacific Northwest.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)

Keywords: Sanders Site, Heat Treatment, Lithic, Stone Tool Technology, Early Holocene, Yakima Uplands, Pacific Northwest

Holocene Sediments and Environment: Sanders Site Kittitas Country, WA (45KT315)

Spencer Mitchell, Steven Hackenberger, Avery Goodell, Jesse Garoutte, Madalyn Hagen
Project Mentor(s): Steven Hackenberger, PhD

Sedimentation and soil formation on uplands of the Columbia Plateau are strongly influenced by climate, tephra, erosion of arid lands, and fire regimes. Magnetic susceptibility (MS) of *in situ* strata and laboratory samples from arroyo profiles of the Yakima Upland Fold Belt can help untangle the interactions of these processes in shaping natural and cultural landscapes. Records from three Sanders Site profiles (2000–9000 B.P.) are compared. The Sanders Site (45KT315), excavated in the 1970's by CWU, is located on the Yakima Army Training Center. Data for sediment size and MS are evaluated for verification. The graphed results are compared for three profiles. Several working hypotheses are outlined. High MS in these profiles appears to correspond to erosion during the arid post glacial maximum (5000–8000 B.P.). MS also peaks in buried A horizons during moist intervals (3000–5000 B.P.). Lower MS can be attributed to the presence of Mazama tephra. Higher MS of the A horizons may also result from natural and cultural fire episodes in the sage-grass steppe communities. Only slight elevations of MS occur for cultural strata in archaeological sites. Project research has been sponsored by the C. Farrell Scholarship program, CWU-OUR, and the PROVOST award.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Sanders Site, Holocene, Sediments, Tephra, Climate Change, Yakima Uplands, Pacific Northwest

Chronological Analysis of The Sanders Site (45KT315) using Tephra Identification & Radiocarbon Dating

Spencer Mitchell, James Brown, Steven Hackenberger
Project Mentor(s): Steven Hackenberger, PhD; James Brown

The Sanders Site (45KT315) located on the Yakima Training Center has long been the focus of graduate and undergraduate research following the original excavation in the early 1970's by CWU professor of Anthropology Dr. Bill Smith. Radiocarbon dates on charcoal, animal bone, and sediments are used to establish greater chronological control and verify an observed gap in dates between eight thousand years ago and six thousand years ago. This gap, if confirmed, indicates distinct phases of site occupation. To answer questions about the periods of occupation we use stable isotope analysis to help reconstruction possibly related climate changes. A stylistic analysis of projectile points is built to compare to radiocarbon dates and points from other sites. Project research has been sponsored by the C. Farrell Scholarship as well as a Student Research grant awarded by the Association of Washington Archaeologists.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Archaeology, Radiocarbon, Isotopes, Tephra, Dating Methods

Biological Sciences

Evaluation of the Antileishmanial Activities of Lactam Tetrahydropyrans Against *Leishmania major,* the Causative Agent of Human Cutaneous Leishmaniasis

Francis Aminkiah
Project Mentor(s): Blaise Dondji, PhD

The leishmaniases are a group of vector-borne parasitic diseases caused by *Leishmania* protozoan parasites. Vectors are infected female phlebotomine sand flies. Leishmaniases are endemic in over 98 countries, with over 1.3 million new cases recorded annually, leading to as many as 70,000 deaths each year. The three clinical forms of the disease include cutaneous, mucocutaneous, and visceral. My research will focus on *Leishmania major*, the agent of cutaneous leishmaniasis, which causes skin lesions. Current treatments are toxic and can have life-threatening side effects, making it urgent to identify new therapeutics with lower toxicity. Consequently, my research project will evaluate the potential of lactam tetrahydropyrans as anti-*Leishmania* agents. I will use the Alamar blue colorimetric assay to assess the activity of my test compounds. Alamar blue changes color to red when metabolically active cells are present. Based on earlier experience in our research group, wells with active compounds remain blue and show lower optical density when measured with a spectrophotometer. Lead compounds will be evaluated for toxicity against mammalian cells using EdU Assay kits to measure DNA synthesis in proliferating cells. I hypothesize that some tested compounds will demonstrate activity levels comparable to or exceeding those of Amphotericin B, while exhibiting lower toxicity in mammalian cells. A structure-activity relationship analysis will be performed to assess the relationship between compounds with similar basic chemical structures and their leishmanicidal activities. Statistical tests will be conducted to compare the compounds with Amphotericin B, which serves as the positive control.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: *Leishmania major*, Cutaneous Leishmaniasis, Lactam Tetrahydropyrans, Alamar Blue, Structure-Activity Relationship, Amphotericin B, Optical Density, Lead Compounds

Effect of Coniferous Trees and Water Availability on Soil Acidification

Jessica Cheever
Project Mentor(s): Mary Poulson, PhD

Water availability and coniferous tree species can cause acidification and a change in soil fertility. Previous research in European forests found that rainfall, soil acidity, and conifer prevalence influenced soil quality and biodiversity. However, not much is known about these effects in the Pacific Northwest's forests. Three forests were chosen based on a gradient of annual precipitation. The Hoh Rain Forest, the Tiger Mountain State Forest, and the Okanogan-Wenatchee National Forest were used for wet, mesic, and dry conditions, respectively. Each location had a three-by-six grid spaced 50 meters between each plot. The location was marked, and a six-inch hole was dug at the base of the nearest tree to collect a soil sample. Collected soil samples were tested for pH, water content, and nutrient content. Soil pH ranged from 5.5 at Okanogan-Wenatchee National Forest, 6.0 at Tiger Mountain State Forest, and 6.5 at the Hoh Rain Forest. Douglas Fir, Ponderosa Pine, Western Red Cedar, Big Leaf Maple, and Red Alder were grown in the greenhouse. Trees were grown in simulated soil moisture regimes to those of the chosen sites. It is expected that the Ponderosa Pine will contribute the most to soil acidification, and coniferous trees will generally result in a lower soil pH than deciduous trees. It is also expected that higher water levels will result in a higher pH level, and vice versa. This study will provide insight into the environmental interactions occurring in Washington's forests and will allow for better management practices.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Soil Acidification, Water Availability, Pacific Northwest

Saccharine: A Literature Review of the Effects of a High Fructose Diet on the Brain

Gwendolyn Erickson
Project Mentor(s): Sarah Oppelt, PhD

Fructose is a sugar that's naturally found in fruit. In the modern era, it's concentrated and used as a sweetener in processed foods such as baked goods and soft drinks. Fructose is an ideal sweetener because it's about twice as sweet as other sugars like glucose. However, unlike glucose, which can be metabolized by every cell in the body, fructose can only be metabolized by certain parts of the body. The liver is primarily responsible for fructose metabolism, but other areas, such as the brain, can also metabolize fructose. Chronic high fructose intake contributes to several negative effects, such as MASLD (metabolic dysfunction-associated steatotic liver disease), insulin resistance, and diabetes. While only 4.5 million adults in the U.S. have been diagnosed with liver disease, the American Liver Foundation estimates that 80-100 million U.S. adults may be living with undiagnosed liver disease. High fructose intake also affects the brain and has been associated with neuroinflammation, oxidative stress, and neuronal damage. While the effects of high fructose on the liver have been receiving increasing attention in recent years, the extent of its effects on the brain is relatively unclear. Given the prevalence of high fructose levels in the Western diet, its effects on the brain must be thoroughly explored. This project aims to consolidate our current understanding by reviewing the existing literature, as well as provide direction for future research.

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: Literature Review on a High Fructose Diet on the Brain

Daily Activity of Clark's Nutcracker in Relation to Whitebark Pine Seed Availability

Brenton George, Caleb Wheeler
Project Mentor(s): Alison Scoville, PhD
Clark's Nutcracker (*Nucifraga columbiana*), an avian seed predator and disperser, facilitates the establishment of the threatened keystone species Whitebark Pine (*Pinus albicaulis*). This study investigates temporal activity of Clark's Nutcrackers with respect to time of day and whitebark pine cone density between 2021 (high abundance of cones) and 2022 (low abundance of cones). Clark's Nutcracker calls were manually verified and analyzed from 4AM to 10PM during peak feeding/caching season (8/14-8/31). A generalized linear mixed model with a negative binomial distribution was used to assess the effects of year and time of day on call frequency. Results showed significant patterns for year, time of day, and their interaction. The findings support the use of vocal monitoring as a non-invasive, cost-effective tool and provides insight into behavioral adaptations of Clark's Nutcrackers in response to environmental changes.
Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Vocal Monitoring, Bioacoustics, Keystone Species

Neurons Exposed to Fructose Have Altered Metabolism That may Impair Neural Function

Catherine Ghigleri
Project Mentor(s): Sarah Oppelt, PhD
Over the last 50 years, fructose consumption in the Western diet has significantly increased, paralleling the rise of metabolic disorders such as insulin resistance, type II diabetes, and systemic inflammation. Recent studies suggest that insulin resistance and brain inflammation contribute to cognitive decline and the increased the risk of Alzheimer's disease (AD). In AD, dopamine producing neurons in the hippocampus region of the brain exhibit mitochondrial dysfunction and heightened inflammation. Since the hippocampus expresses enzymes that break down fructose, it remains unclear whether fructose metabolism alone induces metabolic stress in dopaminergic neurons. This study investigated the effects of fructose on the function of the hippocampal using a hippocampal cell line (N2A cells) as a model. Cells were cultured in media containing varying glucose and fructose concentrations. Cell growth was assessed using a crystal violet assay to quantify viable cells. The function of the mitochondria was evaluated through measuring the amount of energy molecules, ATP produced, the amount of dehydrogenase being produced, and the amount of oxygen being consumed. Results indicated that high fructose exposure didn't reduce cell viability, but impaired mitochondrial function. This suggests that metabolic stress is increased in dopaminergic neurons due to excess fructose consumption. These finding enhance our understanding of how fructose metabolism contributes to degeneration of neurons in the hippocampus. Further research could explain fructose's role in AD development and metabolic brain disorders. This project has been conducted over several years and is the culmination of my master's thesis.
Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: Biology, Cell Culture, Metabolism, Neuroscience, Sugar

Investigating the Impact of Habitat Variables on Clark's Nutcracker Occupancy within the Cascade Mountains to Guide Whitebark Pine Conservation and Restoration

Marianne Gibbons, Serena Welch
Project Mentor(s): Alison Scoville, PhD
Whitebark pine (*Pinus albicaulis*) is a keystone species within the Cascade subalpine forest ecosystem. Whitebark pine populations have been rapidly declining and are now considered a Threatened species under the Endangered Species Act. Whitebark pines have an obligate mutualistic relationship with Clark's Nutcrackers (*Nucifraga columbiana*) because nutcrackers are integral for whitebark pine seed dispersal. In order to guide whitebark pine conservation and restoration efforts, it is necessary to understand key factors for Clark's Nutcracker occupancy in whitebark pine forests. In this study we evaluated the impact of habitat variables by tracking Clark's Nutcracker occupancy across 28 alpine sites collected from January 2023 through December 2023. Audio recordings taken from each site were analyzed for Clark's Nutcracker calls using BirdNET software, then manually validated using RavenPro. We used a generalized linear mixed model in R to evaluate the significance of habitat variables. Preliminary results suggest that elevation and whitebark pine cone counts significantly impact nutcracker presence across months, whereas the effect of whitebark pine mature tree density on nutcracker presence depends on the season. These results could help us better understand the relationship between Clark's Nutcrackers and whitebark pines.
Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Ecology, Conservation

Antimicrobial Resistance Profiles in the Irrigation System of Kittitas Valley

Cruz Guillen, Kaitlyn Holbrook, Bella Blasingim
Project Mentor(s): Holly Pinkart, PhD
Antimicrobial resistance (AMR) is a global health threat due to its rapid spread and impact on human, animal and environmental health. AMR occurs when microorganisms such as bacteria, fungi, or viruses adapt or mutate to resist the actions of antimicrobial drugs, such as antibiotics, antifungals, and antivirals. This project focuses on the irrigation canals of Kittitas Valley. The canals irrigate the crops, act as a water source for cattle and other animals and can be directly accessed by humans, which makes the canals a possible conduit for AMR transmission.
Water samples will be collected from the canals throughout the irrigation seasons of 2024 and 2025, and bacteria will be isolated and tested for resistance to ampicillin, amoxicillin, chloroamphenicol, erythromycin, nitrofurantoin, gentamycin, cephalothin, tetracycline, trimethyloprim-sulfomethoxazole, and kanamycin. Resistant bacteria will be subject to a variety of biochemical tests to identify them to genus and species level. Initial analysis shows that the three species most commonly showing resistance were *Escherichia coli, Serratia marcescens* and *Pantoea agglomerans*. Data analysis will be conducted to compare AMR profiles between the upper and lower Kittitas valley throughout the irrigation season, and to document resistance trends to certain antibiotics. In collaboration with the University of Washington's Center for One Health Research, the data produced will be entered into the Washington Integrated Surveillance for Antimicrobial Resistance (WISAR). This collaboration will improve the initiative towards controlling AMR.
Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: Antimicrobial, Bacteria, Antibiotics, Irrigation

Mapping Small Mammal Movements at a Large Wildlife Passage under I-90 Near Snoqualmie Pass

Lillyana Hammond
Project Mentor(s): Kristina Ernest, PhD

This project investigated small mammal movement and presence at Wildlife Undercrossing 60.9 along Interstate 90 near Snoqualmie Pass, Washington, a critical area for maintaining habitat connectivity in the Cascade Range. Using mark-recapture data collected by the I-90 Wildlife Monitoring Project's small mammal team through Central Washington University (CWU), we analyzed movements of golden mantled ground squirrels (*Callospermophilus* spp.), deer mice (*Peromyscus* spp.), and shrews (*Sorex* spp.) to assess usage of the undercrossing structure. The study included data from 2024, with a total of 97 to 132 individuals: 19-24 squirrels, 63-92 mice, and 15-16 shrews. Original Data was analyzed to identify individuals and recapture events. The Shrews had no recapture events. Recapture data was mapped using ArcGIS Pro to visualize spatial movement patterns. The study area was divided into three trapping grids: one located in the middle directly beneath the highway at the undercrossing, and two in adjacent forested areas to the north and south.

Overall, there was a small amount of movement observed between the grids. The ground squirrels exhibited an average movement distance of 33.0 meters between trap nights, while mice showed greater mobility with an average of 42.8 meters. The maximum recorded movement distances were 112 meters for a squirrel and 80 meters for a mouse. Squirrels were most frequently captured in the middle grid beneath the highway, suggesting a preference for the undercrossing area over the surrounding forest.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Small Mammals, Wildlife Undercrossing, Movement Ecology, Habitat Connectivity, I-90 Snoqualmie Pass, Mark-Recapture, Spatial Analysis, *Callospermophilus*, *Peromyscus*, *Sorex*

Which Terrestrial Fungi Break Down Plastic?

Natali Hernandez, Amy Paredes
Project Mentor(s): Jim Johnson, PhD

About 350 million tons of plastic waste are generated every year. This is a major problem due to waste accumulation in terrestrial and marine ecosystems and slow degradation that leads to long-lasting effects. This study aims to explore the diversity of fungi that colonize polyethylene plastic bags in terrestrial environments, with the goal of identifying the fungi that can contribute to the break-down of plastic waste. Three sites were chosen for this study, throughout Ellensburg Washington, polyethylene bags were placed at the soil leaf litter junction and left for approximately 5 months to go through weathering and colonization before they will be collected. The 3 study sites each include a soil sample, and a polyethylene bag sample. Once collected, the DNA of all organisms tightly adhering to the bags was extracted with the DNeasy PowerSoil DNA extraction kits and the ITS region sequenced to allow for identification of genus and species in levels and approximate quantification of the fungal community. Polyethylene bags were also stained calcofluor white to visually access the levels of colonization. Sites will be compared using phyloseq and statistical software R to characterize differences between experimental and control communities. By expanding our understanding of the fungi that degrade plastic this research can contribute to our understanding of plastic degradation and potentially better methods of waste management.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Fungi, DNA Sequencing, ITS Region, DNA Extraction, Terrestrial Ecosystem, Plastic degradation, Fungal colonization, Microbiology, Mycology

Antibiotic Resistance Trends in Coliform Bacteria of Kittitas County Waters

Kaitlyn Holbrook, Bella Blasingim, Cruz Veronica Guillen Mejia
Project Mentor(s): Holly Pinkart, PhD

Since the mid-1900s, antibiotics have been developed to help fight against bacterial pathogens. However, bacteria can evolve rapidly and have evolved resistance to many types of antibiotics. Using coliform bacteria collected from waters around Kittitas County, BIOL 323 students at Central Washington University have identified a variety of antibiotic-resistant bacteria in Kittitas County streams and canals. Antibiotic resistance was measured from 2014-2019 and compared to data collected in 2024. This study focuses on three antibiotics, amoxicillin, kanamycin, and trimethoprim-sulfamethoxazole. In the past (2014-2019) we saw no change in the trend of antibiotic resistance in collected data for amoxicillin, an upward trend of antibiotic resistance in data collected for kanamycin, and an upward trend of antibiotic resistance in data collected for trimethoprim-sulfamethoxazole. When compared with the data collected in 2024, we see no significant increase in antibacterial resistance for amoxicillin, a significant increase in antibacterial resistance for kanamycin, and a significant increase in antibacterial resistance for trimethoprim-sulfamethoxazole. The results of this research can be used to further study antibiotic resistance in the environment, and the data will be submitted to the WISAR (Washington Integrated Surveillance for Antimicrobial Resistance) database.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Antibiotic Resistance, Bacteria, Irrigation

The Immortal Jellyfish and Its Implications for Understanding Life Cycles

Rhiannon Holwege
Project Mentor(s): Paula Collucci

The "immortal jellyfish," *Turritopsis dohrnii*, is the only known organism capable of reverting from a mature medusa back to a juvenile polyp through transdifferentiation. This process, witnessed to be triggered by external stressors, allows cellular reprogramming and life cycle reversal, challenging traditional aging paradigms. While not truly immortal, due to predation, its unique biology offers insights into cellular plasticity and regenerative abilities.

Limited research since the 1990's reveals T. dohrnii's polyp-medusa reversal and life cycle, with reversal occurring as a response to stressors in 24–36 hours. Though laboratory studies demonstrate its potential for infinite rejuvenation, natural limits remain unknown. This species serves as a model for aging research, stem cell biology, and tissue regeneration, with implications for the possible immortality of other organisms.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Biology, Marine Biology, Cnidaria, Jellyfish, Cellular Plasticity, Regenerative Abilities

Genetic Insights into Bacterial Responses to Per- and Polyfluoroalkyl Substances: Unraveling Resistance Mechanisms

Dharshana Lakshminarayanan; Cindy Y. Castro-Murcia; Jill H. Zeilstra-Ryalls; Gabrielle A. Stryker, PhD

Project Mentor(s): Gabrielle A. Stryker, PhD

Per- and polyfluoroalkyl substances (PFAS) are synthetic compounds structurally similar to fatty acids, with hydrogen atoms replaced by fluorine atoms, resulting in stable carbon-fluorine (C-F) bonds. This stability makes PFAS resistant to environmental degradation, earning them the nickname "forever chemicals". Their water-repellent and heat-resistant properties have led to widespread use in industrial and consumer products for over 80 years. As a result, PFAS are now pervasive in the environment. Epidemiological studies strongly suggest human exposure to PFAS may lead to adverse health outcomes which include endocrine disruption and cancer, though the cellular and molecular mechanisms behind their toxicity remain unclear. To investigate these mechanisms, we used Salmonella enterica serovar Typhimurium TA1535, an "Ames strain" strain commonly employed in chemical toxicity studies. By exposing a population of these bacteria to the PFAS perfluorooctanoic acid (PFOA), we isolated six mutants (DL1-DL6) that can grow in the presence of PFOA concentrations that prevent growth of the parent strain. We evaluated their tolerance to both PFOA and GenX™, a "next generation" PFAS. The varying tolerances among the mutants suggest they carry different genetic changes, implicating various molecular targets. To identify these changes, we are currently conducting whole genome sequencing of the mutants and screening genomic libraries in the parent strain bacteria. We expect the changes will tell us which genes code for molecules that are targets of PFAS toxicity. Knowing these targets may offer insights into developing treatments for PFAS-exposed individuals, as well as enhancing bioremediation efforts.

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)

Keywords: PFAS, Per- and Polyfluoroalkyl Substances, Forever Chemicals, Bacterial Mutants, Genome Sequencing, Genomic Library

The Developmental Impact of Phthalates on Sea Urchin Embryos: A Model for Environmental Plasticizer Exposure

Yutong Liang
Project Mentor(s): April Binder, PhD

Exposures to microplastics and plasticizers such as phthalates in the environment continue to grow as a concern for public health. Current research revolving these chemical plasticizers have shown negative effects on fertility, the immune system, and even some neurological processes. To further explore these effects, this research involved observing sea urchin embryos post-fertilization at the 24-, 48-, 72-, and 96-hour marks. To assess the abnormalities hypothesized to have resulted from plasticizers, the fertilized embryos at each post-fertilization mark were split into two groups: sea water with 4000 ug/L of butyl benzyl phthalate (BBzP), to mimic phthalates in their natural environment of development, and a vehicle control for a comparison to normal growth. Observations were done under the imaging of the EVOS Microscope to observe phenotype differences and collect percentage of abnormality. Furthermore, we used ImageJ to quantify various differences between the BBzP and control mixtures such as circumference area, arm length and other malformations. The results display an evident negative effect on the development of sea urchins as abnormalities were already prominent with shorter exposures (e.g. 24 hours) but increased with longer exposures (e.g. 72-96 hours). This research supports concerns that the increase of leachates, such as phthalates, in our environment may impact or has already impacted the embryotic development of other species. For humans, this is a huge indicator to regulate the exposures of such plasticizers and phthalates in our environment to prevent high risk pregnancies or other reproductive constraints.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Plasticizers, Phthalates, Sea Urchins, BBzP, Abnormalities, Environment, Development

The Effects of a Phthalates and a Non-Phthalate Alternative on Rat Ovarian Cells

Cassius Long
Project Mentor(s): April Binder, PhD

Phthalates are synthetic chemicals that are added to products, such as plastics, to increase their malleability. Phthalates can easily be released from their products due to weak bonding, and leak into the environment around them. Previous research on phthalates, such as DEHP, has shown that exposure to these chemicals can harm our cells in many ways, including increased oxidative stress, changes in cell growth, and cell death. They also have been found to be endocrine disruptors, causing an increase in genes related to cell death, reproductive defects in animal models, and difficulties conceiving in humans. Due to the observed toxicity of phthalates, non-phthalate alternatives were manufactured to replace phthalates as a safer alternative. However, these alternatives are still causing DNA fragmentation and a reduction in follicular growth in mice ovaries. For my project, I looked at how a phthalate (DEHP) and an alternative (ATBC) were affecting the total change in cell count for rat ovarian cells. I hypothesized that both DEHP and ATBC would decrease the total cell count after 72 hours, with DEHP causing more of a decrease in total cell count. Further understanding of this will allow other researchers to greater understand how our bodies are responding to these chemicals.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Biology, Endocrinology, Toxins, Phthalates

Preliminary Investigation of Fish Exposure to Microplastic in Bonneville Pool

Ainsley McGregor
Project Mentor(s): Clay Arango, PhD

With more discovery of microplastics in our water systems it is important to determine where those plastics are coming from and how biological systems can move plastic in the environment. Without proper waste management for plastics and other contaminates, they will continue infiltrate the river ecosystems and interact with living things. Fish are a great model organism to study because they are easy to find and have diverse feeding strategies. In the Pacific Northwest, fish are also important cultural symbols. Fish samples with different feeding strategies were collected from the pool behind Bonneville Dam. The digestive tract was excised in the field and flushed in the lab to clear any microplastics that might have been in the fish digestive system. Each field sample was paired with a control to correct for any ambient plastic contamination from clothing or atmospheric sources. We collected approximately 115 samples including species such as Small Mouth Bass, Yellow Perch, Chinook salmon, and Coho salmon. Both adult fish and smolts were collected to see if there is a difference between the age diversions along with trophic levels. Although counting has not yet happened, it is predicted that the bottom feeders would have the most plastics in their systems. This research is important for understanding how fish might be vulnerable to plastic consumption, which has documented negative health consequences in marine fish studies.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Microplastics, Fish, PFAS, Bonneville Pool

Sea Urchins and the Impact of Non-Phthalate Plasticizers

Jasmine Mehr
Project Mentor(s): April Binder, PhD

Our oceans are filled with a vast variety of organisms, but the number of plastics that leach into our waters is astonishing. To get an understanding of non-phthalates and how it is affecting the oceans and the ecosystem, gametes from Sea urchins were isolated and placed in artificial saltwater with different concentrations of Acetyl tributyl citrate (ATBC), a non-phthalate that is commonly found in items such as food packaging and children's toys as a safer way to enhance the flexibility and processability of these products. The sperm and eggs were placed in a vehicle control, and either a low (100 ug/L) or high (3000 ug/L) concentration of ATBC, to study embryo development. The fertilized embryos were then observed and photographed at 24-, 48-, and 72-hours post fertilization to see the characterized survival and developmental rate of these embryos. The preliminary data has suggested a difference in the development of the arm length within the Sea urchin embryos after exposure to the non-phthalate. The impact that the different concentrations have on these Sea urchin embryos can start to lead us in the right direction on understanding the impact plastics and plasticizers have on our marine life.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Non-Phthalate Plasticizers, Sea Urchins, ATBC

The Adverse Effects of Phthalates Following Long Exposure in Developing Sea Urchin Embryos

Salvador Rosas, Yutong Liang, Jasmine Mehr
Project Mentor(s): April Binder, PhD

Phthalates are a group of chemicals commonly found in a wide range of products, including plastics, attire, food containers, water bottles, cosmetics, and more. They are used to make plastics more flexible and durable. However, because phthalates are not strongly bound to the materials they're added to, they can easily leach out into the environment, and into our bodies through various ways. This research project aims to determine whether a mixture of phthalates affects the development of sea urchin embryos at different time intervals: 24-, 48-, 72-, and 96-hours post-fertilization. A phthalate mixture containing Butyl benzyl phthalate (BBzP), Diallyl phthalate (DAP) and Di(2-ethylhexyl) phthalate (DEHP) was used to mimic the diverse range of phthalates found in large bodies of water where sea urchins develop. Two concentrations of the phthalate mixture were used, a low (100 ug/L) and high (3000 ug/L) concentration to examine differences in exposures. Additionally, an untreated control group and a vehicle control group were included for comparison to assess normal growth. Observations and imaging were conducted using the EVOS microscope, where preliminary data suggests abnormal development, and embryo death due to the long exposure of phthalates. ImageJ was used to measure circumference areas to normal and abnormal phenotypic growth. The results revealed abnormalities in developmental phases, with phenotypic changes becoming more pronounced after longer exposure to the phthalate mixture. Overall, this research clearly demonstrates the adverse effects of phthalates, which continue to pose a significant threat to various species.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Sea Urchins, Phthalates, Development, Growth

Chemistry

Dissecting the Protein-Protein Interactions Bbetween QKI, EMX2, and CNOT6L

Tea Beaulieu
Project Mentor(s): Todd Kroll, PhD

The neocortex is a structure in the mammalian brain that allows for conscious decision-making. The neocortex is divided into distinct functional areas. The mechanisms through which these areas form remain obscure. One identified component of this mechanism is the graded production of the protein Emx2 within the developing embryonic neocortex. Emx2 physically interacts with the proteins Cnot6L and three versions of quaking (QKI-5, QKI-6, and QKI-7), all of which are found within the developing mouse brain and are involved in regulating the fate of mRNA. Because of the identified interactions with Emx2 and the roles Cnot6L and the quaking proteins play in the fate of mRNA, they possess the potential to be involved in the mechanisms behind neocortical area formation. To further investigate the fundamentals of how these proteins interact, I am working to identify the parts of the quaking proteins that facilitate these interactions. This objective is achieved by isolating DNA encoding regions for the quaking proteins and evaluating whether these regions interact with Emx2 and Cnot6L. At present, the regions form amino acids 250 to the end of each of the three quakings have been shown not to mediate the interactions with Emx2 and Cnot6L. Eight new regions of the quaking proteins have been constructed and are in the process of being evaluated for protein-protein interactions using Yeast Two-Hybrid and GST-pulldown assays.

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: Biochemistry, Embryonic Development, Neocortex, Brain Development

A Colorimetric Sensor Array for Differentiating Emerging Material Contaminants Based on Surface Chemistry

Ifunanya Chiamaka Ede
Project Mentor(s): Samuel E. Lohse, PhD

Emerging materials contaminants such as nanomaterials and microplastics pose significant environmental risks due to their elusive nature and the limitations of current monitoring methods. Conventional techniques like UV-Vis absorbance spectroscopy and electron microscopy are effective, but costly, non-portable, and must be deployed in complementary ways to detect materials contaminants. These difficulties in detecting materials contaminants disproportionally impact populations in communities with increased vulnerability to contamination in water sources. To address these challenges, this study developed a simple, portable, and rapid colorimetric sensor tailored for detecting materials contaminants in drinking water.

The sensor design features an array utilizing chemo-responsive dyes or commercially available pH indicators such as methyl orange, methyl red, methyl blue, mordant orange, acridine orange base, bromocresol green and methylene blue. The collective color-change response of the array serves as a distinctive "colorimetric fingerprint," enabling the identification of specific materials contaminants. This research evaluated the sensor array's capability to differentiate nanomaterials contaminants based on their surface charge. Specifically, the efficacy of the array in detecting and quantifying poly electrolyte-coated gold nanorods has been systematically evaluated. Polyelectrolytes coated on the gold nanorods surface include polyallylamine hydrochloride (PAH), polyacrylic acid (PAA), polystyrene sulfonate (PSS), and poly diallyl dimethylammonium chloride (PDADMAC).

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: Sensor, Nanomaterial Contaminants, Emerging Material Contaminants, Ph Indicator Dyes

Cost-effective Synthesis of Lactam-bearing Homoallylic Ketones as Potential Diabetes Wound Healing Medicines

Samuel Edwards, Timothy K. Beng, PhD
Project Mentor(s): Timothy K. Beng, PhD

Several health conditions are responsible for the occurrence of chronic wounds. Examples include diabetes, peripheral artery disease, and coronary artery disease.[1] In the USA alone, over 25 billion dollars are spent each year for the treatment of chronic wounds, which affect about 6.5 million patients.[2] Specifically, it is well established that the skin of diabetic patients is more prone to injury, and hence, wound healing is an utmost critical restorative process for injured skin and other tissues. Diabetes patients have problems with wound healing at all stages, which ultimately results in delays in the healing process. Therefore, it is vital to find new medications or techniques to hasten the healing of wounds. Currently, very expensive metal-organic frameworks (MOFs) promote wound healing by regulating pathological signaling pathways in the wound microenvironment or by inhibiting the expression of inflammation. Synthetic organic compounds continue to play a major role in drug development. Specifically, a lactam (a compound in a cycle that contains a carbon-oxygen double bond and a carbon-nitrogen single bond) has been found to combat diabetes *mellitus*. For this project, a diverse library of lactam-bearing ketones and alkenes (*i.e.,* lactam-tethered homoallylic ketones) have been prepared in a cost-effective manner. The structures of the products have been confirmed by routine techniques, including nuclear magnetic resonance (NMR). Through a collaborative effort, the ability of these novel compounds to treat diabetic wounds will be evaluated. A structure-activity relationship (SAR) study will be conducted, which will facilitate the search for the best diabetic wound healing medicine.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Organic Chemistry, Synthesis, Chronic Wounds, Diabetes, Coronary Artery Disease, Wound-Healing, Grignard Reagents

Nanoparticle Colors: The Role of Size and Shape

Bouraoui Elfeghih
Project Mentor(s): Samuel Lohse, PhD

Gold nanoparticles (AuNPs) exhibit a range of colors from a strong crimson red to a violet to blue due to their interactions size, shape, and interactions with other molecules. Unlike bulk gold, AuNPs display size dependence when it comes to optical properties from metals. As the gold nanoparticle size and shape changes, the wavelengths of absorbed and scattered light shift, leading to a change in the observed color. Rods are just one example of a gold nanoparticle with shape-dependent optical properties, more complex shapes have unique absorbance behaviors. AuNPs have broad applications in fields such as biomedical imaging. Understanding the relationship between nanoparticle sizes and color provides an insight for designing advanced optical materials. The goals of this research is to further understand the optical properties of gold nanoparticles of varying sizes and shapes. The goal of this experiment, is to synthesize various sizes and shapes of AuNPs, and correlate their solution colors with their Ultraviolet-visible-NIR absorbance spectra.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Chemistry, Light, Colors, Nanoparticles, Metals

Redox Dye Stabilization in Polyelectrolyte Systems

Jonathan Flores-Brito
Project Mentor(s): Dion Rivera, PhD

As a means of manipulating oxidation and reduction potentials in redox-active dyes, polyelectrolyte-based environments were applied for their unique intermolecular interactions between species. Utilizing a series of indigo sulfonate dyes, positive and negatively charged polyelectrolytes, polydiallyldimethylammonium chloride and poly (sodium 4-styrene sulfonate), were investigated for their individual impact on the electrode potentials in each dye prior to complex coacervation. Coacervates comprised of oppositely charged polyelectrolytes were created and similarly investigated for changes in oxidation and reduction potential with respect to immersed dyes. Quantification of electrochemical changes in each system was undergone primarily via cyclic voltammetry, with observed oxidation and reduction peak shifting prior to and following inclusion of dyes in polyelectrolyte containing solutions providing insight in stabilization of reduced dyes in disfavored chemical environments. Applying this aspect, technologies incorporating chemical sensitivity to external chemical environments as a function of exposure time can be envisioned for applications in food and medical industries.

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: Analytical Chemistry, Electrochemistry, Coacervates, Dyes, Polyelectrolytes

Waste-minimized Electrochemical Lactonization of Lactam Acids

Keegan Gales, Hana Litus
Project Mentor(s): Timothy Beng, PhD

In modern organic chemistry, the search for green and sustainable processes is of fundamental importance. The environmental impact linked to the use of large amounts of solvents is a recurring criticism of many organic chemical reactions. Recovering the reaction medium (solvent) is a key way to simplify product isolation. It also minimizes the total amount of waste generated. Electrochemical processes (*i.e.*, ones that require electricity to perform a chemical reaction) are of high interest in the modern synthesis of organic compounds, especially medicines. Electrochemical synthesis allows reactions that would otherwise require harsh conditions to be performed under relatively mild conditions, while still producing desired products in high efficiency. Unfortunately, most documented electrochemical processes feature the use of unrecoverable solvents or solvent mixtures in high amounts. The Beng research group aims to address pressing environmental issues and advance sustainable methodologies in the synthesis of pharmaceutically relevant compounds by utilizing electrochemical methods. The Environmental Protection Agency (EPA) has reported environmental benefits resulting from the use of green chemistry techniques, including the elimination of 826 million pounds of hazardous chemicals and solvents. In this proposal, an effective waste-minimized synthesis protocol will be developed to achieve the electrochemical and green synthesis of lactone-lactams (*i.e.,* a cyclic ester linked to a cyclic amide). We will achieve this by employing an acetonitrile–water mixture as the recoverable reaction medium. Our discoveries will likely impact the biomedical field given the established relevance of these lactam-lactones, for example, as anti-inflammatory or antiviral agents.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Organic Chemistry, Green Synthesis, Electrochemistry

Synthesis of Thiol-containing Cyclic Amino Alcohols for the Sweetening of Petroleum Products

Alan Gitonga, Katharyn Curry
Project Mentor(s): Timothy K. Beng, PhD

Crude petroleum products contain nitrogen and sulfur-containing compounds, which greatly affects their chemical properties and performance negatively. As a result, most petroleum refineries focus on eliminating these compounds and carbon dioxide. In this proposal, the synthesis of stable thiol-bearing cyclic amino alcohols (organic compounds containing both a thiol (-SH) and an amino ($-NH_2$) group within a ring structure) will be examined using readily available starting materials. The final compounds will be used to eliminate simple thiols and CO_2 present in crude petroleum products, thus contributing to the sweetening (cleaning) process. We anticipate that these novel compounds will remove the CO_2 by converting it to bicarbonate through base-catalyzed CO_2 hydration, while also eliminating thiols by converting them to stable disulfide (compounds containing two bonded sulfur atoms) through a carefully designed reaction.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Thiols, Cyclic Amino Alcohol, Sweetening

Microwave-Assisted Synthesis of β-Lactams as Potential Anti-Cancer Agents

Ailan Johnsen
Project Mentor(s): Timothy Beng, PhD

The discovery of the antibiotic medicine, penicillin (a β-lactam ring), revolutionized the medical field, saving millions of lives and extending the average human lifespan. However, the rising global health crisis of antibiotic resistance poses a serious threat to everyone from otherwise healthy individuals to vulnerable populations, such as immunocompromised patients. This is especially pertinent given that cancers, such as skin cancer (SC), affect over 9,500 people daily in the U.S. and place an annual financial burden of $8.1 billion. Current treatments for skin cancers are limited by low bioavailability, side effects, and drug resistance. In addition, there is a public outcry for researchers to develop green methods for synthesizing medicines and fine chemicals. Microwave organic chemistry has a potential to meet this imperative benchmark, offering advantages of greater selectivity, easy-to-control parameters, and increased yields without sacrificing quality and stability. Microwave-assisted synthesis is used to achieve the sustainable and cost-effective production of a library of β-lactams with improved efficiency. Our lab is working toward developing these sustainable reaction protocols for the production of the β-lactam subunit through the interaction of the anhydride and the imine, and identified using NMR and IR spectroscopic methods. The successful use of a microwave reactor and small amounts of a green solvent as the reaction medium would confer upon our protocol the coveted 'green chemistry status,' highly attractive to pharmaceutical companies. Through collaborative efforts, we will screen the generated lactams for potential biological activity with a strong focus on skin cancers.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Microwave Organic Chemistry, Sustainability, β-Lactams, Skin Cancer

Molecular Sonification Used as a Pedagogical Tool in Chemistry and Music

James D. Kirkham III
Project Mentor(s): Tim Sorey, PhD

Are chemistry and music disparate, unrelated fields with very little in common? Recently research stands in direct opposition to this question. Multiple groups of researchers have been investigating the pedagogical value to bridge chemistry with music in the classroom. Key to these experiments is a concept known as molecular sonification; where data for a molecule is converted to sound-based, musical information. Taking experimental data from processes such as FTIR and NMR spectroscopy, outputs data in 'sound format' in units of Hz and converts it to wavelengths appropriate for music; frequencies that match to the 88 keys on a piano. These converted data are ultimately applied to compose original music in the classroom. This process can reinforce learning by adding an extra sonic aspect to it, which allows for student participation in the process. This presentation analyzes existing studies on this subject, with a particular focus on handling the musical aspects of chemical spectroscopy, in support of people with interest in both the composition of chemistry and the composing of music.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Chemistry, Music, Teaching, Pedagogy

Secondary Formation of Organic Coronas on Nanoparticle Surfaces

Cody Messika
Project Mentor(s): Samuel Lohse, PhD

Increased plastic waste and pollution is an urgent issue that requires action. Despite growing danger from the use and misuse of plastics, few studies have researched binding affinities during the formation event of a second corona. This study addresses gaps in knowledge by interpolating the binding affinity of the formation of various coronas, the surface or outer covering of an object, around nanoscale plastics known as nanopolymers (NPs). To do this, we analyzed the binding affinity of two specific compounds: lignin and bovine serum albumin (BSA), and how they interact with an NP-probe. The NP-probe approximated an NP exposed to just one of the compounds to form the first NP corona complex. The probe was then exposed to the remaining compound. In total, we collected four binding constants: 1) the first formation of an NP corona complex with lignin, 2) the second formation of a BSA corona on a lignin NP corona complex, 3) the first formation with BSA, and 4) the second with lignin on a BSA NP corona complex. Our research confirmed that the presence of an organic compound as a corona decreases the binding of a new corona.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Binding Constant, Analytical Chemistry, Environment, Plastics, Nanoparticles

Construction of Three QKI Deletion Mutants for Use in Investigating Protein-Protein Interaction of Interest in Embryonic Neural Development

Jennifer Moe, Kiera Campbell
Project Mentor(s): Todd Kroll, PhD; Téa Beaulieu

The neocortex is the largest part of the mammalian cerebral cortex and is divided into distinct areas, each with a unique function. The protein Emx2 is involved in the partitioning of the neocortex. However, the specific mechanisms through which Emx2 establishes these boundaries remain unclear. The Kroll laboratory has identified that Cnot6L and the QKI proteins interact with Emx2 and thus may be involved in these mechanisms. This research team is working to determine the regions of the QKI proteins that interact with Emx2 and Cnot6L to begin to understand how Emx2 enacts control over the division of the neocortex during development. This research project has worked towards this goal by cloning segments of the QKI gene encoding for the regions spanning amino acids 82-180, 82-205, and 1-205 into the pGEX plasmid. These clonings allowed the QKI regions to be evaluated for interactions with Emx2 and Cnot6L via GST-pulldown assays.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Plasmid, Biochemistry, DNA, Cloning, PCR, Neural Development

Synthesis of Novel Boronates as Potential Aspartic Protease Enzyme Inhibitors

Kayden Stiner, Christopher Williams, Jackson Tiber, Alma Wanguba, Charles Ericksson, Emmerson Miller, Alexi Granados, Callan McLoudrey, Chase Perez, Katie Snyder, Brett Vagt, Michel Frank
Project Mentor(s): Levente Fabry-Asztalos, PhD

Modern HIV therapies have proven to be effective, however challenges have arisen through low bioavailability, toxicity, adverse side effects, and the increased number of drug-resistant viruses, which suggests that a new treatment method must be developed. One approach is to inhibit the replication process of this virus. In targeting the enzyme that is essential for HIV replication, we are aiming to prevent the virus from generating new infectious viral particles in an infected individual. Our goal is to create multiple novel boron containing compounds that will act as inhibitors of aspartic proteases, such as HIV-1 protease, as boron's unique coordination chemistry strengthens a compound's binding ability to the active site of the protease. These compounds potentially function as dual-mode inhibitors by blocking the enzyme's active site through competitive inhibition and preventing the dimerization of its monomers. The synthesis process begins with a homologation reaction, which yields an α-chloroalkylboronic pinacol ester, which is then used for nucleophilic bimolecular substitution with various R-groups. Building a diverse library of compounds will potentially allow to overcome the limitations of current HIV treatments, by offering improved bioavailability, lower toxicity, and fewer side effects. Through competitive and associative inhibition for HIV-1 protease, these boron-based compounds will potentially disrupt both its enzymatic activity and the dimerization process. Through further development in the future, these compounds could provide an effective and less toxic alternative for treating HIV, including cases of drug-resistant strains.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Chemistry, Organic Chemistry, Medicinal Chemistry, Virology

Time-honored Synthesis and Evaluation of Lactam Carboxamides as Antithrombotic Agents

Keegan Roy Yu
Project Mentor(s): Timothy K. Beng, PhD

Two of the most common causes of death worldwide are heart attack and stroke. They typically result from blood clotting in the arteries. This is referred to as arterial thrombosis. In recent years, the Beng research group has sought to identify more selective and specific medications that can either prevent or treat arterial thrombosis. These small molecules are called antithrombotic agents. Our prior efforts identified one lactam carboxamide (an amide out of a ring that is attached to another amide in a ring (see Figure 1, compound 3) as an efficient antithrombotic agent. It performed better than aspirin (the current medicine typically prescribed to patients) in mice models. Unfortunately, it ended up being toxic to the host. In this proposal, a new set of lactam carboxamides have been prepared in a cost-effective and orientation-specific manner. The structures of the compounds were confirmed using common spectroscopic techniques. Through collaborative efforts, similar tests are being conducted to see if the target compounds affect the process in which platelet cells stick together causing a blood clot. This is typically referred to as platelet aggregation and it tends to be induced by the presence of collagen. A detailed structure-activity relationship study is being conducted to find the best antithrombotic agent. Importantly, we are hopeful that this time around, the identified candidate would be nontoxic to the host.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Lactam Carboxamide, Antithrombotic Agents

Computer Science

Leveraging NeuroSymbolic AI for Providing a Deep Understanding and Explanation of Handwritten Formulas

Isaiah Colwell
Project Mentor(s): Razvan Andonie, PhD
The field of Artificial Intelligence has surged in popularity, with generalist Large Language Models like OpenAI's GPT 4.5, Anthropic's Claude Sonnet 3.7, and DeepSeek's DeepSeek R1 becoming very popular for daily use between the common user and software developers. However, a significant challenge still persists: even with Chain-of-Thought reasoning, AI may not accurately explain and justify its actions on why it made the decisions it made. Of course, with how much data and training that goes into these massive corporate-scale, multimodal Large Language Models, these LLMs are able to provide a decent explanation for trivial mathematical tasks. However, as tasks gradually become more complex, the chances of the AI hallucinating an incorrect answer increase in kind, or otherwise come across the correct answer through incorrect reasoning. With NeuroSymbolic AI, it becomes possible to provide accurate, explainable decisions while requiring considerably less data than most LLMs by providing a set of rules for the AI to follow. We propose utilizing a NeuroSymbolic framework for interpreting and explaining handwritten mathematical formulas. Our approach combines neural networks for handwriting recognition with symbolic reasoning to provide transparent, step-by-step explanations of formula evaluation. This hybrid architecture not only accurately processes handwritten expressions but also generates clear explanations following mathematical principles. Some preliminary experiments show that this method requires less training data than pure deep learning approaches while delivering superior explainability. This advancement should hopefully offer significant potential for mathematics education and scientific documentation where understanding the reasoning is as important as the final result.
Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: Artificial Intelligence, Neurosymbolic, Computer Science, Explainable AI, Mathematics

KNN Information Energy R Package

Ryan Gallagher, Sean Galloway, Aaron Snyder, Matt Hansen, Noah Rodal, Austin Snyder, Alex Buckley, Vandan Amin, Chaker Baloch, Bobi Vladimirov
Project Mentor(s): Donald Davendra, PhD; Yvonne Chueh, PhD
The purpose of this project was to create a K Nearest Neighbor based approximation of Information Energy. This task was part of our class for Computational Statistics, assigned by Dr. Davendra, but in conjunction with Dr. Chueh. This is implemented to be used as an R package, with the goal of publishing to the CRAN repository, so that it can be used by all as open source software. We were given an existing codebase created by previous students, and tasked with further optimizing performance, while also handling all of the packaging requirements necessary of an R package. Our goal is for this package to be able to be used by as many users as possible, with as little configuration and knowledge required as possible. This meant creating different source codes for a wide range of users, including CUDA implementation, OpenCL implementation, and pure C++ implementation. Using the power of GPU computing, as well as simple multithreading on the CPU, we have found compelling benchmarking results in our computations. We have also achieved the goal set out by the group who worked on this project before us, of having a heavily optimized function, which is still user friendly, in that they can call it just as a simple R function. The most complicated decision a user faces is determining which implementation to call in their code.
Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: High Performance Computing, Statistics, R, C++, CUDA

Construction of a 3D Rendering Engine using OpenGL

Sean Gallaway
Project Mentor(s): Donald Davendra, PhD
This project is about the process of creating of a featureful 3D rendering engine from scratch using OpenGL, C++, Dear ImGui and STB_Image. This renderer will include features such as: A camera that can move to render the scene at different angles and the math involved, an editor to apply transformations to objects, and to change/recompile shader programs, Different types of light sources that can be added and removed in real time, Normal, Specular, and Diffuse mappings to add additional detailing.
Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: 3D Rendering, OpenGL, C++, Software Development, Shaders, GPU

Cause and Effect Probability: Computational Optimization Through Gaussian Integrals and Parallelization

Kiyrah Keith, Cole Ralph
Project Mentor(s): Donald Davendra, PhD; Yvonne Chueh, PhD
Many statistical measures, such as Pearson's R and Spearman's rho, quantify correlations between variables but do not indicate causality—a crucial element in the development and conclusion of statistical findings. Bilateral statistical measures like Mutual Information can capture dependency yet still do not establish this critical measure of directional causality. To address this deficiency, prior work by Cațaron, Andonie, and Chueh introduced a unilateral dependency measure to quantify causal directionality between variables. In this study, the aim was to employ the Maximum Likelihood Estimation (MLE) method to compute causality measures between variable pairs in a dataset. A key contribution of this work is a rigorous mathematical framework linking bivariate joint probability density functions to closed-form solutions for Onicescu's information energy and the unilateral dependency measure. To enhance computational efficiency, the necessary statistical methods were deployed on NVIDIA GPU architecture and CUDA, enabling significant speedup on large datasets. The heterogeneous development in R, C++, and CUDA ensures usability for statisticians, providing the benefits of parallelized, compiled libraries without requiring advanced programming expertise. The resulting package allows users to compute causality between variables following a normal distribution with heatmap visualizations to aid interpretation. Additionally, this work establishes a foundation for extending the method to non-normal distributions in future research.
Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: Cause and Effect, Computational Statistics, CUDA, Information Energy, Probability, Probability Density Functions, Maximum Likelihood Estimation

Primate Facial Recognition Using Convolutional Neural Networks

Kiyrah Keith
Project Mentor(s): Szilárd Vajda, PhD

Recent advances in machine learning and affordable computing power have accelerated research in animal recognition using computer vision. This interdisciplinary field has achieved breakthroughs in monitoring invasive species, preventing poaching, improving road safety, estimating populations, and promoting animal welfare. However, small-scale projects still lack clear guidelines for developing accurate animal classification models. This study reviews current methods, highlighting challenges and solutions from collaborations between computer scientists and animal experts. A key barrier remains the shortage of large, high-quality labeled datasets for training convolutional neural networks (CNNs). Developers must also handle issues such as lighting variation, occlusion, head rotation, shadows, and class imbalances. Proposed solutions include citizen science, user-friendly labeling tools, transfer learning, synthetic image generation, and data augmentation. Yet, consensus on the most effective approach remains elusive. This research identifies key challenges and explores practical strategies for enhancing model performance. A selection of these methods was tested on public non-human primate face datasets, successfully identifying individuals and species with over 95% accuracy, while avoiding overfitting—despite dataset limitations. The results highlight how careful CNN training adjustments, even with limited data, can produce high-performing models. These findings emphasize the value of interdisciplinary collaboration in advancing animal recognition and demonstrate how applied machine learning can support conservation, improve animal welfare, and drive ecological research forward.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Animal Welfare, Chimpanzee, Convolutional Neural Network, Computer Vision, Facial Recognition, Machine Learning, Primates, Transfer Learning

Semantic Manipulation of Music

Jared Osborne
Project Mentor(s): Razvan Andonie, PhD

Music emotion recognition (MER) is an important and growing field which predicts the emotions that music evokes in listeners. This has applications in marketing, psychotherapy and personalized music recommendation systems. While emotion recognition in speech is a largely solved problem, music presents many more challenges as the modality and context of emotions within music are much more complex.

This project uses MER as part of a feedback loop to manipulate the emotional content of an existing piece of music while preserving the recognizability of the original work to the listener, a novel field we call the semantic manipulation of music. We propose a new process in this updated project by replacing the simplistic AccoMontage accompaniment generation model with a GAN model that can select a single instrument stem from a multi-instrument song and replace it with a newly generated track. A GAN consists of two neural networks in competition with each other where one tries to generate data that passes as real and the other tries to spot the generated data. This maximizes the quality of generation as the first model is rewarded for quality data and the second is rewarded for the elimination of poor data.

The practical applications of this work are in music synthesis, music authorship tooling, and individualized user remix and cover creation.

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: Music, AI, Emotion Manipulation, Music Emotion Recognition, Accompaniment Generation, GAN

Explainable Machine Learning with Hyperblocks

Austin Snyder, Ryan Gallagher
Project Mentor(s): Boris Kovalerchuk, PhD

Building on existing work with hyperblocks, which classify data using minimum and maximum bounds for each attribute, we focus on enhancing interpretability, decreasing training time, and reducing model complexity without sacrificing accuracy. This system allows subject matter experts (SMEs) to directly inspect and understand the model's decision logic without requiring extensive machine learning expertise. To reduce hyperblock complexity while retaining performance, we introduce a suite of algorithms for hyperblock simplification. These include removing unimportant attributes from blocks, pruning redundant or ineffective blocks through overlap analysis, and merging blocks to allow disjunctive logic. These methods eliminate unnecessary parameters, dramatically reducing model size without harming classification power. We increase robustness by introducing an interpretable fallback mechanism using k-Nearest Neighbor (k-NN) classifiers for points not covered by any block, ensuring complete data coverage while preserving model transparency. Software optimizations reduce training time on challenging datasets from over two hours to under three minutes, a 40x speedup, enabling application of the model to large datasets. Our results demonstrate that interpretable models can scale to high-dimensional, large-volume datasets while maintaining competitive accuracy. On benchmark datasets such as WBC (9-D), we achieve strong predictive performance with significantly reduced complexity. On MNIST (784-D), our method continues to improve through tuning and simplification, showing promise as a transparent alternative to black-box models in domains where trust, clarity, and control are crucial.

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: Explainable Machine Learning, Visual Knowledge Discovery, High-dimensional Data, Rule-based Classification, k-Nearest Neighbors, Hyperblocks

Generative Artificial Intelligence for Drug Discovery for HIV-1 Protease Inhibitors

Kollin Trujillo
Project Mentor(s): Razvan Andonie, PhD; Levente Fabry-Asztalos, PhD

Drug discovery is an expensive and time-consuming process, often taking 10–15 years and costing over a trillion USD to bring a single drug to market. This is largely due to the vast size of the molecular space compared to the relatively small known drug space. To address this, artificial intelligence techniques have been employed to more efficiently narrow down viable molecules. We propose adapting BART (Bidirectional and Auto-Regressive Transformers), a model developed by Meta AI that merges the strengths of BERT and GPT into a single, flexible architecture capable of both bidirectional understanding and autoregressive generation. Our adapted BART model is designed for generative prediction of molecules within a chemical space known to inhibit HIV-1 protease. To ensure syntactic validity and enhance chemical diversity, we utilize SELFIES (Self-Referencing Embedded Strings), a molecular string representation designed to always produce valid molecules by encoding chemical structures through a robust grammar that prevents syntactically incorrect outputs. This allows for better exploration and interpolation across chemical space, increasing the chance of discovering novel, viable drug candidates. Given the limited public data in drug design, transfer learning is incorporated to support model training and domain adaptation. Molecules generated by the model will be prioritized and evaluated using molecular docking simulations to assess their potential as HIV-1 protease inhibitors in-silico, streamlining the identification of promising drug leads.

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: Artificial Intelligence, Chemical Language Models, Large Language Models, Deep Learning, Drug Discovery, HIV-1 Protease, BART

Boosting of Classification Models with Human-in-the-Loop Computational Visual Knowledge Discovery

Alice Williams

Project Mentor(s): Boris Kovalerchuk, PhD

High-risk artificial intelligence and machine learning classification tasks, such as healthcare diagnosis, require accurate and interpretable prediction models. However, classifier algorithms typically sacrifice individual case-accuracy for overall model accuracy, limiting analysis of class overlap areas regardless of task significance. The Adaptive Boosting meta-algorithm, which won the 2003 Gödel Prize, analytically assigns higher weights to misclassified cases to reclassify. However, it relies on weaker base classifiers that are iteratively strengthened, limiting improvements from base classifiers. Combining visual and computational approaches enables selecting stronger base classifiers before boosting. Our recent paper proposed moving boosting methodology from focusing on only misclassified cases to all cases in the class overlap areas using Computational and Interactive Visual Learning (CIVL) with a Human-in-the-Loop. It builds classifiers in lossless visualizations integrating human domain expertise and visual insights. A Divide and Classify process splits cases to simple and complex, classifying these individually through computational analysis and data visualization with lossless visualization spaces of Parallel Coordinates or other General Line Coordinates. After finding pure and overlap class areas simple cases in pure areas are classified, generating interpretable sub-models like decision rules in Propositional and First-order Logics. Only multidimensional cases in the overlap areas are losslessly visualized simplifying end-user cognitive tasks to identify difficult case patterns, including engineering features to form new classifiable patterns. Demonstrations show perfectly accurate and losslessly interpretable models for benchmark datasets, and simulated data shows generalized benefits to accuracy and interpretability of models, increasing end-user confidence in discovered models.

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)

Keywords: Visual Knowledge Discovery, Classification Model Boosting, Interpretable Machine Learning, Human-in-the-Loop, Lossless Visualization

Craft Brewing

From Concept to Keg: Brewing and Analyzing a Mint Chocolate Stout

Armando Lazo-Sanchez, Carlos Rosales Torres, Aliyah Finch
Project Mentor(s): Geoffrey Sasaki, PhD; Brian LaBore

Our project focused on the design, brewing, and evaluation of a unique craft beer: a mint chocolate stout. Our primary objective was to gain hands-on experience with the homebrewing process while exploring the intersection of brewing science and creativity. We aimed to produce a beer that not only reflected solid brewing techniques but also offered a distinct and underrepresented flavor profile in the current market. Using a traditional homebrew setup, we incorporated unsweetened cocoa powder and peppermint to create a rich, seasonal stout with layered complexity. Our process included mashing at 156°F for 60 minutes, followed by a batch sparge yielding 6.5 gallons for the boil. Standard yeast, malt, and hop additions were used alongside our specialty ingredients. Throughout the brewing process, we collected and analyzed data including first and final gravity, fermentation time, ingredient ratios and amounts, and sensory evaluations, allowing us to reflect on how each step affected the final product. During this time, we also researched marketing. The research concluded that our beer was unique and could appeal to audiences that enjoy seasonal flavors. Ultimately, this project allowed us to not only develop practical brewing skills, but also to engage critically with flavor profiling, target marketing, and product differentiation. The overall experience provided a balance of science, artistry, and teamwork that culminated in a final product we were proud to share.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Brewing, Fermentation Science, Stout

Crafting a Stout for a Campfire

Tristen Sanz, Braden Clark
Project Mentor(s): Geoffrey Sasaki, PhD; Brian LaBore

For Biochemistry of Brewing (CRBW 317), the final project for the class was to build a recipe for a beer, brew a 5-gallon batch, collect analytical and sensory data throughout the process, and finally put together a marketing proposal. All groups were tasked to make a stout, so we had to think of a way to not only make a good beer but also make it unique and creative. We landed on a marshmallow inspired stout, considering the fact the oats added more body to the beer that fit the texture of a marshmallow. Using cacao nibs to add the chocolate flavor, specialty malts to replicate the graham cracker flavor, and finally marshmallow root and lactose to give it true marshmallow aroma and sweetness. The base recipe was developed to have a natural sweetness left over from the malt, and not too roast forward like Guinness. The lactose, a non-fermentable sugar, gives it the residual sweetness of a pastry stout. The final brew was successful because it met our target expectations, with a few potential improvements, such as lacking upfront marshmallow flavor and roast character. In the end, the project provided a hands-on experience brewing and revealed an insight into what is to be expected in new product development in the Craft Brewing industry.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Brewing, Fermentation Science, Stout

Cultural and Environmental Resource Management

Shrubsteppe Birds Under Fire: Establishing a Baseline for Post-Wildfire Habitat Restoration in Eastern Kittitas County, Washington

Kevin Clements
Project Mentor(s): Jennifer Lipton, PhD
The conversion of shrubsteppe in Washington following European settlement has reduced viable habitat for many declining bird species. Wildfire and invasive vegetation, consequences of anthropogenic land conversion, threaten native sagebrush ecosystems. Cheatgrass (*Bromus tectorum*) and other invasive species quickly establish and prevent sagebrush regrowth following fire, effectively converting the landscape from shrubland to grassland and displacing shrub-associate birds. Restoration of sagebrush habitat is imperative for promoting biodiversity, but understanding of bird populations in fire-impacted areas is limited. This study analyzes bird populations in the Whiskey Dick and Quilomene Wildlife Units of the L.T. Murray Wildlife Area following the 2022 Vantage Highway fire. Through point-count surveys and autonomous recording units, the species occurrence, species richness, and Shannon diversity of bird populations were analyzed alongside habitat characteristics in burned and unburned areas. Burned areas have reduced sagebrush, shrub, and tree cover compared to unburned areas. Results indicate a strong correlation between Shannon diversity and percent cover of sagebrush in upland habitats, and percent tree cover in riparian habitats. Sage thrasher and Brewer's sparrow presence are strongly linked to percent sagebrush cover, while Sagebrush sparrows are linked to overall shrub cover and composition. A total of 67 bird species were positively identified, indicating a diverse range of habitat usage. Birds are important contributors to the ecosystem and are bioindicators of ecosystem health. With increasing projections of global extinction rates throughout the century, this research underscores the importance of restoring critical habitat in fire-disturbed landscapes.
Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Birds, Wildfire, Ecology, Habitat Restoration, Wildlife Management

Reanalysis of the Pre-Mazama Mammal Remains from Bernard Creek Rockshelter

Laura Collins
Project Mentor(s): Patrick Lubinski, PhD
The Bernard Creek Rockshelter (10IH483) produced a significant collection of animal remains from the Cascade Phase. An initial faunal analysis in 1976 listed identifiable species but lacked quantification and taphonomic analysis. This study presents the preliminary results of a taphonomic and taxonomic reanalysis of 429 pre-Mazama faunal specimens from the site. This study aims to complete the faunal reanalysis begun by Lianne Day and Dr. Patrick Lubinski. Their study focused on Block I from 160-370 cmbd, correlated with four radiocarbon dates ~7400-7190 BP. To complete the faunal reanalysis, my study will concentrate on the final six levels, encompassing approximately 3,000 specimens from 250-310 cmbd. This presentation reports the results from the 429 specimens recovered from 250-260 cmbd and the goals of the upcoming thesis. Preliminary results concur with earlier findings that the fauna is dominated by fragmentary remains of small artiodactyls, particularly bighorn sheep, with small numbers of carnivores. The analysis will continue, culminating in a thesis synthesizing results of the complete mammalian assemblage from the pre-Mazama sample.
Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Archaeology, Zooarchaeology, Cascade Phase

A Journey Through Past Journeys of Stone Tools

Rebecca Gutshall, Peter Mills, Carole Ramos
Project Mentor(s): Patrick McCutcheon, PhD; Peter Mills

In continuation of expanding modern understanding of Hawaiian society and social interaction, UH Hilo's Geo-Archaeology lab and other departments are an example of cultural sensitivity and appreciation in archaeological research. This essay examines the chemical compositions of isolated deposits at Kahalu'u Habitation Cave. These deposits are mainly sourced to Mauna Loa and Pu'u'wae'wae lava flows and one additional unknown source on Hawai'i Island. This data set includes several thousands of samples of basalt and volcanic glass. These were sourced using EDXRF geochemical analysis. Using a statistical analysis of the varied raw material availability and procurement, the deposits may present a history of engagement and movement in recent Hawaiian history.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Hawaiian Archaeology, Stone Tool Sourcing, EDXRF, Volcanic Glass, Trade Relations

Holocene Fire-Human-Climate Interactions near Progresso Lagoon in Northern Belize

Bronwen Hardee, Megan Walsh, Audrey Scott
Project Mentor(s): Megan Walsh, PhD

This research uses multiproxy paleoenvironmental data to infer how humans living near Progresso Lagoon in northern Belize interacted with fire, climate, and vegetation changes during the Holocene, specifically filling a gap in our understanding of these interactions during the early to middle Holocene. Charcoal records are especially important to this investigation given the use of fire in agriculture throughout the region, and the rarity of natural fire in the region's tropical lowland broadleaf forests. We are reconstructing past fire activity using macroscopic charcoal analysis on five sediment cores collected from the Progresso Lagoon area. These efforts have produced the first macroscopic charcoal analysis-based fire history reconstructions for any site in northern Belize, one of only three such studies in Belize as a whole. Preliminary charcoal results show widespread use of fire during the past four thousand years and clearly illustrate the reduced level of burning following the Maya Collapse. However, low levels of burning occurred near Progresso even before Maya populations inhabited the area, starting as early as ~6400 years ago. When combined with pollen, sedimentological, and climatic data, this research will provide needed Holocene paleoenvironmental context to the archaeological findings from the Progresso Lagoon region

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Paleoecology, Environmental History, Human–Landscape Interactions, Macroscopic Charcoal Analysis, Holocene, Maya, Fire, Pollen, Climate, Belize

A Suppression Cost Comparison of Three Classes of Wildland Fires in the U.S.

Stephanie A. Overla
Project Mentor(s): Megan K. Walsh, PhD; Brian Potter; Tony Sipic, PhD

Every year large wildfires that burn hundreds of thousands of acres across the U.S. Shifts in the frequency and severity of drought and other weather patterns have changed natural fire regimes. Additionally, the spatial complexity of human development patterns within the wildland-urban interface has increased human-ignited wildland fires, as well as greater difficulty in fighting these fires. Suppress-at-all-costs management of the past century limited wildfires' ability to clear understory vegetation, leaving the forests unusually rich in fuel. As a result, more frequent large wildfire events have increased national suppression costs. Federal budgeting, forest management policy, state, and local regulations, dictate suppression management, and real-time decision making. The increased suppression costs and heightened pressure on incident management to meet budgets may be limiting factors in protecting life and property during a wildfire event. This study uses area burned and growth criteria for naming conventions of three types of wildfires: fires of unusual size (FOUS), extra-large fires (XLF), and large fires (LF), and aims to identify how distinct types of wildfires affect suppression costs. Preliminary results concur with previous research in that suppression costs increase with the size of the fire. However, they also unexpectedly show that the intensity of the fire growth affects suppression costs, specifically that less rapid fire spread leads to higher suppression costs. The information gained from this study will help inform local and federal agencies who prepare for these extreme events, with the overarching goal of limiting the loss of life and property.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Wildfire, Suppression Cost

Modeling Recreational Risk Factors on the Landscape: A GIS Analysis of Recreation Accident Response Surrounding the Snoqualmie Valley, Washington

Naomi van Roon
Project Mentor(s): Mike Pease, PhD; Sterling Quinn, PhD

Search and Rescue (SAR) teams in Washington respond to approximately 900 incidents annually, many stemming from outdoor recreation near Interstate 90 surrounding North Bend. This study utilized predictive GIS analysis to identify areas of concern within state lands, including Mount Si and Middle Fork Snoqualmie Natural Resource Conservation Areas, Raging River State Forest, and Rattlesnake Mountain Scenic Area. The predictive model was calibrated using SAR data from March to November between 2020 to 2023 and informed by analyzing risk factors contributing to recreationalist injury potential. This research then developed a decision support system to aid land managers in proactively mitigating hazards and improving emergency response times. The study identified areas with high incident probability potential near popular trails up Mount Si, Mailbox Peak, and Teneriffe Falls. Contributing factors included proximity to roads and trails, areas further up the trail with some elevation gain comparable to the trailhead, moderate slopes, and a history of past incidents. Policy recommendations include enhanced signage regarding SAR injury risks, potential reopening of closed roads for SAR use, and more frequent trail conditions updates via online platforms. Implementing these measures could significantly improve recreation safety and emergency response efficiency in the region. Research into recreation emergency management is crucial. An informed approach to SAR can mean the difference between life and death, help reduce the severity of injury through quicker intervention, and improve response times by decreasing the duration before someone if found and assisted.

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: Outdoor Recreation, Search and Rescue, Risk Factors, GIS Analysis, Accident Response, Management Recommendations, Washington

Holocene Stratigraphy and House Occupations: Vernita Site Middle Columbia River, WA(45KT315)

Luke Weston, Avery Goodell
Project Mentor(s): Steven Hackenberger, PhD

The Vernita Site (45BN157) contains archaeological evidence of subsistence and early house occupations. The site was excavated in the early1970s by volunteers led by Dr. David Rice. However, analyses of the collection were never fully completed. In 2004, Stapp and Simmons conducted a preliminary study of the collection and recommended further stratigraphic analysis and radiocarbon dating of several possible buried house features. The earliest of these homes, although undated, are probably associated with a cultural period known as the Frenchman Springs Phase (4000-2500 B.P.). This time period is also characterized by a cooler and moister climate. Both 2D mapping and 3D modeling of the distribution of stone artifacts and animal remains help interpret original site notes and stratigraphic drawings. We are currently working with the Wanapum Band and surrounding tribes to gain permission for radiocarbon dating of four different samples of bison teeth. Dating these teeth will help determine more exact age estimates for house features and confirm the climatic period in which Bison were more plentiful. These analyses, of a legacy collection, contribute toward understanding the deep cultural heritage of the Middle Columbia Plateau. Project research has been sponsored by the CWU-OUR.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Vernita Site, Holocene, Stratigraphy, House Occupations, Wanapum, Columbia River

Environmental Studies

Effect of Planting Density, Light and Temperature on Secondary Stem Development and Soil Nutrient Quality for Flax

Skyler Campion
Project Mentor(s): Mary Poulson, PhD

Flax (*Linum usitatissimum*) is an economically important plant for not only seed oils, but also for textile goods. The quality of the fiber from the plant is dependent on the nutrients in the soil and the number of secondary stems on the flax plant during growth and development, primary stems being better for producing fiber. This research seeks to determine ideal growing conditions for flax from seed germination to harvest. Effects of temperature, light availability and planting density on seed germination and plant growth were investigated. Seed germination was not dependent on temperature (10 ˚C, 20 ˚C, and 30 ˚C) or light level. However growth rate and plant development was strongly dependent on planting density, growth temperature and light availability. In addition, all plants grown in each treatment type presented stunted growth and contained unexpected secondary stems. Nutrients in the soil were also dependent on soil temperature. Results of this research serves to help flax growers understand how environmental conditions affect flax fiber quality and soil nutrients available for plant growth.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Flax, Density Planting, Secondary Stems

Snow Water Equivalent Change in the Washington Cascades From 1985-2020

Dylan Zintz
Project Mentor(s): John Bowen, PhD

During winter, environmental conditions allow precipitation to fall as snow and accumulate in mountainous regions. Snow Water Equivalent (SWE) measures the amount of water stored in the snowpack, serving as a critical indicator for water availability. In Washington State, SWE is essential for managing water resources and maintaining streamflow for ecological health and municipal use during the dry summer months. There are concerns that a declining snowpack due to climate change could negatively impact water security, particularly in Eastern Washington. To assess change in mountain snowpack, SWE data were collected from 30 SNOTEL sites in the Washington Cascades, comparing average April 1st values from 1985–1987 with those from 2020–2022. Contrary to my hypothesis, A matched pairs t-test showed SWE was significantly higher in recent years compared to 1985. A Spearman correlation analysis revealed a statistically significant correlation between SWE values by SNOTEL site in 1985 and 2020. This analysis also utilized RStudio to develop a multiple regression model, aiming to understand how elevation and latitude at each site have influenced changes in SWE. Finally, a geographic information system (GIS) was used to analyze spatial trends in SWE change across the region.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Snow Water Equivalent, Statistical Model, GIS, Water Resource Management, Washington State, Cascade Mountains

Geography

Let ‘Em Pass! - Recreational Rock Dams Block Fish

Kaila Akina, Aimee Taylor, Zac Zacavish
Project Mentor(s): Jennifer Lipton, PhD

Recreational rock dams have the potential to impede the migration of fall-spawning salmonids negatively. Channel-spanning rock dams become fish passage barriers as flow levels begin to drop in the late summer months. A recreational rock dam is any structure constructed, typically of large rocks stacked perpendicularly to the stream. The purpose is generally to back up water to create warm swimming pools. Mid-Columbia Fisheries Enhancement Group has sponsored the Bull Trout Task Force (BTTF) crew to remove recreational rock dams and educate the public since 2013. During the summer months from 2013-2024, the BTTF traversed several bull trout spawning tributaries in the Upper and Lower Yakima Basin (Naches, Cle Elum, Tieton), known to have high streamside recreation. The crew collected data on rock dam locations, length (m), and whether it was channel-spanning or not. Signage was also posted in these locations to educate the public on how rock dams negatively impede fish passage and remind recreationalists to leave the streams to flow naturally. The data has been cleaned, charted, and mapped for spatial analysis to determine if the amount of rock dams has changed over the years, identify areas that are most affected by rock dams, identify years of significance for rock dam recreation, and understand how effective posted signage about the harmful impact of recreational rock dams has been over the years. The spatial analysis displays a pattern of rock dam hotspots on Indian Creek, Little Naches, and the Cle Elum River at the campgrounds.

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: Recreational Rock Dams, Fish Passage, Recreation, Public Outreach

Riparian Zone Species Diversity in Relation to Distance from Water

Charlotte Barrett, Amour Cooper, Ericka DuBore, Sam Olson
Project Mentor(s): Lisa Ely, PhD

Riparian zones are ecologically important areas where water availability influences species composition, particularly in arid environments like the shrub-steppe of the Inland Pacific Northwest. This study explored how plant species richness, ground cover, and soil characteristics vary with distance from Umtanum Creek in Ellensburg, Washington. We hypothesized that species richness and percent ground cover would decrease with increasing distance from water, with native species more common closer to the creek and non-native species more frequent farther away. Field observations were conducted at three sites, with five 4m × 10m plots at each site set at increasing distances from the water (0–4 m to 16–20 m). In each plot, we estimated percent ground cover (bare ground, litter, snowpack, and live vegetation), identified plant species, and noted whether they were native or non-native. Soil texture was also recorded. Results showed a general decline in species richness with distance from water, supporting our hypothesis. Native herbaceous plants were more prevalent near the creek, while non-native species were more abundant farther away. There was no strong correlation between total ground cover and distance, likely due to seasonal dieback and snowpack at the time of sampling. Soil texture varied among plots, suggesting that additional factors such as competition and microclimate might also influence species distribution. These findings highlight the importance of riparian zones in supporting native biodiversity and limiting invasive species. Further research across seasons and with recurring observations could provide more insight into the drivers of plant communities.

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: Riparian Zones, Species Richness, Ground Cover, Native Species, Non-Native Species, Shrub-Steppe, Umtanum Creek, Soil Texture, Water Availability, Plant Community Composition

Modeling Highway Air Pollution and its Demographic Relationships

Clay Dedrick
Project Mentor(s): Sterling Quinn, PhD

Vehicle emissions are one of the highest sources of air pollution in the United States, particularly in high-density urban areas. In Seattle, vehicle pollution is most concentrated along the busy interstates and highways near Seattle, SeaTac, and Bellevue. Living in these high-exposure areas are exposed to increased health risks, including respiratory conditions, cardiovascular diseases, and other long-term health issues. To better understand these patterns, a GIS model was developed to visualize how air pollution potentially disperses from major roadways. Using traffic concentration and a distance decay formula, it highlights where the highest pollution concentrations likely are. These concentration scores are then applied to census areas in western King County to analyze how different demographic groups may be affected. After analyzing the socioeconomic relationships, it was found that every demographic had a low correlation with traffic pollution levels, with only a few reaching moderate strength, and none of the correlations were statistically significant enough to suggest a meaningful relationship between traffic air pollution and specific demographics.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: GIS, Air Pollution, Modeling, Traffic, Demographics

Testing Loss-on-Ignition as a Proxy for Charcoal Concentration Using Lake Sediment Cores from Progresso Lagoon in Northern Belize

Katie Lender-Aberle, Megan K. Walsh, Audrey Scott, Melinda Cramp, Jasmin Gutierrez
Project Mentor(s): Megan Walsh, PhD

Holocene-length paleoenvironmental histories from Progresso Lagoon in northern Belize were reconstructed using multiple lake sediment cores obtained in 2022. Progresso Lagoon is a large, brackish water body that sits in lowland tropical forest within the boundaries of the ancient Maya Civilization. The area near the site has been greatly altered by agricultural use for many thousands of years, including the use of fire for land clearance and management. The purpose of this research is to determine if loss-on-ignition, which measures both percent organics and percent carbonates of the sediment, is a useful proxy for charcoal quantity within the lake cores. We compare high-resolution macroscopic charcoal and loss-on-ignition data to visually analyze trends in both data sets. We hypothesize that charcoal concentrations and percent organic values will show similar trends when carbonate values are high near the top of the cores, indicating that charcoal is making up the bulk of the organic material in the sediment at those times. However, we hypothesize that when carbonate values drop in the lower depths of the sediment cores, charcoal concentrations and percent organic values may diverge from one another. This would indicate that charcoal is no longer the primary source of organic material in the core. The results of the study are important because if the percent organics can be used as a proxy for charcoal concentration, then the much less time-consuming process of loss-on-ignition could be used instead of macroscopic charcoal analysis to determine past fire activity on the landscape.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Loss-on-Ignition, Macroscopic Charcoal, Sediment Core, Carbonates, Belize

Analyzing Three Washington Counties for LCLU Data Contribution Patterns in OpenStreetMap

Carter Merritt
Project Mentor(s): Sterling Quinn, PhD

This study examines contribution patterns of OpenStreetMap (OSM) land cover (LC) and land use (LU) data across three Washington state counties-King (urban), Clark (suburban), and Lincoln (rural)-to assess how regional diversity may influence mapping behaviors. To investigate these patterns, I determined land use and land cover data prominence using QuickOSM data extraction within QGIS, identifying the three most mapped tags per county. A Python script I created processed OSM contributions, extracting usernames, changeset IDs, comments, timestamps, and changeset bounding boxes to visualize contribution patterns. Additionally, I counted each contributor's number of mapping days to assess engagement frequency. Contributor behaviors and motivations were further examined using resources such as OSM wiki pages as well as Pascal Neis's "Your OSM Heat Map" tool. This analysis found that contributor engagement scales with development intensity, with King County exhibiting the highest contributor count and global participation, while Lincoln County is shaped by a small number of dedicated, topoliphic mappers with a primary focus on agricultural land use. Clark County reflects a blend of local and broad scale contributors, predominantly mapping residential areas. Across all three counties, human influenced tags attract the most contributions whereas natural LCLU features receive much of their focus specifically when they are proximal to features of human influence. By analyzing patterns of spatial density and user activity, this research highlights both the strengths and weaknesses of OSM as an open-source platform and how it relates to LCLU coverage throughout differing regional types.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Geography, GIS, Maps, OSM

Spatial Analysis of Human-Driven Seasonal Changes to Lake Tapps, WA

Paige Winsor
Project Mentor(s): Jennifer Lipton, PhD

Lake Tapps, located in Pierce County, Washington, is a man-made reservoir previously used for hydroelectric power, but is now used for recreation. The current lake is the result of four natural lakes that were combined in 1910. Due to agreements between residents and Cascade Water Alliance, the lake is drained every fall and refilled every spring. In my research, I used satellite imagery and spatial analysis to analyze seasonal water level changes of Lake Tapps caused by the annual drainage and refilling of the lake. First, a historical map of the area from 1873 was acquired through the Bureau of Land Management, and a 2022 hydrology dataset was acquired from the Washington State Department of Transportation. These two datasets were visually interpreted to see the long-term change in the shoreline of the lake that has arisen from human development in the area over 149 years. Satellite images were acquired from Sentinel 2 for three dates, from November 8, 2023, August 29, 2024, and January 19, 2025, to represent different seasons. Natural Color composites were created from these images, then supervised classifications were conducted on all three images to categorize different water depth levels. The composites and supervised classifications show a noticeable increase in deep water levels in summer, and an increase in shallow water levels in fall and winter. This suggests that as a whole, the lake is deeper in the summer months to allow for summer recreation on the lake and shallower in fall and winter.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Spatial Analysis, Satellite Images, Hydrology, Composites Images, Supervised Classification

Geological Sciences

Ecosystem Engineers: How Beaver Dams Affect Sediment Transport and Water Quality in Streams

Emma Estrada, Alexis Kinley
Project Mentor(s): Lisa Ely, PhD

We investigated the effects of beaver dams on sediment transport and their ability to filter water. Water quality and sediment size were tested upstream and downstream of three different beaver dam locations in March 2025. Two sites are on Currier Creek, about 100 feet apart, and one site is on a side branch of the Yakima River near the KOA campground. To assess water quality, the temperature, pH, turbidity, conductivity, and dissolved oxygen were measured using Vernier probes. Streamflow was measured using a streamflow meter. To assess sediment size, sediment samples were shaken in graduated cylinders with water and left to settle for two days. The percent of each sediment texture was measured using a ruler (mm). ANOVA (Analysis of Variance) was used to determine significant differences in sediment texture and water quality upstream vs. downstream at each beaver dam location. There were significant differences in streamflow, turbidity, dissolved oxygen, and conductivity, but not in temperature and pH. The most significant differences were found at the KOA site. The KOA site had significantly finer sediment upstream, predominantly silt grain size, and coarser sediment downstream, which had more pebbles and sand. Currier Creek had less significant differences between dams due to their close proximity, where the downstream of one site mirrors the upstream of the other. However, the average grain size on Currier Creek is finer upstream of the dams and coarser downstream. Beaver dams can increase habitat complexity in stream channels in terms of both sediment distribution and water chemistry.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Beaver Dams, Sediment Transport, Water Quality

Pre-Eruptive Timescales of Devils Washbasin Basalt and Hogback Mountain Basaltic-Andesite Deposits in the Goat Rocks Area, Cascade Arc, WA

James Genero IV, Yusei O'Leary, Hannah Shamloo, Kellie Wall
Project Mentor(s): Hannah Shamloo, PhD

Understanding timescales related to pre-eruptive processes provides critical information to support eruption forecasting and volcanic hazard assessment. Diffusion chronometry has allowed for the calculation of eruption initiation-to-eruption timescales by modeling the chemical gradients between zone boundaries preserved in crystals in erupted material. We apply this tool using iron and magnesium interdiffusion in clinopyroxene crystals in the Goat Rocks area in the Cascade Arc in Washington state. The area comprises several composite volcanoes built between 3.1 and 0.1 Ma and several nearby mafic volcanoes active between 3.5 Ma and 65 ka. Here, we focus on the Devils Washbasin basaltic volcano (~3.0 Ma) and Hogback Mountain basaltic shield complex (~1.0 Ma). Backscattered electron images of zoned clinopyroxenes were collected. Greyscale profiles were extracted perpendicular to the zone boundaries nearest the crystal edge using ImageJ. Using a misfit minimization approach in Python, using greyscale value as a proxy for Fe/Mg ratio— these profiles were modeled at a range of temperatures from 1050ºC to 1210ºC using the analytical solution to the diffusion equation. Results suggest that for both units, the timing between the final magmatic event prior to eruption (i.e., potential recharge event mobilizing stored magma) is on the order of months and no longer than decades, and pre-eruptive temperatures are around 1100ºC. These timescales agree with diffusion studies conducted on other mafic eruptive products of the Cascade Arc. Our results provide pre-eruptive timescales for polygenetic mafic eruptive centers of Cascade volcanoes, and the first ever pre-eruptive timescales for the Goat Rocks area.

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: Volcanology, Geochemistry, Geology

Snowshoe Hare Mismatch and Early Snowmelt in a Post-Fire Forest: Preliminary Results

Hunter Golat
Project Mentor(s): Susan Kaspari, PhD; Marketa Zimova; Carey Gazis, PhD

Snowshoe hare (*Lepus americanus*), a fire-dependent keystone species, face a visually striking consequence of climate-driven snowpack change in the form of coat color mismatch which increases predation and heat stress-related mortality, threatening long-term hare population stability and prey availability across boreal ecosystems. Large wildfires perpetuate snowpack change by decreasing canopy shading and darkening the snow surface through the deposition of charred wood, both of which can result in earlier snowmelt timing for over 15 years post-fire. However, snowshoe hare preferentially select for early-successional vegetation at recently burned sites. In spring 2024, we detected 161 snowshoe hare using camera traps across 15 sites on Table Mountain in central Washington, among other species such as bobcat, black bear, Northern flying squirrel, and cougar. Since October 2024, 26 cameras deployed across the same area have documented greater snow accumulation/ablation at burned sites, as well as several instances of coat color mismatch in snowshoe hare and short/long-tailed weasel, two other coat color-changing species. Monitoring will continue through June 2025 with the aim of shedding more light on how snow-adapted species are impacted by changing fire regimes and snow conditions.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Wildlife, Wildfire, Climate Change, Ecology, Snowmelt, Mismatch, Snowshoe Hare

DEM Generation from Non-Geotagged Imagery: A Case Study Using Agisoft Metashape on Alluvial Fans

Erika Gurrola-Beltran, Jasmine James
Project Mentor(s): Breanyn MacInnes, PhD

This project examine the use of Agisoft Metashape to generate high-resolution Digital Elevation Models (DEM) of a 3-meter by 3-meter sample area located at the center of alluvial fans in Kittitas County. The DEMs were created to help determine characteristics of an active or in-active alluvial fan, with one characteristic being microtopography. Initial attempts to generate the DEMs were unsuccessful due to the absence of ground control points (GCP) and missing geolocation metadata in the image set. As a result, Metashape was unable to accurately scale or georeference the model. To resolve this, GPS coordinates were manually acquired for each corner and the center of the sampling box. This was accomplished using a combination of phone GPS readings (for four of the nine locations) and coordinates derived from Google Earth Pro, based on detailed field sketches marking the box location. These points were then entered into Metashape as manually placed markers, enabling successful model alignment and DEM creation. This process emphasizes the critical role of GCPs in photogrammetric workflows. The successful creation of the DEMs provides insights into the topography of the alluvial fans and aids in the classification of its activity status.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Photogrammetry, Digital Elevation Model (DEM), Agisoft Metashape, Ground Control Points (GCP), Alluvial Fan, Georeferencing, Microtopography, Terrain Modeling, Field Mapping

Soil Infiltration Rates on Yakima River Terraces of Different Ages near Thorp, WA

Cassidy Harker, Hailee Coldiron, Maddy Luke
Project Mentor(s): Lisa Ely, PhD

This project investigated the surface-water infiltration rates, soil development, and sediment size distribution on river terraces of different ages. As river terraces have clear relative ages and should have very similar source rock, we were able to assess the impact of longer periods of soil development on infiltration rates. We hypothesized that infiltration rates would increase from floodplain to higher terraces due to the higher organic matter content such as roots, but the opposite was found true. A series of three river terraces and a floodplain of the Yakima River were identified near Thorp, Washington. The vegetation was riparian in the floodplain and low terraces and transitioned to shrub-steppe at higher terraces. A dual-infiltration ring was used at three locations on each terrace to test soil infiltration rates, and soil moisture was calculated in the lab from field samples. The data display a clear decrease in soil infiltration rate (1.07x10-5 in/hr to 8.47x10-7 in/hr) and sediment size (medium sand to silt) from floodplain to high terraces. Conversely, soil moisture increased (20.6% to 38.2%) from floodplain to high terraces. We believe this is due to the greater accumulation of silt and clay in the higher, older terraces. Much is being done to improve water resource supply and retention in the Yakima River Basin. Understanding the relationships between relative river terrace age, soil infiltration rates, soil moisture content, and vegetation can inform water management decisions by identifying suitable sites for managed aquifer recharge and anticipating differential runoff during snowmelt or precipitation events.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Soil, Soil Infiltration, Soil Development, River Terraces, Yakima River Basin

Investigation of the Focal Mechanism of the 2020 M7.6 Sandpoint, AK Earthquake

Ryan Hayes
Project Mentor(s): Walter Szeliga, PhD

On October 19th, 2020, a magnitude 7.6 earthquake shook the Alaska peninsula. The epicenter was 99km southeast of the island of Sand Point along the boundary between the North America and Pacific plate. While earthquakes in this region typically have a thrust faulting sense of slip, the USGS W-phase moment tensor, a measure of the fault motion for the bulk of the seismic energy, suggests that this event was strike-slip. Oddly, however, this earthquake also produced a tsunami, which is an uncommon occurrence for a strike-slip earthquake. In this study, I examine P-wave and SH-wave first motions to create a focal mechanism to determine the fault motion at the very beginning of the earthquake. My results suggest that the earthquake began with thrust faulting, in good agreement with the production of a tsunami. I explore some ways in which the earthquake could have transitioned between thrust and strike-slip during rupture and the implications for resulting tsunami.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Focal Mechanism, Seismology, Earthquake, Tsunami

Identifying Active vs Inactive Alluvial Fans and Debris Flow Potential in Kittitas County

Jasmine James, Alex Gurrola-Beltran
Project Mentor(s): Breanyn MacInnes, PhD

Kittitas County is home to numerous active alluvial fans, along with many old debris flows, especially within the Yakima River canyon and along the Manastash Ridge range front (the steep slope on the southern side of Kittitas Valley). Some of these fans are more active than others and have the potential to produce debris flows. This study aimed to determine which fans are active and where they are located, as well as which channels are more frequently used and have the potential to move large amounts of sediment.

20 fans were selected for analysis, thirteen on the range front of Manastash Ridge and seven within the Yakima River canyon. To determine if a fan was active, we used field observations of surface color, grain size, and images of the fans surface that were then stitched together in Metashape and then put into GIS to obtain surface roughness estimates. Through lidar, we determined the shapes and dimensions of the fans and used satellite imagery to analyze the density of the vegetation. We then used GIS to collect watershed size, steepness, and stream order. Finally, we compared this dataset to historical precipitation, wildfire, and known recorded debris flow events.

Active fans generally had bigger sediment sizes, more vegetation, and had rougher surfaces. Fans better suited for debris flows had steeper angles and smaller watersheds. This data is useful in assessing locations best suited for future debris flows and improves our understanding of the alluvial processes in Kittitas County.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Geology, Alluvial Fans, Debris Flows, Kittitas County, Field Mapping

The Effect of Slope Aspect on Insect Gall Density on Artemisia Tridentata

Zachary Karol, Dugan Eckstein, Tristan Eims, Caleb Wheeler
Project Mentor(s): Lisa Ely, PhD; Maggie Egan

Galls are abnormal growths on plants like Big sagebrush (*Artemisia tridentata*) and are onset by insect activity, including herbivory and reproduction. Gall density could be an indicator of plant or insect population health. We hypothesized that slope aspect would have an effect on gall density on Big sagebrush, soil moisture content, and soil temperature, the latter two being contributors to plant health. To measure this, we selected two sites on north- and south-facing slopes in Umtanum Canyon. We randomly selected 20 plants in each site and counted the galls on 20 evenly spaced 20-cm-long segments per plant to estimate gall density per plant. The average gall density was 7.85 per plant on north-facing slopes and 23.9 per plant on south-facing slopes. We measured 3 soil temperatures and collected 4 soil samples per slope. Soil samples were weighed, dried, and reweighed to measure average moisture content. The north-facing slope averaged 3°C and 25.9% soil moisture, while the south-facing slope was 9°C and 13.7%. Statistical tests showed significant differences in all three variables between the slopes, with p-values of 0.006653 for gall densities, 0.01548 for soil moisture, and 0.00334 for soil temperature ($\alpha = 0.05$). The results indicate that slope aspect does have an effect on gall density of Big sagebrush, soil temperature, and soil moisture, even during the winter wet season. The greater gall density on the warmer, drier slope could indicate a preference in insects for those conditions or a difference in the susceptibility of Big sagebrush to insect herbivory.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Big Sagebrush, Artemisia Tridentata, Gall Density, Soil Moisture Content, Soil Temperature, Slope Aspect, Plant Health, Insect Herbivory

Delineating Isostatic Uplift From Dynamic Uplift Episodes in the Transantarctic Mountains

Katilyn Kotchka
Project Mentor(s): Audrey Huerta, PhD

The Transantarctic Mountains (TAM) run North-South through the center of the Antarctic continent for roughly 3500 km. The current understanding of the geologic history of this mountain range is based on low-temperature thermochronology conducted during the 1970's through the early 2000's.
These analyses examine apatite and zircon grains using fission-track dating methods to constrain the rate at which these mountains were exhumed. Fission-track results can be used to pinpoint dynamic erosion events, if samples collected along near-vertical transects all reveal similar ages.
Prior studies conclude the main uplift of the TAM occurred at 55-50 Ma. However, this understanding is based on results from sub-vertical sample sets (initial examination reveals 20º-30º slope elevation). This project aims to determine whether uplift of the TAM can reliably be attributed to dynamic, tectonically driven uplift events, or if there is a case to be made for steady, isostatic mantle adjustment in response to normal weathering and surface erosion. This latter process would yield uplift rates similar to those found in the present-day Appalachian Mountains. Evaluating the vertical nature of published transects and determining the rate of uplift based on age vs. elevation will give a better understanding of the forces that formed these mountains.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Antarctica, Apatite Fission-Track Thermochronology, Geology, Isostatic Uplift, Transantarctic Mountains

Assessing Potential for Aquifer Storage, Recovery, and Recharge: A Hydrogeological Analysis of the Manastash Creek Alluvial Fan in Central Washington

Elif Myers, Carey Gazis, Lisa Ely, Eliza Sterne
Project Mentor(s): Carey Gazis, PhD; Lisa Ely, PhD
In south-central Washington, the Yakima River Basin spans 6,100 square miles, encompassing 10% of the state. With a growing population and over 400,000 acres of irrigated cropland, reliable water availability is crucial for agricultural irrigation, municipal needs, and aquatic habitats. To ensure water for future use, Shallow Aquifer Recharge (SAR) and Aquifer Storage and Recovery (ASR) have been proposed within the Yakima Basin Integrated Plan (YBIP). This research identifies the Manastash alluvial fan–located west of Ellensburg, Washington as a potential location for SAR or ASR. To determine suitability for groundwater recharge, lithologic, hydrologic, and pedologic methods were applied. Synthesized Department of Ecology well logs supplied data to create subsurface cross-sections, indicating aquifer locations and depths. In summer 2024, water samples collected from residential wells, canals, Manastash Creek, and the Yakima River were analyzed for major ions and isotopic signatures to identify groundwater sources, mixing, and barriers to flow. Once aquifer and water characteristics were finalized, National Resource Conservation Science Web Soil Survey data was utilized to develop soil infiltration maps, denoting suitable locations for flood application. Upon completion, summarized findings will be provided to the Washington Department of Ecology Yakima River Basin Integrated Management Plan Groundwater Storage Subcommittee, informing decisions for future SAR or ASR applications.
Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: Alluvial Fan, Shallow Aquifer Recharge, Aquifer Storage and Recovery, Geochemistry, Yakima Basin Integrated Plan

Investigating the Impact of Arctic Mineral Dust on Glacier Melt

Oscar Orme, Elisabeth Isaksson, JC Gallet, Jack Kohler
Project Mentor(s): Susan Kaspari, PhD
The Arctic is warming at 4x the global rate. Warming is particularly pronounced in Svalbard, Norway, where warming is 5-7x greater than the global rate. A consequence of this warming is glacier retreat. Light-absorbing particles (LAP; black carbon (BC), mineral dust, and colored organics) can also contribute to glacier melt by darkening otherwise reflective surfaces. Previous LAP research on Svalbard has focused on BC, while properties of dust remain relatively understudied. To address this knowledge gap, dust from four glaciers on Svalbard was analyzed for grain size and composition to understand spatial variance. This was supplemented with an 8.15m ice core analyzed for temporal trends in LAP deposition. X-ray diffraction and scanning electron microscopy characterized dust compositional traits, while inductively coupled plasma mass spectrometry and single particle soot photometry yielded temporal trends of dust elemental proxies and BC. All sampled glaciers contained clay minerals and common rock forming minerals. Carbonates were exclusively found in dust from southern Svalbard. Mineralogical differences were accompanied with varied grain sizes; mean sizes ranged from 8.43-16.8µm. BC and dust concentrations within the ice core were found to be relatively low; BC concentrations ranged between .004-2.06µg/L, and elemental proxies for dust ranged between .023-35.9ppb. These differences in size, composition, and concentration show that dust deposited on Svalbard potentially has both local and long-range sources, with varied degrees of deposition occurring between glaciers. This work has contributed to a baseline understanding of Svalbard dust and highlights the need for further studies on dust provenance and LAP properties.
Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Climate Change, Dust, Glacier Melt

Lichen Density and Distribution on Various Basalt Formations

Lane Peterson, Nicolette Carlson, Peter Zuñiga
Project Mentor(s): Lisa Ely, PhD

Our study investigates how basalt surface textures affect lichen coverage in the Central Washington area. We examined three basalt types: pillow, columnar, and entablature, which are typical components of individual basalt flows. Our study sites were Rattlesnake Dance Ridge Trail, Yakima Canyon Road, and the Vantage Highway east of Ellensburg. The latter two locations are both road cuts, which could cause the percentages to be lower. Field data were collected within a 7x7 inch square; photographs were taken and analyzed on a computer by overlaying a grid to determine lichen coverage percentage. Our results indicate significant differences in lichen density among basalt types. Pillow basalts exhibited an average lichen coverage of 22%, columnar basalts 35%, and entablature basalts 89%. These findings confirm that surface texture plays a crucial role in lichen colonization, with rougher, irregular surfaces supporting higher lichen densities. The entablature may support a higher density of lichen because the highly fractured and uneven surface likely retains more moisture and provides more microhabitats for nutrient accumulation compared to the smoother pillow (palagonite) and columnar textures. Another potential reason for why entablature has a higher lichen density is that the rougher texture could allow the lichen to grip the irregular surface better than a smooth surface. Overall, our study highlights the importance of basalt surface texture in influencing lichen colonization, with the highly irregular entablature basalt providing the most favorable conditions for lichen growth in Central Washington.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Lichen, Entablature, Columnar, Pillow

Talus and Rattlesnakes

Tyler Radtke, Dakota Marks
Project Mentor(s): Lisa Ely, PhD

The northern pacific rattlesnake prefers to hibernate in talus rock slopes at the base of cliffs where the rocks measure 7,000 – 15,000 cm^3. We investigated geological factors that could create talus of this size. We chose two variables to focus on: basalt cliff type (the chaotically jointed entablature and the vertically jointed colonnade) and cliff height. Our goal was to find whether there was any significant difference in the rock size across these variables. We systematically measured the sizes of 252 rocks at two field sites: Umtanum Creek and Frenchman Coulee. Parametric tests revealed the data were not normally distributed, so we ran a spearman correlation test to compare cliff height to rock size. We also ran a two-sample Wilcoxon rank sum W test to see if there was a difference between rock sizes under colonnade and entablature cliffs. The results indicated that both cliff type and cliff height play a part in affecting -- or are correlated to -- the size of talus in the slope below. Furthermore, the data indicated that taller colonnade-type cliffs are more likely to produce talus in the size preferred by the northern pacific rattlesnake.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Geology, Columbia River Basalt, Talus, Biology, Habitat, Northern Pacific Rattlesnake

Geodetic Investigation of Magma Recharge at the Three Sisters Volcanic Complex

Nicole Switzer

Project Mentor(s): Walter Szeliga, PhD

The Three Sisters volcanic complex consists of three closely spaced volcanic peaks located in the Oregon portion of the Cascade Range. The most recent eruption in the Three Sisters complex occurred less than 2000 years ago. Beginning in the late 1990's, space geodetic techniques have indicated shallow magma intrusion into the complex. Using data from a mixture of campaign and semi-continuous Global Positioning System (GPS) instruments collected over the past 24 years, I have created position time series of ground deformation in a single, consistent reference frame. These position time series may be used to model the location and volume of this recent shallow magma intrusion.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)

Keywords: Geology, Volcanos, GPS

Potential Fields Investigation of the Shallow Subsurface of Manastash Creek 7.5-minute Quadrangle, Central Washington

Kiersten Wilbur, Anita Bauer, Andrew Sadowski, Todd Lau

Project Mentor(s): Walter Szeliga, PhD; Megan Anderson, PhD, LG; Anne Egger, PhD

The Manastash Creek 7.5 Minute Quadrangle (quad) is southwest of the town of Ellensburg, WA. This study is near a local western extent of the Columbia River Basalts whose absence exposes older basement rocks to the northwest of the quad. These older rocks included the Easton Metamorphic Complex, the Teanaway Andesites and Basalts, and the Swauk and Roslyn Formations. The quad is also located in the Yakima Fold and Thrust belt which contains thrust faults striking roughly NW-SE, monoclines, and paired anticline-syncline structures. This study combined rock properties (density and magnetic susceptibility) and the earth's gravity and magnetic fields (potential fields) to make map view interpretations and construct a 2D cross-section using iterative forward modeling to deduce what near subsurface structures there may be and what their dip angle, strike, and layer thicknesses are. Field work for this area included collecting rock samples throughout the quad and gravity data to construct a grid with points 2 km apart using two different gravimeters: Scintrex CG-5 and G-908. Aeromagnetic data previously flown in 2008 by Blakely et. al. (2020b) and geologic surface observations from Washington Geologic Survey colleagues were used as extra constraints. Early findings suggest that there may be a flow of Teanaway Basalt between the Swauk and Roslyn Formations and that just north of Manastash Creek (the creek) there may be a pop up feature bracketed by four faults to the east and a synclinal feature to the west. This project was conducted through the WGS and their STATEMAP program.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)

Keywords: Gravity, Magnetics, Subsurface, Faults, Folds, Geophysics, 2D Modeling, Maps, Potential Fields

Law and Justice

Examine Supreme Court Decisions That Have Influenced The Gender Salary Gap

Shinhae Hwang
Project Mentor(s): Rodrigo Murataya, PhD

Gender salary gap refers to the difference in earnings between men and women, and it has been an ongoing issue in the U.S. labor force (Hegewisch et al 2010). In 1963, women earned 59 cents for every dollar earned by men. That same year, the Equal Pay Act was passed to abolish the salary disparities based on gender. Later, the Equal Employment Opportunity Act of 1972 prohibited employment discrimination based on origin, sex, religion, age, disability, political beliefs, familial status (U.S. Equal Opportunity Employment Commission 2011).

In 2005, Senator Tom Harkins, introduced the Fair Pay Act to address wage disparities based on gender and minority status. The Fair Pay Acts helps prevent employers from using different occupational titles for men and women in similar jobs as a justification for unequal pay. The bill states that when working conditions are similar, wages should be similar (Glappond and McEvoy 2005-2006).

Although various legislative efforts have been made to address the gender salary gap throughout history, the disparity still persists. Supreme Court decisions have significantly shaped the legal landscape surrounding the gender salary gap. This study examines how Supreme Court rulings have influenced the gender wage gap and how these decisions have contributed to efforts to eliminate salary disparities based on gender.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Gender Salary Gap, Supreme Court

Mathematics

Building a CNN Model for Quality Inspection of Copper Foil

MinChieh Lee
Project Mentor(s): Yvonne Chueh, PhD

As AI technology continues to advance and gain widespread recognition, many companies are working to enhance their existing products with AI capabilities. JyeJiang Group has been a leader in the quality control inspection machinery for copper foil for many decades. With the rise of AI technology in recent years, JyeJiang Group is now looking to incorporate AI into their current product line.

I aim to explore the potential for integrating neural network model training into image classification and evaluate the accuracy of these models in real-world image classification tasks. To accomplish this, I will be using image data provided by JyeJiang Group for training and testing a Convolutional Neural Network model.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Data Science, Artificial Intelligence

Modeling and Predicting Homeless Demographics Across U.S. States

Doug Snyder, Ian Ford, Cade Pratz
Project Mentor(s): Yvonne Chueh, PhD

Homelessness is a complex issue in the United States. This study analyzes the relationship between homeless demographics by state and socioeconomic factors such as GDP and other variables, using predictive modeling to inform resource allocation strategies. Understanding these patterns can help organizations provide more targeted support. We apply various modeling techniques, including principal component analysis, best subset selection, ridge and lasso regression, principal components, partial least squares regression, as well as tree-based methods like CART, bagging, random forests, boosting, and BART. Model performance is evaluated through cross-validation tests and validation set errors. Data is sourced from the Office of Policy Development and Research, the U.S. Census Bureau, and the Bureau of Economic Analysis.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Homelessness, Predictive Analysis, Demographics, United States

Physics

Calibration of a Single Axis Seismometer in Relation to a Short Period Seismometer

Tiberius Bruton
Project Mentor(s): Walter Szeliga, PhD

This project focuses on calibrating a single-axis seismometer (SAS), specifically an AS-1 seismometer, using a Short Period Raspberry shake Seismometer (SPS) as a reference. The SPS has an extended frequency range and high sensitivity, which provided a stable baseline for comparison, allowing for a reliable calibration of the SAS. The primary objective is to evaluate the relationship between ground motion and the electrical signal output of both seismometers, assess the frequency response characteristics of the SAS, and apply digital signal processing (DSP) techniques to improve its accuracy.

To achieve this, both instruments were collocated, and seismic data was collected from both instruments and analyzed. The frequency response of the SAS was compared to that of the SPS through analysis of frequency plots, and discrepancies between the two seismometers were identified and adjusted to match. Impulse response alignment techniques were employed to synchronize signals, while low pass filtering and Fast Fourier Transform (FFT) analysis were used to examine phase and amplitude deviations. Deconvolution methods were applied to correct system differences, and amplitude scaling adjustments were implemented to refine the calibration process.

Results indicate improved agreement between the SAS and SPS, with reduced phase and amplitude mismatches across key frequency bands. These findings enhance the reliability of our SAS measurements, making them more suitable for seismic studies where a representation of ground motion in meters per second is necessary. The improved calibration process can be applied to field deployments where broadband seismometers may not be available, contributing to more accurate ground motion analyses in seismology applications.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Calibration, Seismometer, Frequency

Modeling and Identifying the Changes in the Planetary Boundary Layer of a Coastal Region to an Urban Region

Tiberius Bruton

Project Mentor(s): Darci Snowden, PhD

The Planetary Boundary Layer (PBL) plays a critical role in weather, climate, and air quality by governing energy exchange and momentum between the Earth's surface and the atmosphere. Identifying how terrain influences PBL structure is essential for improving atmospheric models in any environment where physical changes, such as rapid jumps in elevation, often are modeled using rough averages. To evaluate terrain-dependent fluctuations in PBL depth and structure in the PBL, I collected and compared datasets over the Gulf Stream in the Atlantic Ocean and Ellensburg, WA. Over a five-day period in January 2025, atmospheric profiles were collected off the coast of Delaware between 7 am and 11 am. I also collected and analyzed data in April 2025 of the post-sunrise PBL over Ellenburg, WA using a helium filled tethered weather balloon at a maximum altitude of 500 feet. In both cases, data was collected with a radiosonde sensor to measure temperature, pressure, humidity, wind speed, and wind direction. By comparing diurnal trends and vertical gradients in two data sets, I aim to characterize PBL evolution and identify key differences in coastal and urban PLB. In the future these insights could contribute to a better understanding of how the boundary layer processes are changed by human development, along with implications for weather forecasting and environmental monitoring in different terrains.

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)

Keywords: Planetary Boundary Layer, Model, Weather Balloon

Geometric Analysis of Microtubule Rotation in Axons

Stephanie L. Denton; Calvin T. Sprouse; Rafe Habedank; Christopher W. Manry (Drexel University College of Medicine); Bridie D. Eckel (Drexel University College of Medicine); Peter W. Baas (Drexel University College of Medicine); Erin M. Craig, PhD

Project Mentor(s): Erin M. Craig, PhD

Axonal microtubule arrays support transport of cellular cargo in developing and established axons. Disruptions to microtubule arrays affect axon function and are a significant factor in neurodegenerative pathogenesis. Axons are long, narrow cellular structures that vary in diameter and are densely packed with microtubule filaments, proteins, and organelles. In this study we examine how microtubule patterns are maintained in this crowded environment. We developed a computational model to analyze the spatial distribution of microtubules in axons to determine the conditions in which microtubules might flip direction through rotational diffusion and disrupt the optimal polarity pattern. We determined the upper limit of microtubules in any cross section of the axon using a model in which microtubules self-organize into a hexagonal pattern that maximizes packing efficiency. We assumed the radial distribution of microtubules is random for low microtubule density. By estimating the average distance between each microtubule and its neighbors, we calculated the maximum rotation angle of a microtubule as a function of its length, the axon diameter, and the number of microtubules occupying the same cross section. This, in turn, allows us to determine the likelihood of “flipping” events for a given set of axon conditions. The predictions of this model provide insight into one of the hypothetical mechanisms for disruption of axonal microtubule arrays in neurodegenerative diseases such as Alzheimer’s.

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)

Keywords: Computational, Biophysics, Neuron, Physics, Axon, Microtubule, Statistics, Geometry

Developing Methods for Measuring Angular Correlation of Double Gamma-ray Cascades

Joey Knight
Project Mentor(s): Michael Braunstein, PhD

The angular correlation of double gamma-ray cascades plays a role in understanding the angular momentum states of certain nuclei. The purpose of this project was to develop methods to perform gamma-ray angular correlation measurements using equipment available to the CWU Physics department. Measurements were performed using two high-purity germanium (HPGe) detectors mounted on an apparatus for which the relative angles between the detectors could be changed. A brief verification of methods was performed using ^{60}Co and compared to previous angular correlation measurements. Electronics for the detectors were then configured for gamma-ray signals from ^{133}Ba. One of the detectors was set for the 356 keV gamma-ray, and the other was set for the 81keV gamma-ray of the ^{133}Ba double gamma-ray cascade. Then when the two signals were detected in coincidence, a counter was incremented. By graphing the count rate as a function of angle, an angular correlation measurement is obtained. The measurements performed were compared to and fit with a widely accepted theoretical model for angular correlation of double gamma-ray cascades. The fits were of mixed success suggesting that further refinement of the apparatus and methods is needed. This research helped to develop and refine methods that can be applied to further studies using the apparatus.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Physics, Angular Correlation, Gamma-ray, Coincidence

Measuring Laser Power Broadening of ^{87}Rb Hyperfine Transitions in Saturated Absorption Spectroscopy

Jimmie Krager
Project Mentor(s): Michael Braunstein, PhD

The relationship of laser power broadening on the F=2 → F′=3 hyperfine transition of ^{87}Rb was measured using a tunable external cavity diode laser (ECDL), saturated absorption spectroscopy techniques, and a Michelson interferometer. Incident laser power was controlled using continuously variable neutral density filters placed in the pump and probe beam paths. The F=2 → F′=3 transition was chosen specifically because it is well separated from other transitions or crossover frequencies. Waveforms of saturated absorption scans and Michelson interferometer signals were collected with and downloaded from a digital storage oscilloscope and measurements of laser power were taken pre-and-post filter in both pump and probe beam paths after each set of five waveform downloads from the oscilloscope. The downloaded waveforms were fit using OriginLab software to obtain a width measurement of the F=2 → F′=3 transition, calibrated to frequency by a fit to the Michelson interferometer signal. The measured relationship between the pump beam power and linewidth of the transition were consistent with a widely accepted model. Gaining this quantitative understanding of how power broadening affects linewidth will be useful in choosing parameters to achieve different objectives in saturated absorption spectroscopy.

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: Atomic Physics, Laser Physics, Optics, Saturated Absorption Spectroscopy

Guidance on Selecting Suitable Test Wavefunctions to Use in Variational Principle Calculations

Christian E. Laurent
Project Mentor(s): Benjamin White, PhD

To participate in the emerging quantum economy, students need practical and applied training in quantum mechanics. Given the difficulty of solving for exact state energies of realistic quantum systems, students typically learn several approximation techniques. Among these techniques, the variational principle is used to calculate an upper bound for the ground-state energy of a quantum system. A test wavefunction must be selected and used in any variational principle calculation, and the accuracy of the energy estimate is predicated on how closely the test wavefunction matches the true ground-state wavefunction of the quantum system. This presentation concerns guidance instructors can offer students on the nuances of selecting a suitable test wavefunction. To develop some rules of thumb, we studied several different quantum systems, represented by single-potential wells with different characteristics (e.g., widths, curvatures), using five distinct test wavefunctions. It was found that a wavefunction's rate of convergence to zero, out away from the center of the well, governs how accurately that wavefunction performs when using the variational principle. A Gaussian test wavefunction provided the most accurate results for a wide range of potential wells due to its width and its rate of convergence to zero. But we also studied specific systems for which a Lorentzian, hyperbolic secant, or infinite-square well test wavefunction offered better accuracy. The results of this study offer a toolkit instructors can provide to students when they study the variational principle.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Variational Methods, Ground-State Energy, Quantum Mechanics, Potential Energy Wells, Approximation Methods, Wavefunctions

Automation of Data Collection for Characteristic Curves From Transistors

Alison Prekeges
Project Mentor(s): Michael Braunstein, PhD

The goal of this project was to automate the data collection process for characteristic curves from transistors. A characteristic curve is the measurement of a transistor's collector current as a function of the collector-emitter voltage at a fixed value of base current. An apparatus was developed that sweeps a transistor's collector-emitter voltage, uses a multimeter to measure and display the transistor's base current, and uses a digital storage oscilloscope to measure, display, and store the transistor's collector-emitter voltage and a signal proportional to the transistor's collector current. A Python script was developed to collect a specific section of data from all necessary channels on the oscilloscope and transfer them into a .csv file. This method will lower the time required for the collection of transistor characteristic curve data for students in Lab Practices and Techniques, a physics class at Central Washington University.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Physics, Electronics, Code Development, Process Automation

Optimization and Characterization of an Undergraduate Cold Cathode Table-Top Electron Accelerator for Beam Evaluation and Attenuation

Mason Skeath, Caitlin Balmer, Dominic Showalter
Project Mentor(s): M. Miron Zaini, PhD; Peter Zencak

Rising cancer cases spurred advancements in radiation therapy modalities, including electron accelerators. In this oral presentation, descriptive and diagnostic analysis was utilized to develop and characterize a functional, low energy cold cathode table-top electron accelerator for radiation physics experimentation in Central Washington University's (CWU) undergraduate radiation lab. The device features a tungsten cathode (TC), brass anode, and copper Faraday Cup (FC) in a vacuum generated by an Edwards RV8 Rotary Vane Vacuum Pump, enclosed by blue-tinted polyvinyl chloride (PVC). TC electron emission was facilitated by applied electric fields from input voltages of 1000 to 5000V by a Stanford Research Systems Model PS370 High Voltage Power Supply. FC collected electron current in the range of 0 to 100μA as measured by a Keithley Instruments Model 480 Picometer. Baseline measurements exhibited a Fowler-Nordheim relationship for low input voltages, transitioning to linear step correlations for higher input voltages. This behavior was thoroughly investigated using a quantum mechanical approach in MATLAB. With the introduction of an aluminum attenuator, an exponential decrease in beam current with respect to attenuator thickness was observed; moreover, input voltage of 4500V produced oscillatory current output, ranging from 0 to 24μA with a 6 second period. Oscillation is thought to be caused by space-charge effects that are attempted to be eliminated via grounding of the attenuator. This optimization and characterization of an electron accelerator demonstrated the potential for radiation physics experimentation at CWU. Future research should aim to enhance beam quality, visualize beam dynamics, and further investigate quantum mechanical properties.

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: Electron Accelerator, Cold Cathode Electron Field Emission, Electron Attenuation, Radiation Physics, Fowler-Nordheim Relationship

NASA Student Launch Initiative

Algirdas Veitas, Trevor Finnern, Benjamin Breslich, Erik Hardiman, Trey O'Brien, Jobe Kirner, Elijah Berehnie, Colin Thomas, Alex Vargas
Project Mentor(s): Darci Snowden, PhD; Tammy King

Wildcat Rocketry participated in the 2024 / 2025 NASA Student Launch, a nine month long research initiative focused rocketry and STEM payload development. This year's challenge involved designing and launching a rocket capable of collecting environmental and flight data to estimate the probability of survival for STEMnauts (simulated astronaut figures) during flight. Once landed, the data will be transmitted to a NASA ground station via radio communication. Of the variables to monitor, our team chose: atmospheric temperature, STEMnaut orientation, altitude, and acceleration. These parameters informed our survival probability algorithm. The payload was flown inside a 99.5 inch long, 4 inch diameter fiberglass rocket weighing approximately 35 pounds. Our flight objectives included reaching an apogee of about 5,500 feet on a L-1150R motor which would propel us to a max acceleration of 589 ft/s. To meet NASA's kinetic energy landing requirements of 75 ft-lbf we calculated that the rocket must descend slower than 17 ft/s upon landing. This constraint guided our parachute dimensions as we would be reaching near the altitude limit of the competition. This would cause us to balance between descending quickly under drogue, to not exceed the 90 second decent time limit, but slow enough under main as to land under the kinetic energy limits. Using our models and data from flying a subscale, as well as three flights of a fullscale rocket, we verified that a 24" drogue chute in combination with a 96" main chute, will keep us within the competition constraints.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Rocketry, Physics, MET, EET, NASA, Engineering, Research

Political Science

Examinging Refugee and Asylum Seeking Trends

Jackson Brassfield
Project Mentor(s): Bernadette Jungblut, PhD

"A refugee is a person who has fled their own country because they are at risk of serious human rights violations and persecution there" (Amnesty, 2024). Refugees are people who do not feel safe in their home country. They fear for their lives from the effects of war, prosecution, or even death. After taking the decision to seek safety outside of their own country, why do refugees emigrate to certain states during a time of war? Why do certain states choose to take in refugees and asylum seekers? Through a comparison of the United States, Germany, and Sweden, this research investigates the reasons why some states seem more likely than others to accept refugees during war time and why consequently, refugees flee to those countries. Possible reasons include: laws in place that are more favorable for refugees or asylum seekers; public opinion that is more favorable to allowing an influx of refugees; and leaders who appear willing to harbor refugees in their country. An improved understanding of refugee migration will enable humanitarian organizations to better predict when and where to prepare to support some of the world's most vulnerable people.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Refugee, Asylum Seeker, Emigrate

The Politics of Inequality: The Struggle of Latinas/os, African Americans and Native Americans in the United States

Zachary McHenry, Sean Williams, Russell Hoyt
Project Mentor(s): Gilberto Garcia, PhD

This panel examines the central issues in the politics of inequality and its representation in the context of the various political movements of multiple identities with a special focus on three of the most important communities in the United States: Latina/o, African American, and Native American communities. This panel examines the political interaction of the community struggles and politics of the state in the establishment of public policies addressing inequality. The presentations Identify the diverse composition of the various political movements affected by racism, ethnicity, discrimination, and class privilege.

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: Inequality, Race, Class, Political Power

Why Post-War Matters: The Russia-Ukraine War

Sean Williams
Project Mentor(s): Shawn Reichert

Post-war agreements are made to bring peace and stability to the region where these states reside after the war. In Europe, post war agreements have failed several times throughout history failing to resolve the issues between states paving the way for a greater conflict in Europe. These examples have been seen in post-war periods from the Napoleonic Wars leading to the French revolution to the German and Balkans wars. The post wars of the German and Balkans wars lead to German unification and political instability in the Balkans driving the way to World War One. The Treaty of Versailles is a perfect example of why post war matters, the failure to solve the underlying issues between states led to the most violent conflict the world has ever seen causing the deaths of millions of people, throughout the world because of a failed peace treaty. The eventual post-war period of the Russia-Ukraine War needs a congruent post war agreement that can prevent the chances of another conflict in Europe. This presentation will highlight what comes next after the war, what challenges we face after the war and what lessons we learned after the war.

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: Ukraine, War, Peace, Strategy, Russia, Europe, Diplomacy, Policy, International Relations

Primate Behavior and Ecology

Arts-Based Education Methods as a Conservation Outreach Tool

Em Bradford-Brann
Project Mentor: Jessica Mayhew, PhD

My research project investigated the effectiveness of arts-based educational interventions in enhancing conservation awareness for the endangered bonobo (*Pan paniscus*). This ape species is endemic to the Democratic Republic of Congo and relies solely on the ecology of the Congo River Basin to survive. Traditional methods of education can have limitations in conveying the complexity of conservation topics. Arts-based educational methods offer a different approach to address these challenges by utilizing creative expression, through which a deeper connection to this species might be fostered. I compared the use of traditional educational methods and an arts-based intervention, including a website and comprehensive lesson plan, to help college students at Central Washington University enhance awareness and understanding of bonobo conservation issues and test the efficacy of an arts-based educational method compared to traditional methods. Both study groups were supplied with a lesson plan to research specific aspects of bonobo behavior and ecology. The arts-group created their own arts-based project, whereas the non-intervention group received traditional teaching methods to create a written project. Students completed a pre- and post-assessment to gauge their knowledge and perceptions of the materials. Data collection will be completed using Qualtrics software and will be analyzed using an independent t-test. By integrating visual arts into the curriculum of 100-300 level anthropology courses, this research project aims to evaluate the effectiveness of arts-based strategies in the university classroom.

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: Art, Biodiversity, Bonobo, Conservation, Education, Outreach, Primate

Chimpanzee Hierarchy in Caregiver Daily Shift Reports

Alexis Erickson; Katelyn Seymour; Mary Lee Jensvold, PhD
Project Mentor(s): Mary Lee Jensvold, PhD
Through cross-fostering experiments that began in the 1960s and 1970s, chimpanzees Washoe, Moja, Tatu, and Dar were immersed in American Sign Language and raised in conditions that resembled Western human homes. This method allowed them to acquire signs in an environment similar to how human children learn their first language. Later, Washoe's adopted son Loulis acquired signs from her and other signing chimpanzees. In 1980 and 1981, the chimpanzees moved to Central Washington University and lived at the Chimp Lab on the third floor of the Psychology Building. Caregivers documented the daily behaviors and signed conversations of the chimpanzees in shift reports. The current project looked at three months of shift reports from 1986 through the lens of the chimpanzee hierarchy, as later described by Sanz et al. (1996) and Hayashida et al. (2002). Patterns emerged with Washoe, the most dominant chimpanzee, that detailed her tendency to engage in physical touch, assert her dominance, and reassure others. Loulis sought her reassurance often and had a close relationship with middle-ranking Dar. Tatu, also middle-ranking, frequently helped with daily chores. Moja, the lowest-ranking, often appeared in high-arousal interactions. These patterns reflect some of the behaviors in free-living chimpanzees that appear in greeting, grooming, reassurance, and other social contexts.
Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: American Sign Language, Signs, Chimpanzee, Hierarchy, Dominance, Social Rank

Webcams at Zoos and Aquariums in the United States: Perceptions of Their Function and Utility by Staff

Audrey Joseph, Jacey Brugnone
Project Mentor(s): Kara Gabriel, PhD; Mary Radeke, PhD; Jessica Mayhew, PhD
Webcams are an important medium through which zoos and aquariums can achieve their goals. To understand the current landscape of webcams in the United States, this research visited websites of all zoos and aquariums accredited by the Association of Zoos and Aquariums, as of March 2024. Of these 226 institutions, 61 had active live webcams. In addition, this research explored staff perspectives on webcams by surveying the same institutions. Fifty-six responses were collected from 15 unique institutions. Respondents were asked about general use of webcams; Likert scale-based questions concerning benefits, limitations, and future webcam use; qualitative, open-ended questions about webcam use; and respondent and institution demographics. The Likert scale-based questions were phrased differently for institutions with and without webcams. Principal component analysis was conducted on the benefits/limitations Likert scale items to determine the presence of any underlying themes within the data. This analysis revealed four distinct components: community facing benefits of webcams, costs of webcams to the provider, animal behavior, and environmental complications. To further understand the elements of webcam decision making, qualitative responses underwent content analysis, which revealed 11 themes. The most common issue associated with webcams was a lack of access to reliable Wi-Fi connection. The most common benefit was the remote monitoring of animal health and behavior. From these results it is clear that while there are factors stopping the implementation of webcams for some institutions, many find the benefits to be worth the cost.
Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Zoos and Aquariums, Organizational Decision Making, Content Analysis, Webcams, Animal Care

Chimpanzees' Use of American Sign Language in Cooperative Interactions

Candice Mendez; Katelyn Seymour; Mary Lee Jensvold, PhD
Project Mentor(s): Mary Lee Jensvold, PhD

Five chimpanzees who had acquired signs of American Sign Language (ASL) lived on the campus of Central Washington University from 1980-2013. Chimpanzees, Washoe, Moja, Tatu, and Dar, were immersed in American Sign Language in a cross-fostering laboratory modeled after Western human households which allowed them to acquire signs in a comfortable, friendly environment. Loulis acquired signs from the other signing chimpanzees. Caregivers signed conversationally with the chimpanzees throughout their lives. Caregivers wrote shift reports to describe their activities and observations during care shifts. This rich narrative is used to explore the culture at the Chimp Lab, in particular the cooperative environment. For example, the chimpanzees assisted with cleaning, shared food and objects with humans and other chimpanzees, and waited for their turns during meals. This cooperation was dependent on strong friendly relationships between caregivers and chimpanzees. While the ethos for caregivers was as a trusted butler to the chimpanzees, the chimpanzees referred to caregivers as "friends." Mutual respect is demonstrated in greetings and use of "sorry" in conversations between caregivers and chimpanzees. However, there also were times of conflict, as reflected in the chimpanzees' use of the sign "dirty", often used as an insult, in response to a denied request. When faced with aggression, caregivers asked the chimpanzees to sign about it and/or demonstrated submissive behaviors. Caregivers would occasionally offer reassurance to the chimpanzees. Cooperation between caregivers and chimpanzees was an integral aspect of life at the Chimp Lab.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Cooperation, American Sign Language (ASL), Signing Chimpanzees, Mutual Respect, Cross-Fostering

Public Outreach in a Sanctuary Setting: Blog Posts at Chimpanzee Sanctuary Northwest

Jacob Naumann, Alyssa Castilla, Hayden Atencio
Project Mentor(s): Jessica Mayhew, PhD; Lori Sheeran, PhD

Educational outreach and assessment of its efficacy are components of animal sanctuary accreditation by the Global Federation of Animal Sanctuaries (GFAS). Chimpanzee Sanctuary Northwest (CSNW) uses a daily public blog as a key outreach tool, sharing updates on 15 resident chimpanzees, 3 cattle, caregiving practices, and broader animal advocacy. To provide baseline data on this outreach, we randomly sampled 85 blog posts across the 52 weeks of 2024. Each coder was randomly assigned a week and then a specific day within that week to analyze the corresponding post. Using an ethogram-informed coding schema, four coders scored each blog post on eleven variables: chimpanzee caregiving, focus on specific individuals, linkage to wild chimpanzees, mentions of the local environment or species, references to non-chimpanzee primates, and presence of advocacy content. If a YouTube video was included, coders also recorded the number of views, whether the link was present, if comments were enabled, and whether a video description was provided. Posts could be assigned multiple content categories. Prior to data collection, five coders established interobserver reliability using non-sample posts; Cohen's kappa values ranged from 0.667 to 1.0. Among sampled posts, 82.4% featured chimpanzee behaviors, with 12.9% linking these behaviors to wild contexts. Caregiving appeared in 45.9% of posts, while advocacy was present in 11.8%, most often centered on chimpanzees (9.4%). These results offer foundational insight into CSNW's blog and video-based outreach and serve as a reference point for evaluating the sanctuary's educational impact.

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: *Pan troglodytes*, Educational Outreach, Sanctuary, Blog Posts, Captive Primates

Effect of Familiarity and Use of American Sign Language (ASL) on Chimpanzee (*Pan Troglodytes*) Sign Modulation

Katelyn Seymour; Mary Lee Jensvold, PhD
Project Mentor(s): Mary Lee Jensvold, PhD

Familiarity of conversational partner affects conversational behaviors in both human and chimpanzee interactions. In this study, the researcher examined the effects of familiarity and use of American Sign Language (ASL) on four signing chimpanzees' modulations of signs. Three of the chimpanzees had been cross-fostered and acquired signs from human caregivers. The fourth acquired signs from other chimpanzees. They used more conversational behaviors (e.g., vocabulary, turns, initiation, participation) with familiar-signers than unfamiliar or nonsigners (Hartel, 2005). Modulations, or modifications to the form of a sign, alter the sign's meaning, affect intensity and comprehension, and vary across conversational contexts among human and chimpanzee signers. During 4-min trials, the chimpanzees were presented with a human participant who was in one of four conditions: familiar-signer, familiar-nonsigner, unfamiliar-signer, and unfamiliar-nonsigner (*N*=20 participants in each condition). The experimenter coded sign duration and sign reiterations from videos of trials. Chimpanzees were expected to use longer durations of signs with the unfamiliar-nonsigners than with the familiar and signer conditions. Sign durations were significantly longer with nonsigners than with signers. Only one of the chimpanzee participants—Loulis—interacted with all four human conditions. His signs followed this pattern when his signs were assessed together and on the individual signs CHASE and THAT. Human and chimpanzee literature supports the expectation that individuals adjust their conversational behaviors to their conversation partner according to their familiarity and use of signs.

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: Chimpanzee, Communication, Language, Familiarity, ASL, Sign Modulation

Psychology

One Center, Many Paths: Differentiated Support at the CWU Reading Intervention Center

Jared Bieker, Hannah Bremerman
Project Mentor(s): Richard Marsicano, PhD

Reading is important, as it significantly impacts academic achievement because "failure to achieve sufficient proficiency in reading hinders [their] access to the needed tools for further learning" (Cadiz-Gabejan & Quirino, 2021). All children learn to read at different rates with some requiring additional supports to become successful readers. The CWU School Psychology program aims to provide these additional supports by offering direct reading intervention and assessment through the Reading Intervention Center (RIC), in partnership with local elementary schools. RIC tutors, school psychology graduate students and undergraduate interns, use a research-based reading intervention, Sound Partners, to help children develop their early readings skills on the path to becoming fluent readers. Tutors use curriculum-based assessment (CBA) to monitor RIC client progress. CBA is predicated upon the use of timed, brief, and repeatable fluency based academic probes such as Oral Reading Fluency (ORF), or Nonsense Word Fluency (NWF). All RIC clients receive behavioral support via a token economy. In addition to the Sound Partners intervention and token economy, tutors are encouraged to adapt their tutoring practices to meet the specific academic and behavioral needs of their clients. This poster will examine the effectiveness of the academic intervention provided at the RIC with a focus on the tutor-initiated, individualized academic and behavioral modifications.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: School Psychology, Sound Partners, Reading Intervention, CBA, Academic Support

Recognizing Structural Bias Predicts Support for Inclusive Political Representation

Jocelyn Cruz, Tonya Buchanan, PhD
Project Mentor(s): Tonya Buchanan, PhD

Understanding how systemic biases shape social inequalities can increase support for broad, inclusive political representation. We examine whether recognizing structural bias—beyond interpersonal discrimination—predicts support for diversifying political leadership.

In Study 1 (*N*=178), participants completed measures assessing beliefs about structural and interpersonal sexism (Craig et al., 2020) and rated the importance of electing leaders from currently underrepresented groups (adapted from Lucas & Silber Mohamed, 2021). Beliefs about structural sexism uniquely predicted greater support for increasing the representation of these groups, even after accounting for participant ideology and demographics. This link was strongest for women and LGBTQ+ candidates but weaker for Asian American representation, potentially due to "model minority" stereotypes.

In Study 2 (*N*=160), we tested whether highlighting the impact of structural bias affects attitudes toward diversity in political representation. Participants who read about structural sexism showed marginal increases in support for inclusive representation compared to control and interpersonal sexism conditions. Additionally, those who acknowledged structural bias—regardless of their beliefs about interpersonal discrimination—expressed the highest levels of support. In contrast, those who focused only on interpersonal bias were least supportive of expanding representation.

These findings suggest that recognizing systemic inequalities can promote advocacy beyond one's own group and may serve as a valuable strategy for fostering equitable political representation.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Structural Bias, Political Representation, Inclusivity Support, Diversity Support

Campus Well-Being in Context: PERMA and National Health Trends

Quaid Hunt
Project Mentor(s): Cristina Bistricean, PhD

This study examines undergraduate well-being against a campus-based PERMA-Profile well-being survey with national data from the *Undergraduate Student Reference Group (HCHA) Fall 2024* report. The national sample (n = 25,503) was diverse offering a broad benchmark for student health and engagement. An undergraduate sample (n = 191) completed a Qualtrics survey assessing five PERMA domains: Positive Emotions (M = 3.32, SD = 0.59), Engagement (M = 3.70, SD = 0.53), Relationships (M = 3.42, SD = 0.68), Meaning (M = 3.27, SD = 0.76), and Accomplishment (M = 3.60, SD = 0.62), along with an additional Health item (M = 3.09, SD = 0.93). 68.4% of students in the HCHA survey reported a sense of belonging at their institution. Our findings suggest that active class participation and mindfulness are associated with higher engagement scores. In terms of emotional wellness, although the HCHA survey measured psychological stress directly and our study focused on positive emotions, these constructs are often inversely related. The positive emotions score corresponds with the moderate national rates of stress; 77.6% of students in the HCHA sample reported moderate to severe stress, highlighting a concern for student mental health. Our Health ratings align with national findings: 55.8% of HCHA respondents reported having no ongoing mental health difficulties, consistent with our sample's relatively low average health score. These findings indicate consistency across institutional and national contexts, and they emphasize the importance of continued attention to factors that support student well-being, in the areas of stress, health, and emotional engagement.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: PERMA Model, Student Well-Being, Undergraduate Mental Health Engagement, Positive Emotions, Stress

Hidden in Plain Sight: How Masks, Sunglasses, and Facial Expressions Alter Personality Perception

Malcolm Jasmin, Dominique Martinez-Driscoll, Michael Cicero
Project Mentor(s): Mary Radeke, PhD

Facial inferencing research demonstrates that perceived personality traits systematically vary with facial expressions; individuals tend to attribute positive traits to smiling faces and negative traits to scowling faces (Radeke & Stahelski, 2020). Additionally, the emotional label (anger, disgust, fear, sad) assigned to the facial expression, even when incorrect, appears to play an important role in the facial inferencing process (Stahelski, et al. 2021). The normalized use of face masks in the US during and since the height of the Covid 19 pandemic has led to the study of facial occlusion on social interactions, including the personality and social perceptions of others (Lau, 2021). Results of this research are mixed; some occluded facial expressions result in more negative inferences, such as a decrease in trustworthiness and honesty, while other facial expressions do not. The purpose of our research was to explore the effects of fully occluded (mask and sunglasses) facial expressions on ratings of the Ten Item Personality Inventory (TIPI). Using a repeated measures design, participants viewed models exhibiting three facial expressions (sad, fear, and neutral) that were fully occluded and unoccluded. After viewing each image, participants completed the TIPI based on their impression of the model. The TIPI ratings for the fully occluded and unoccluded faces were then compared. We hypothesized that full facial occlusion would significantly alter personality trait ratings compared to unoccluded faces.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Face Masks, Facial Expression, Facial Inferencing

There is Hope in the World: The Development of a Hopeful Personality Assessment with Artificial Intelligence (AI) Assistance

Emmalie Forland, Rachel Johnston
Project Mentor(s): Cristina Bistricean, PhD

Hope is a motivational human strength that involves an individual's capacity to create and attempt multiple pathways towards their goal. By understanding and measuring hope in undergraduate students, this research aims to support student well-being, success, and long-term goal achievement. This research explores how to integrate ethical use of artificial intelligence (AI) technologies with the development of a new Hopeful Personality Survey based on Charles Snyder's hope theory. Five sub-scales were developed with conceptual definitions, including agency and goal-directedness, optimism, resilience and perseverance, positive future orientation, and problem-solving adaptability. ChatGPT feedback was used to assess each statement for revision edits, suggested words, or statements that were similar. Using AI as a revision tool within this research is one way to demonstrate ethical use of this advancing technology within undergraduate research while still using critical thinking skills and originality. An exploratory factor analysis sorted the assessment items into two factor loadings, rather than the initial five subscales. Further analysis will identify the overall impact of AI use on development of the assessment. Future focus will include the development of best practice to ensure the ethical use of AI technologies in undergraduate research.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Ethical Artificial Intelligence Hope, Personality Assessment

Exploring Student Motivation: A Promotion vs. Prevention Approach

Harmony Lee
Project Mentor(s): Tonya Buchanan, PhD

In this study, we aim to assess which regulatory focus (promotion-focused vs prevention-focused) approach to classroom assignments is more effective in enhancing student motivation and if motivation is dependent on the match between student's preferred focus orientation and the provided approach. Previous research on regulatory focus theory suggests that incorporating a message involving either a promotion or prevention focus within boring tasks encouraged individuals to complete them (Smith et al., 2009). Other research found a promotion focused approach led to decreases in task burnout and increases in work engagement, while a prevention-focused approach did not (Lichtenthaker & Fischbach, 2018). In this ongoing study, (current n=84), participants read a hypothetical classroom assignment description containing either a promotion-focused message (e.g. possible grade boost), prevention-focused message (e.g. possibly saving a future grade), or none at all. Participants then rate their interest in completing the assignment and complete Kruglanski's (2000) Regulatory Mode Questionnaire to assess preferred regulatory orientation. We expect that students will self-report having higher motivation to complete the assignment when it is paired with the promotion-focused message, when compared to the prevention group. We also expect that more students will self-report having higher motivation to complete the assignment when their Regulatory Mode results align with the provided regulatory-focused message. Applying these findings to an academic setting by catering to student preferred regulatory focus has the potential to increase class engagement. Strengthening our understanding of ideal student regulatory focus will ultimately benefit both students and instructors in future academic settings.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Student Motivation, Regulatory Focus Theory, Regulatory-Fitness Theory, Regulatory Mode, Promotion-Focus, Prevention-Focus, Motivation, Academia

Student Attitudes about Electronic Devices in College Classrooms

Harmony Lee, Eugene Yum, Gwendolyn Perry
Project Mentor(s): Ralf Greenwald, PhD

Technology has found itself permeating various aspects of our lives, whether it be recreationally, professionally, and academically. In the academic setting, educators and students rely on technology for a plethora of purposes; completing homework, communicating with colleagues, research, and accessing a now expansive wealth of knowledge published on the internet. After the recent pandemic occurring now nearly half a decade ago, the use of electronics and technology has consequentially increased significantly among the academic populations, and as a result, detrimental effects on education resulting from the use of electronics are on the rise. The use of devices whether it be cell phones or computers can detract from the learning experience of one's peers, and the usage of electronics evidently varies based on a few factors. Those factors are the perceived difficulty of a class, mode of instruction, and the length of lectures. Our study used a 11-13 question survey asking CWU students to self-report their views on electronics usage in online or in-person classroom settings, especially as it relates to non-class related usage. Building off a pilot study examining the effects of the pandemic, we hypothesized that non-class related electronics usage is more likely to occur in online settings, and furthermore that non-class related electronic usage would be higher in online students. Based on the aforementioned factors we hypothesized, we believe adjusting those factors may assist instructors in designing a more engaging classroom experience, ultimately reducing distractions.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Academia, Technology, College Classrooms, Electronic Usage

Emotion Recognition Accuracy with Fully Occluded Faces: Do Eye Gaze Patterns and Fixation Durations Shift When We're Wrong?

Dominique Martinez-Driscoll, Michael Cicero, Malcolm Jasmin

Project Mentor(s): Mary Radeke, PhD

Prior research on facial expression recognition (FER) has shown that the use of face masks significantly impairs the ability to correctly identify facial expressions, especially those that engage the lower regions of the face such as disgust and anger (Carbon, 2020; McCrackin et al. 2022). Not only does FER accuracy decrease with a masked or occluded face, but gaze patterns also shift and dwell time increases from those areas that are covered (mouth) to areas uncovered (eyes) (Rabadan, et al. 2022). In situations where both eyes and mouth are covered, the gaze patters shift and dwell time increases to the area between the eyes. Fixation patters and dwell times of occluded faces also differ depending on the facial expression. This study explored the effect of FER accuracy on eye scan patterns and fixation time. Using a repeated measures design, participants viewed images of anger, fear, sad, and neutral models with eyes and mouth occluded. Participants' eye movements were recorded using Imotons eye tracking technology. Participants responded to an emotion recognition question to identify correct and incorrect assessments of the facial expressions. All facial expressions were divided into correct and incorrect recognition categories and collapsed across facial expressions. Eye scan patterns using Time to First Fixation measures (TTFF) and Dwell time (DT) were compared for the correct and incorrect categories.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)

Keywords: Facial Expression Recognition, Eye Gaze Patterns, Eye Gaze Dwell Time

Moving Towards the Reversal of Neurodegenerative Diseases, Such as Alzheimer's, by Studying Planarian Behavior and Regeneration

Rose Montano

Project Mentor(s): Ralf Greenwald, PhD; April Binder, PhD

Planaria are a genus of flatworm commonly used as model organisms for stem cell research. The proposed study aims to investigate the physical and behavioral effects of supplied neurotransmitters (e.g. serotonin) on planarian spatial learning and regeneration. While these chemical messengers are known to play a crucial role in the ocellus regeneration and neuromuscular function of planaria, the neurotransmitter-influenced factors of epigenetics, conditioning, and overall regeneration are yet to be explored. This pilot study will begin by assessing the conditioning versus sensitization of planaria's navigation through a Y-maze, with positive reinforcement of food, under the influence of various neurotransmitter agonists. With prior research suggesting their ability to retain knowledge post-regeneration, the planaria will then be halved via a transverse incision. Upon total regeneration, they will be reassessed in the Y-maze. The planaria's regeneration rates will also be recorded and compared between agonists. It is expected that supplemented neurotransmitter levels will accelerate regeneration rates and learning. With the tremendous similarity between planarian neoblasts and human embryonic stem cells, it is the goal of this research to produce results that can help further the understanding and possibilities of stem cell treatment for various conditions. Greater insight into planarian regenerative mechanisms could possibly be used to develop advanced methods of human wound/tissue repair and, ultimately, the reversal of neurodegenerative diseases.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)

Keywords: Neuroscience, Behavior, Neurotransmitters, Planarian, Neurodegeneration, Regeneration, Stem Cells, Neoblasts, Pluripotency

Engaging Students in Social Justice: Topic Sequencing and Moral Framing

Alyna Nguyen; Reyhaneh Bagherian Shamir; Tonya Buchanan, PhD
Project Mentor(s): Tonya Buchanan, PhD

We examined how topic order (SES-based vs. race-based prejudice) and moral framing (binding vs. individualizing) in a social psychology unit on stereotyping, prejudice, and discrimination influenced students' (N = 142) attitudes toward the class and relevant content. Prior research shows that course sequencing affects engagement (Bernstein, 2018) and that moral framing shapes responses to social issues (Feinberg & Willer, 2013, 2019). Conservatives tend to respond more positively to binding moral frames (i.e., loyalty, authority, purity), while liberals are more influenced by individualizing morals (i.e., care, fairness).

We hypothesized that binding moral framing and SES-based topics would resonate more with conservatives, who are generally less receptive to discussions on inequality (Reyna et al., 2006) and more accepting of stereotyping (Stern & Axt, 2021). Conversely, we expected individualizing morals and race-based topics to engage liberals more effectively.

Overall, liberal students showed overall interest in the course, anticipated more comfort in the class, and reported more positive diversity, equity, and inclusion (DEI) attitudes. However, framing and topic order moderated these effects. When SES-based bias was introduced first and course content was framed using binding morals, conservatives anticipated feeling as comfortable and supportive of DEI as liberals. Notably, these gains did not come at the expense of reduced comfort or less favorable DEI attitudes among liberals.

These findings suggest that structuring course content to align with students' moral values can enhance engagement and inclusivity. Thoughtful framing and sequencing may help instructors foster productive discussions on challenging social issues.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Social Justice, Education, DEI

Exploring the Mental Health of Psychology Graduate Students

Zaire Preston, Jaque Ramirez, Sandra Gomez, Olivia Zavala
Project Mentor(s): Heath Marrs, EdD

Recent research suggests graduate students, especially those in psychology fields, face significantly higher rates of mental health challenges such as anxiety, depression, and burnout that exceeds rates of the undergraduate or general population (El-Ghoroury et al., 2012; Hulac, 2024). Many of these challenges derive from barriers such as increased academic pressures, financial stress, time constraints, and access to offered services among other factors. Universities have a unique position to foster supportive environments that utilize evidence-based strategies to help enhance academic success and inclusiveness. This review will present possible ideas in the literature for addressing graduate student well-being, such as student workshops, mindfulness training, enhancing faculty-student relationships, and other ideas. We will also explore the current ethical implications of decreased well-being and how it can impact the delivery of psychological services in the field. Finally, we will review barriers to graduate students accessing support in the university environment.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Mental Health, Psychology, Graduate Students, Well-being

Facial Inferencing in Relation to Expressions

Cole E. Ralph

Project Mentor(s): Anthony Stahelski, PhD; Mary Radeke, PhD

In his seminal work The Expression of Emotions and Man and Animals (1872), Charles Darwin proposed that facial expressions are universal, rooted in biological evolution. Decades later, psychologist Paul Ekman expanded on Darwin's theory, conducting cross-cultural studies in the 1960s to explore whether expressions and gestures are biologically innate or shaped by sociocultural learning. While the debate around universality continues, research today examines how individuals perceive facial expressions across social contexts. The present study builds on this work by investigating how participants infer specific traits from facial expressions. Using a mixed-methods design, models displayed either a happy open-mouth smile, a happy closed-mouth smile, or a neutral expression. Participants—undergraduate students from Central Washington University recruited via the Qualtrics platform and SONA—rated the models on perceived traits such as positivity, dominance, and excitability using the Self-Assessment Manikin, followed by the Ten-Item Personality Inventory. Results showed statistically significant differences in positive trait ratings between expressions. Models displaying happy open-mouth smiles were rated significantly more positive than those with neutral expressions ($p < .001$), supporting the hypothesis that more overt expressions of happiness enhance positive inferences. Specifically, the happy open-mouth smile yielded a mean positivity rating of 3.57 (scale range of 1-4), compared to 3.46 for the closed-mouth smile and 2.34 for the neutral expression. Further analyses will explore how these trait inferences vary across model gender and personality dimensions.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)

Keywords: Facial Inferencing; Universality; Ten-Item Personality Inventory; Self-Assessment Manikin; Personality Dimensions

Negative Facial Expressions Lead to Negative Facial Inferences

Cailyn Rogers

Project Mentor(s): Anthony Stahelski, PhD; Mary Radeke, PhD

Past facial inferencing research focused on inferences made from the specific facial expression attached to six emotions: anger, disgust, fear, happiness, sadness, and surprise. Research results show that positively valent inferences are associated with 'happy' (smiling) faces, and negatively valent inferences are associated with 'angry' (scowling) faces. The research presented here examined inference differences made to the two negative facial expressions: anger, disgust, plus neutral.

Facial photographs of a young female and young male were shown to participants in an online survey format using the Qualtrics platform. Participants were recruited from undergraduate psychology courses. In the repeated measures research design, each participant saw ten different facial photographs, showing different expressions from either the same female or male model, in randomized orders. Participants responded to a question set for each photograph. The questions asked participants to assess the Big Five personality traits associated with each facial expression.

We hypothesized that maximally negative inferences would be associated with the angry face, followed by disgust, and lowest in negativity, neutral. Results generally supported the hypothesis. Analyses demonstrated significant differences and effect sizes in the inferences made to the three facial expressions. The angry faces were usually the most negative, followed, in order of declining negativity, by disgust and neutral. The results indicate that one, both negative facial expressions led to negative inferences, and two, negative valence demonstrated by facial expressions and inferences, is varied.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)

Keywords: Facial Expressions, Personality Traits, Facial Inferencing

Exploring College Students Perceptions of Mental Health Apps and Integration of Artificial Intelligence (AI)

Elliotte Wood; Claire Burianek; Cristina Bistricean, PhD
Project Mentor(s): Cristina Bistricean, PhD

Due to an increase in mental health services along with limited access to trained professionals, mobile health applications have emerged as supplementary tools, including the integration of artificial intelligence (AI) in these apps. This raises concerns for privacy/data security, accuracy, personalization, and usage of these applications. This study examines college students' perceptions of AI usage in mental health apps, with a particular focus on privacy, AI features, motivation for use, and its role in mental health support. A total of 238 undergraduate students completed a Likert scale survey (1 = strongly disagree, 7 = strongly agree) measuring six areas: (1) Privacy and Data Use and Data Security, (2) App Features and Accessibility and Preference, (3) Usage, Motivation and Engagement, (4) Specific Needs and interests and Mental Health Support, (5) Information and Awareness, and (6) Therapeutic Interaction. Descriptive statistics indicate that while students appreciated availability of resources through AI (M= 1.41, SD= 1.77), they reported low interest in using AI chatbots for support (M= 1.48, SD=0.73). Students expressed discomfort with sharing personal information (M=1.41, SD=0.73) and identified a lack of empathy and personalized advice as limitations (M=2.00, SD=1.26). Concerns around the accuracy of AI-generated advice were also reported (M=3.07, SD=0.88). Findings suggest that while students recognize the potential for AI to fill service gaps, trust and usage are dependent on improvements in personalization and accuracy.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Artificial Intelligence, Chatbots, Personalization, Privacy Concerns, Mental Health Apps

Sociology

The Realities of the CWU Virtual Leadership Academy

Kelli Bergquist, Emily Williams, Laura Mead, Ashlyn Galloway
Project Mentor(s): Gary Myers, PhD

This project explores and serves as a qualitative analysis of the CWU virtual leadership development program. Serving dual roles as both a class and a campus wide initiative, the CWU Virtual Leadership Academy (VLA) hosted 60 students using a virtual platform and anonymous digital avatars to drive interactions. My purpose with this investigation is to qualitatively explore the impact of anonymity in student interactions using this modem. Overwhelmingly, students surveyed that impact of anonymity on their development and strengthening of leadership and team skills. Meeting two times a week for 10 weeks, data showed significant increases in student confidence levels in leadership contexts, as well as extended development of quality relationships. Similar to myself, students openly confessed to being able to 'break out of their shell' while further taking on challenges that further improved their self-reported and peer-reported leadership abilities. In analyzing the acquired quantitative data associated with individuals leading dyads, triads, and hexads, this paper and presentation will highlight how team development and leadership confidence can be facilitated through virtual environment scenarios. Overall, the CWU VLA provides evidence on the effectiveness of creatively used technology to foster social traits that are difficult to do without anonymity being present.

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: Leadership, Characteristics, Group Work

The Realities of the CWU Virtual Leadership Academy

Ashlyn Galloway, Emily Williams, Kelli Bergquist, Laura Mead
Project Mentor(s): Gary Myers, PhD

As a remote learning modality, the Central Washington University Virtual Leadership Academy (VLA) provided an opportunity for participants to funnel their focus into the single endeavor of leadership development. Meeting for an entire quarter (10 weeks) for 4 hours each week (two 2hr sessions), participants anonymously worked together to achieve objectives and refine their versions of leadership. This paper uses qualitative data in the form of interviews, observations, and an ethnographic framework to explore how participants in the VLA were able to identify their strengths and weaknesses as leaders while still maintaining a foothold in their comfort zones. Though communication during the program only occurred through text chat modems, the impact of the virtual platform experiences were evident in their self-reported improvement as leaders and the increased quality of the peer evaluation of their interactions. Students openly confessed to feeling closest to one another despite being anonymous throughout the entirety of the experience. This cohesion was shown to carry far beyond the conclusion of the course and did so in such a manner that students that completed the curriculum, looked forward to returning to mentor future cohorts. Overall, personal growth and increased awareness of team dynamics were direct byproducts of the language used by participants to describe the highlights of their experiences. My research will detail this experience while methodically touching on future implications of such a creative approach to leadership development and social bond formation.

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: Sociology, Leadership

How Environmental Factors Affect CAMP Students' College Experiences and Academic Success

Emily Lugo Rosales
Project Mentor(s): Pamela McMullin-Messier, PhD

This research builds on existing studies of educational disparities by examining how rural geographic challenges, school resources, and family/community support impact CAMP (College Assistance Migrant Program) students. These findings could have broader implications for improving educational equity for underrepresented rural students. The study investigates how environmental factors affect CAMP students' pathways to and experiences in higher education. Key terms include "CAMP students," who are participants in a federally funded program designed to assist migrant and seasonal farmworkers, and "rural geographic disparities," which refer to the challenges faced by students from rural areas in accessing educational resources. The research addresses three questions: What barriers do CAMP students face due to rural geographic disparities? How do family and community support systems differ across socioeconomic groups among CAMP students? What interventions could reduce these disparities and improve college access and success for CAMP students? I am conducting a quantitative study, distributing surveys to 60 CAMP students at Central Washington University. The survey collects data on students' socioeconomic backgrounds, educational experiences, and environmental factors influencing their college success. Data analysis will be performed using R statistical software. Expected results include insights into the specific challenges faced by rural CAMP students, differences in support systems based on socioeconomic status, and potential interventions to improve college enrollment and persistence rates. This research could inform policies and interventions for rural, first-generation college students to improve higher education access and success. Future studies could explore the long-term effects of such interventions on educational outcomes and social mobility.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Education Equity, Barriers, Community Cultural Wealth, CAMP (College Assistant Migrant Program)

The Realities of the CWU Virtual Leadership Academy

Laura Mead, Ashlyn Galloway, Emily Williams, Kelli Bergquist
Project Mentor(s): Gary Myers, PhD

My project dives into several different aspects of a virtual leadership development curriculum here at CWU. Using a combination of survey data and individual observations, this research highlights a unique modality for leadership development through virtual platform tools. A pool of 60 participants (college undergraduates) met online through a virtual platform two times a week for 10 weeks. During this time, students were evaluated and self-reported leadership development across 6 traits: Preparation, Proactiveness, Communication, Support, Rapport, and Patience. Additionally, log data was collected to observe the frequency and quality of interactions using text-based communication methods.
Results showed that this program was capable of positively impacting participants' self-confidence in leading, as well as in strengthening social connections between one another. Further testimony of these results were evident in the social cohesion formed between participants long after the conclusion of the curriculum. Students identified the holistic nature of the program by citing multiple aspects of how these results were attained.

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: Leadership, Sociology, Teamwork

Appropriate Blackness: Feminism, C .R.T, Marxism & Boxing

Olene Togiailua
Project Mentor(s): Cynthia Pengilly, PhD

Black people of the Progressive era were concerned with how to regulate their behavior to better their position in society. This research will examine the synthesis of gender performativity, critical race theory, Marxism, and psychoanalysis to create an assimilation identity strategy called "Appropriate Blackness" and how it was demonstrated through the sport of Boxing. The case study subject of all these different frameworks is the first Black Heavyweight champion of the world, Jack Johnson, who was the premier Black celebrity during the Progressive Era and thus an example for a specific gender strategy many working-class Black men adopted. His contribution to culture still exists today in how rappers portray themselves. The study's results found depictions of Johnson to be conflicting based on class and assimilation strategies; however, the prevailing ideological camps of assimilationist and confrontationalist both had the understanding that Johnson, as their racial representative, deserved better treatment, as do many Black people. This "Appropriate Blackness" framework can be used and applied to other Black celebrities and civilians in different fields to test its validity. The identity of Whiteness remains to be explored and how it is relational to the concept of "Appropriate Blackness". The results further illustrate the social construction of race and masculinity within the purview of White acceptance. The implications of the results indicate the need for more scholarship on the dialectical relationship between Blackness and Whiteness, as both identities are in stark opposition to one another. There is also a need to correlate the results with

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: Race, Performativity, Feminist Analysis, Class Conflict

The Realities of the CWU Virtual Leadership Academy

Emily Williams, Ashlyn Galloway, Kelli Bergquist, Laura Mead
Project Mentor(s): Gary Myers, PhD

Using qualitative analysis and observational reporting, this paper targets the participant experiences of the Virtual Leadership Academy (VLA) here at CWU. This program ran two simultaneous iterations: a university class (30 students) and a campus wide version for multiple campus centers (30 students). Students interacted with one another for 4 hours a week and for 10 weeks during the quarter. During this timeframe participants were tasked with planning and leading one another through multiple challenges within the virtual platform all while being evaluated by their peers on multiple dimensions of leadership. This paper specifically focuses on how the data was used to increase student self-confidence in leadership and teamwork endeavors. Additionally, data from the project served as evidence of the effectiveness of virtual platforms and anonymity in allowing students to identify and then become the best version of themselves.

Results indicated that, across the board, students discovered nuanced ways of how to find confidence as leaders. Though teamwork was shown to be critical in this development, data from the chat logs and self-reported surveys pinpointed numerous aspects of the curriculum that significantly (and positively) impacted the results.

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: Leadership, Virtual

The Transgender Timeline Project

Rowena Wombold
Project Mentor(s): Griff Tester, PhD

As part of *TransRural Lives*, a digital storytelling initiative led by Drs. Griff Tester and M. Eliatamby-O'Brien, this study examines the archival documentation of transgender, Two-Spirit, and gender-diverse histories in the Pacific Northwest through the Transgender Timeline Project. The timeline features over 200 historical documents, spanning from 1868 to 2011, primarily sourced from the *Trans Digital Archives*, the largest repository of transgender history.

These documents are categorized into six thematic areas—medical, legal, social, anecdotal, educational, and journalistic—and analyzed to explore trans representation across different historical and institutional contexts. A key focus of this project is the intersection of language and transgender experience. For example, a 1972 newspaper clipping from Seattle documenting early gender-affirming medical research falls under both the medical and legal categories due to its reference to gender marker changes on birth certificates.

This methodological approach contributes to a broader linguistic database that tracks shifts in transgender representation over time. By examining how language shapes social perceptions of gender, this research highlights the structural and discursive forces that construct marginalized identities. It also underscores how historical language use influences contemporary understandings of gender, offering insights relevant to broader discussions on social marginalization and identity formation.

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: Transgender, Language, History, Gender, Representation, Intersectionality, Change, Identity, Narratives, Queer

Community and Student Groups

In addition to CWU academic college participation, there are presentations from the following campus and community groups and organizations:

- Central Washington University
  - Community Engagement
  - Douglas Honors College (DHC)
  - ENST 480: Campus Sustainability
  - Graduate Student Association (GSA)
  - McNair Scholars Program
  - Multimodal Learning
  - Office of Sustainability
  - Students With a Purpose (SWAP)
  - Transfer Center
- Ellensburg School District
  - Ellensburg High School
  - Robotics
- Kurume Institute of Technology (KIT)
- Washington State University

Central Washington University

Community Engagement

CWU Community Engagement Panel

Geoffrey Sasaki, Matthew Wenz, Erin Oostra, Christina Miller, Caleb Cleland, Amy Walker, Jordan Tschabold, Z Morris

Project Mentor(s): Geoffrey Sasaki, PhD; Matthew Wenz; Ash Perron

This panel brings together students, faculty, and community leaders to explore and celebrate partnerships between Central Washington University and the greater Ellensburg community. Featuring students from CWU's Graphic Design and Craft Brewing programs, alongside faculty and community members, this discussion will highlight how academic programs are connecting with local businesses and organizations in meaningful and mutually beneficial ways. Together, they will share insights into successful collaborations, discuss the value of experiential learning, and reflect on how these partnerships enrich both student development and the community. In addition to spotlighting existing initiatives, this panel will invite attendees to imagine new and innovative ways the university can serve and engage with the broader Ellensburg area. Through open dialogue, we hope to inspire continued growth in campus-community connections and cultivate a shared vision for the future of collaboration in the Kittitas Valley.

Presentation Type: Panel (May 15, 4:00pm–5:30pm)

Keywords: Community, Internship, Engagement, Brewing, Graphic Design, Ellensburg, Kittitas Valley

Douglas Honors College (DHC)

Tassel Turning Versus Turning in the Towel: An Analysis of Undergraduate Student Persistence and Challenges

Josie Ambur

Project Mentor(s): Pamela McMullian-Messier, PhD; Bernedette Jungblut, PhD

Completing college is no easy feat. All higher education has barriers and obstacles students must face and overcome. Observations have been used to gather various student perspectives that have been compiled alongside research in the field to create a picture of what student barriers look like at Central Washington University specifically. Some of these barriers include navigating academic requirements, challenges with academic advisors, unique challenges first-generation students face, and financial challenges including balancing employment and academics. Within the personal lives of students, there are several internal factors that impact their success such as their persistence, grit, and stress levels. All aspects work together to impact student well-being and student success. As an institution, there are ways to improve conditions that impact student success. Academic advising is a critical part of a student's ability to complete their degree. Training advisors to be able to accurately answer student questions or to direct students to the right department or resources to assist them is one way this barrier to student success can be improved. Integrating financial literacy learning into beginning student classes can be one way to aid students in learning to manage the additional financial stressors that come with moving to college. Individual experiences are at the core of student success and retention, which is why individual student perspectives are the most important ones to gather. This study aims to produce suggested solutions for institutional change to help improve student success and outcomes.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)

Keywords: Retention, Persistence, Student Perspectives, Barriers, Success

Understanding the Role of Language and Identity in Anti-Autistic Bias

Sam Coyle
Project Mentor(s): Tonya Buchanan, PhD; Naomi Petersen, PhD

Anti-autistic biases are often used to justify abusive medical interventions, inadequate education, and the systemic exclusion of autistic people from society. Some neurodiversity advocates attribute anti-autistic biases to deficit-based language (i.e., emotionally loaded terminology that equates disability to inferiority) and the lack of autistic perspectives in the psychology field. In this study, I investigated whether deficit-based language (e.g., "fails to initiate social interactions") impacted bias toward autistic people when compared to value-neutral language (e.g., "does not initiate social interactions"), as well as whether gender, neurotype, or enrollment in a psychology major predicted bias. Participants (N=149) read either a deficit-based or value-neutral description of an autistic peer before completing the Measure of Attitudes Toward Autistic People (MATAP) explicit bias survey and an Implicit Association Test (IAT). Results showed no difference in explicit, $t(149)=-1.65$, $p=.100$, or implicit, $t(143)=1.25$, $p=.214$, bias between language conditions, but explicit bias did relate to identity. Men demonstrated greater explicit bias than women, $t(141)=-3.45$, $p<.001$, and psychology majors expressed less than non-psychology majors, $t(146)=2.51$, $p=.013$; however, the relationship between gender and bias was eliminated for men psychology majors ($p<.035$). Further, autistic participants displayed less explicit bias than non-autistics, $F(1,19)=60.3$, $p<.001$. Notably, the rates of implicit bias were consistent across all demographics with no relationship between explicit and implicit bias, $r(143)=.030$, $p=.717$, suggesting that self-reported bias may not reflect ingrained prejudices. These results demonstrate the value of further studies on language choice, gender roles, and community-based participatory research as means of reducing anti-autistic biases.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Autism, Neurodiversity, Bias, Ableism, Deficit Model, Language, Gender

Efficient Integration of Musical Tools When Learning Rhythmic Patterns

Nolan Downard
Project Mentor(s): Bret Smith, PhD

Understanding how humans efficiently integrate musical instruments into their reachable tool-space, known as the peripersonal space, is a key question bridging cognitive science and skill learning. This pilot study examines two models of tool embodiment using a musical instrument, drumsticks: joint action, where participants play alongside an instructor, and independent self-exploration, where participants practice alone. I hypothesize that joint action will be the more effective route towards tool habituation as interaction with a partner can lead to unified multisensory representations – a shared peripersonal space. This shared peripersonal space encourages sharing of possible instrument use for both parties. I will be instructing six novice participants in a pilot study designed to determine best practices and sample sizes needed for significant insights. These participants will be split equally into a joint action condition and a solo exploration condition. Each participant will attempt to replicate a quantized target pattern on a Roland MIDI drum set. The MIDI events will be recorded and compared to the target pattern. I will analyze the MIDI performance data – timing accuracy and dynamics consistency – and subjective integration of the drumsticks. I will use ANCOVAs for the MIDI event data and Likert survey questions targeting three key areas: perceived instructor influence, self-reliance, and level of tool integration. Findings will shed light on the proper effect sizes and study design needed to examine how shared tool-use and solo tool-use affect tool habituation, with implications for motor learning, peripersonal space integration, and music pedagogy.

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: Peripersonal Space, Joint-Action, Body Schema, Tool Use, Music Pedagogy

COVID's Impact on Our Youngest Learners

Scottie Ellsworth
Project Mentor(s): Amanda Obery, PhD; Wendie Castillo
The COVID-19 pandemic profoundly disrupted education, leaving lasting effects on elementary students' academic success. This research investigates the lasting impact of the pandemic on elementary students' educational success, with a particular focus on literacy and reading comprehension. Using a mixed-methods approach, this study integrates qualitative insights from interviews with five educators from diverse educational backgrounds and quantitative data from the OSPI Report Card to detect academic challenges. Inductive analysis and descriptive coding identify key trends and patterns across the interviews, highlighting differences in education before and after COVID-19. By integrating these findings, this project highlights critical areas where students need support and proposes actionable strategies to aid their academic recovery. The conclusions drawn from this research contribute to discussions on educational policy and intervention strategies aimed at mitigating the long-term effects of pandemic-related learning loss.
Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: COVID-19, Elementary Education, Learning Loss, Literacy, Teacher Interviews

An Examination of American Sports: The Price of Paying to Play

Kylee Gregory
Project Mentor(s): MaryJane Kluempers; James Avey, PhD
Athletes at any level elicit a sort of competitiveness that is motivated by the environments they compete in. The culture surrounding American sports is heavily influenced by money, which puts individuals at the beck and call of their environments. In terms of maltreatment, excessive punishments, negative comments, fear-mongering, and pushing physical limits are just a few forms of maltreatment that athletes can face in their youth and adult years. This research is intended to highlight what brings about environments of maltreatment and the transitive effects of these highly negative environments to change and combat the current system of normality of financial power in youth and collegiate athletics. This research defines maltreatment at all levels in American sports and relays information on how to pinpoint maltreatment from youth to professional levels, highlighting the usage of finances against youth, collegiate, and professional athletes. By synthesizing a multitude of resources about topics such as sports culture and maltreatment, this research aims to combat the current structure of American sports. Defining what culture is, along with the meaning of maltreatment, and how it relates to sports. This research will also dive into how sports can be a driving force towards American Culture and the financial magnitude that is held within American sports at all levels. Divided into three sections- youth, collegiate, and professional sports- this research aims to highlight the stigmas and provide action towards redefining sports at all levels, making it more about the athlete rather than the financial benefit they provide.
Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Sports, Culture, Maltreatment, Environment

Phytochemistry of *Dalea lanata* var. *terminalis*, with Novel Metabolites that Show Antibacterial Potential Against Resistant Microbes

Luke Hurd
Project Mentor(s): Gil Belofsky, PhD

The Native American medicinal use of plants from the genus *Dalea* suggests a potential for novel compounds with antimicrobial activity. Prior research on the genus has revealed many compounds with antimicrobial activity against resistant microorganisms, opioid receptor binding properties, and other biomedically relevant effects. However, most species in the genus remain unexplored. A phytochemical investigation of the plant *Dalea lanata* var. *terminalis* will include the extraction, isolation, purification, and identification of metabolites from both the aerial and root portions of the plant. These parts are separated and worked on in parallel due to their differing chemical compositions. Isolation and purification of compounds will be done using a series of chromatographic techniques. Purified compounds will undergo numerous analyses to identify their chemical structures. The primary tools for structure elucidation will be ^{1}H and ^{13}C NMR spectroscopy. Circular dichroism (CD) spectroscopy, and mass spectrometry will provide additional support for structural confirmation. The CD spectroscopy will be performed in collaboration with Dr. P. Clint Spiegel, Department of Chemistry, Western Washington University. Purified compounds will also be tested for antimicrobial activity against human pathogenic microorganisms by Dr. Christine Salomon, Center for Drug Design, University of Minnesota.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Natural Product Isolation, Antimicrobial Compounds, Phytochemistry, Ethnobotany, Chromatographic Techniques, *Dalea lanata* var. t*erminalis*, Novel Metabolites, Structure Elucidation, NMR Spectroscopy

Shadows of the Past: Residential Schools and Intergenerational Trauma

Remi Villarreal
Project Mentor(s): Matthew Martinson

Many know the irreversible harm caused by The U.S. and Canadian governments' implementation of residential schools starting in the 17th century and lasting into the 20th century. What sorts of trauma did residents suffer? How does this trauma affect subsequent generations? These children were taken from their families and often not allowed to visit them during the formative years of their childhood. Sickness and illness remained prevalent throughout the schools and staff often physically and sexually abused students. Trauma, if not resolved, is quickly passed down to victims' children. This presentation aims to examine the trauma that individuals faced while attending residential schools by reviewing existing literature about residential schools and intergenerational trauma and analyzing how they overlap. While also looking at how trauma can be transmitted through intergenerational trauma. Concluding with what the Canadian government has accomplished in terms of reconciliation efforts compared to the U.S. government and what the U.S. should do moving forward.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Residential Schools, Trauma, Intergenerational Trauma

A Critique of The Foster Care-to-Prison Pipeline

Haley Walzer
Project Mentor(s): Pamela McMullin-Messier, PhD

There is a clear connection that exists within the foster care system that is called the foster-care-to-prison pipeline. This explains how children that age out of foster care, end up in jail at some point in their adult life and there is much research explaining why this pipeline exists and what the potential causes are. Foster care is an important system because many children don't have parents that are able to take care of them for many different reasons. These kids and families need the support in order to have a safe environment to grow up and thrive in. However, there are many flaws with this system, just like any system we have. According to the department of Children, Youth, and Families, nearly 1 in 4 young adults are arrested within a year of aging out of the foster care system; this is a problematic statistic and shows that there are many children that are being failed within the foster care system. There are many systematic factors that affect how foster care youth are seen in everyday life, down to economic status and the way they look. I'm critiquing the issues present within the foster care system and I want to educate people to make more informed decisions on how they treat individuals who've experienced foster care. This presentation will demonstrate and explain the data to educate others about the foster care-to-prison pipeline, what systematic factors affect this, and how interventions can impact outcomes in the foster care system.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Foster Care, Pipeline, Juvenile Delinquency, Socioeconomic Factors

Embodying the Abstract: A Study in Mathematical Aesthetics

Ethan Weron
Project Mentor(s): Keith Lewis; Stuart Boersma, PhD

A true appreciation of mathematics is almost non-existent outside of an upper-level education program focused on the field. The technical nature of mathematics leaves many unable to appreciate its intricacy and elegance. The goal of this project is to develop an engaging path to experience the beauty of mathematics. To accomplish this, a series of selected proofs will be studied and distilled to highlight their aesthetic and intellectual significance. While these metrics are difficult to quantify, they can be explored extensively when unpacking the characteristics of the selected proofs. Each proof will be linked to a detailed explanation of its aesthetic interest and technical importance.

Along with a written element, an art jewelry piece will be created to bring a tangible form to the abstract concepts of the chosen mathematical proof. In addition to personal experience with metalwork, the medium itself speaks to some of the foundational understandings of mathematics. The solidity and integrity of the material are echoed by the characteristics of mathematics as a field. The design process and difficulties therein are discussed and connected to the principles of mathematical aesthetics.

Not only will this project allow those outside the field to experience a fresh and engaging take on mathematics, but it will also provide an expression of the creative and expressive depth of the discipline.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Mathematics, Aesthetics, Art Jewelry

The Psychology and Practice of Active Study Habits with Illustrative Methods

Cameron Wertz

Project Mentor(s): Ian Quitadomo, PhD; Aaron Woods

The creative portion of *Engaging Minds: The Psychology and Practice of Active Study Habits with Illustrative Methods* transforms theoretical concepts into accessible and engaging material. Through illustrative literature, conceptual diagrams, and applied examples, this booklet demonstrates the practical implementation of active learning techniques. Designed for students, educators, and professionals, the creative content provides a visually compelling and intellectually stimulating approach to study habits, fostering long-term academic and professional growth. By integrating storytelling and structured visualization, this booklet bridges research with practice, offering a dynamic exploration of active learning and its lasting benefits.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)

Keywords: Active Learning, Education, Psychology, Professional Development, Personal Development

ENST480: Campus Sustainability

Reducing Energy Consumption and Fostering Accessibility on CWU Campus: Campaigning for Taking the Stairs

Charlotte Barrett, Andrew Wall

Project Mentor(s): Susan Kaspari, PhD

This project promoted sustainable behavior change among students, staff, and faculty at Central Washington University by encouraging the use of stairs over elevators when appropriate. The project addressed two key goals: reducing unnecessary elevator use while fostering a culture of accessibility and awareness around stair usage. The project involved the creation of informative posters, a survey, and improved signage in buildings to help people more easily locate both stairs and elevators. The campaign emphasized that elevators remain essential for accessibility and stair use as an option for those who are able and to participate. Feedback was gathered through the optional survey posted in stairways and near elevators. By promoting informed decision-making, this campaign worked to create a more energy-aware and accessibility-conscious campus culture.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)

Keywords: Accessibility, Stairs, Elevators, Energy Conservation, Inclusive Messaging, Campus Culture, Student Engagement, Sustainable Practices

Developing a New Way for Access to Donated Clothing Through Career Services and Wildcat Pantry

Deante' Barry, Erik Hardiman
Project Mentor(s): Susan Kaspari, PhD

New clothing can be expensive, especially when it comes to business wear. The Wildcat Pantry and Career Services aims to solve this issue by giving away free clothing to students on campus at their respective locations. The issue that arises is that they are currently backlogged with clothes or not able to publicize and display their merchandise well. The aim of this project is to make sure clothing that is still usable is not thrown away and made available to students at no cost. CWU surplus and another student installed new clothing donation centers around campus. Washing donated clothing fast enough to be offered was also an issue faced. A solution was found after working with auxiliary services laundry to use their industrial washer and dryer. After surveying the capacities of the Wildcat Pantry and Career services, it was determined that alterations to the clothing sections were needed. This was done with new racks, some of which were donated from surplus, along with cubbies for items unable to be hung. A personal changing room was also furnished with seating and a mirror at Career Services' new Casual Wear Closet.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Donated Clothing, Recycled, Thrifting

Introducing Sustainable Washing Practices to Campus to Reduce the Environmental Impact of Laundry

Summer Beaudoin
Project Mentor(s): Susan Kaspari, PhD

Microplastics are an ever-growing issue in the local and global environment. It has been found that a lot of these microplastics are actually microfibers, which stem from the runoff water from laundry machines. Every time a material is washed, it sheds microfibers. Depending on the washing cycle selections, such as water temperature, water level, and soil-level, a material could shed more or less microfibers. There is also the issue of the amount of water and energy used by washers and dryers. For this project, students on campus were educated on the environmental impact of doing laundry. Posters that included information on water temperature, water level, soil-level, ECO mode, as well as dryer settings and line-drying options were posted in each laundry room on campus. An Earth Day tabling event was done to educate students. At this event, there was a raffle for a product called Guppy Friend Washing Bags, as well as informational flyers. Students were also educated on how often certain clothing material needs to be washed as well as the ideal washing conditions. A website was created through CWU Sustainability to provide students with more in-depth information on sustainable laundry products and washing cycles.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Sustainability, Laundry, Microplastics

Supporting Pollinators by Installing Native Bee Hotels at Wildcat Farm

Lora Burke
Project Mentor(s): Susan Kaspari, PhD

Bees provide about 200 billion ecosystem services annually, mostly in the pollination plants, including many crops. While declines in honeybee populations have been severe (June 2024 thru March 2025, 62% of cultivated bees in the US died) —wild bees have not received the same attention to study their declines—or to address their parallel stressors. This means that although it is next to guaranteed that wild bees are suffering as well, remedies are not being offered. Pesticides, insecticides, parasites, loss of habitat, and loss of biodiversity are still plaguing these pollinators.

This sustainability project will support solitary native bees by installing 12 native bee hotels at Wildcat Farm, which provide a habitat for nesting, larval stages of young bees, and food storage. These hotels are relatively low cost and use natural non-insecticidal materials. To keep the bee homes safe from moisture and ground predators like spiders, they will be staked above ground. This will help extend their lifespan and make them more effective as shelter for the bees. Educational signage on some of the bee hotels will tell people about the important role they play in our ecosystem and explain the purpose of installing the hotels on our farm.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Solitary Native Bees, Native Bee Hotels, Pollination, Local Biodiversity, Sustainable Materials, Educational Signage

Central Washington University Green Office Certification

Emerson Carter
Project Mentor(s): Susan Kaspari, PhD; Jeff Bousson (CWU Sustainability Director); Jordan Spradlin (CWU Sustainability Coordinator)

University offices and administrative spaces contribute significantly to campus-wide environmental impacts through energy use, waste generation, and unsustainable procurement practices. Despite the increasing awareness of climate change and resource use, there remains a gap in an actionable framework that empowers staff and faculty to implement sustainable practices in daily operations. Central Washington University's Green Office Certification Program is dedicated to promoting sustainable practices in office spaces across the CWU Ellensburg campus. This program fosters a campus environment that is sustainable by encouraging offices to adopt and recognize environmental, social, and economic actions.

The Green Office Certification Program assists offices in assessing current actions and provides tips for implementation across six different categories: Energy, Transportation, Purchasing, Waste, Participation, and Special Events. Participating offices are awarded a level of certification based on their earned score. This program benefits the environment and supports a culture of stewardship among the CWU community. The Green Office Certification program contributes to the CWU Climate Action Plan. This action plan is a guide for how the university will do its part in preserving the planet and its resources for future generations. The Green Office Certification contributes to the Climate Action Plan through topics such as Energy Efficiency and Conservation, Waste Diversion, Transportation/Commuter Emissions, and Sustainable Procurement. The certification also contributes to CWU’s Association for the Advancement of Sustainability in Higher Education Sustainability Tracking, Assessment & Rating System(AASHE STARS) rating, which is a transparent, self-reporting framework for colleges and universities to measure their sustainability performance.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Sustainability, University Offices, Certification, Environmental Stewardship, Social Action, Climate Change

Enhancing Sustainability by Expanding the Wildcat Farm Food Forest

Mila Eslinger, Kaitlyn Flesher
Project Mentor(s): Susan Kaspari, PhD

A lack of knowledge and understanding of how people can participate in sustainable practices in their everyday lives is a persisting issue in society today. One way to be more sustainable is to eat food grown locally, including from a food forest. Food forests increase local plant growth by simulating a natural forest environment with layers of edible vegetation. This type of system facilitates plant growth, while simultaneously creating a space for people to come and enjoy locally grown produce.

The Wildcat Farm was created to improve and facilitate sustainability practices on campus. The Food Forest at the farm was created in 2019 to help educate students and community members on subjects including climate change, sustainable gardening techniques, and native plants. Since the Food Forest was created, new trees have been planted, and continuous weeding and composting has been done. The purpose of this project is to improve the Food Forest so that it can flourish, help educate the community, and facilitate consumption of local produce. Improvements have been made to the existing herb garden, and new plants have been added, creating the layers that a food forest requires. Signage was also added to the Food Forest to help educate students and community members attending the farm. The further development and expansion of the Food Forest at the Wildcat Farm is an excellent resource for the community and helps to address the lack of knowledge that exists about sustainable food practices.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Wildcat Farm, Food Forest, Sustainability, Local Produce, Education

Implementing Bat Boxes on CWU's Campus to Recover Local Populations

Aidan Evensen, Kaitlyn Flesher, Kristina Ernest
Project Mentor(s): Susan Kaspari, PhD

Bats are a crucial species in the local ecosystem due to the control of pest species. Bats as a species are in danger due to loss of habitat from human encroachment. Bats per night consume nearly half their body weight of pest species, leading to a saving of $3.7 billion for farmers as well as lowering populations of species such as mosquitoes. Installing bat boxes provides a means for vulnerable species to roost. In this project bat boxes were placed in critical areas surrounding water ways in the effort of encouraging roosting across campus. If endangered species, such as the Hoary bat, make a population, further funding can be sought. With the potential introduction of Bats on campus, there may be a reduction of pest species. The bat guano as a byproduct will be collected in trays to be recycled into fertilizer at the Wildcat farm, aiding in the generation of on campus produce. On average across species found in Ellensburg, each bat will produce waste 30 times per day, leading to a colony of 20 to 300 insectivorous bats creating 10,000 droppings annually.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Bats, Sustainability

Establishing Clothing Donation Bins on Campus to Limit Waste and Help Students in Need

Erik Hardiman, Deante' Barry, Jason Bakeman, Dale Larson, Kaila Red Bow
Project Mentor(s): Susan Kaspari, PhD

Clothing waste is a huge issue in modern society. Due to personal changes, moving, or lack of interest, many articles of clothing that are still usable and even desirable end up in landfills due to lack of awareness or facilities for donation.

Unlike many other universities, CWU lacks an organized system for accepting and getting clothes to those in want or need. Career Services and the Student Pantry lack the infrastructure or personnel to accept clothing donations, especially around move-out times. Many students who don't have a vehicle to drive to Goodwill or without knowledge of donation facilities often abandon clothing. This clogs up the Campus Surplus system, and many of these abandoned clothing items end up in the garbage due to not selling via Campus Surplus.

In response to this issue, clothing donation bins were built and placed around campus in widely trafficked and visible areas. These bins, in partnership with Career Services' business and casual closets and the Wildcat Pantry will help stem the flow of clothing into landfills and help students in need find clothing.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Sustainability, Waste Reduction, Reuse

Reducing Driving and CWU's Carbon Footprint by Piloting a Campus Bike Share Program

Caydence Hesch, Logan Scully
Project Mentor(s): Susan Kaspari, PhD

Excessive and unnecessary driving is a sustainability problem as it releases harmful emissions that contribute to climate change. Choosing biking instead of driving for short trips can reduce personal travel emissions by up to 75%, having a large impact on an individual's carbon footprint and its environmental consequences. Many students lack accessibility to personal bicycles, due to their high price points and the barriers of storage, maintenance, and repairs. To combat this problem, a bike share program was piloted through the on-campus Outdoor Pursuits and Rentals store. Bikes were made available to students to be rented at no cost for anywhere from a few hours to a week. The bikes came in multiple sizes, were fitted with head and tail lights, and rentals came with helmets. Repairs and maintenance were completed by OPR Student Staff. Availability to bikes without the responsibility of full-time ownership enables students to commute more sustainably on campus and within Ellensburg. Biking is good exercise, which can improve mental and physical health. On top of this, the pilot program paves the way for expansion and a larger-scale bike share to be implemented in the future to reach even more students.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Sustainability, Carbon Footprint, Biking, Bike Share

Reducing Waste by Increasing CWU Student Participation in 'Don't Waste, Donate'

Sage Morris
Project Mentors(s): Susan Kaspari, PhD

Every quarter, students at Central Washington University throw away good clothing, unopened food, and useful household items that could have easily been donated. Despite many existing programs to discourage waste, such as CWU Surplus, Wildcat Pantry, and "*Don't Waste, Donate"*, many items still end up in dumpsters due to a lack of awareness and convenience. This project tested student behavior on donating items by building on CWU's current *Don't Waste, Donate* program by creating two test donation stations at Barto and Wendell residence halls.

Donation carts were placed in high-visibility, high-traffic areas during the school year, particularly around quarter move-outs. The carts were clearly labeled to accept food, clothing, and household goods. Each morning, the carts were cleaned out at the same time that trash and recycling were picked up. Records were kept for the first two test bins to determine whether students were using them correctly, as this would define the project's success.

The goal was to assess whether a passive donation station setup was effective or whether promotion was necessary to increase student engagement. This pilot plan helped inform CWU whether low-cost sustainability ideas could work and demonstrated whether students were willing to participate. It also helped foster a more sustainable campus culture by diverting reusable items from landfills and making useful items accessible to other students.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Don't Waste, Donate, Reducing Waste, Landfill

Reducing Pollution on the Yakima River through Educational Outreach

Elias O'Brien
Project Mentor(s): Susan Kaspari, PhD

The Yakima River is one of the most popular streams in the West to fly fish for wild trout and anglers from across the state and country flock to it annually. Additionally, the summer months are busy with raft groups, tubers and other recreational users enjoying the river and escaping the heat. This unique biome is home to stunning canyon walls, home to bighorn sheep and nesting eagles.

While this gem of a natural resource boosts the economy and beauty of our community, there's also a serious problem for the river and its wildlife as trash accumulates along its banks and public access points due to its popularity. Everything from beer cans and popped floaties to industrial agriculture equipment gets left in the river. This causes a real threat to terrestrial and aquatic wildlife.

Future public access and perception also depends on a clean river. To help to solve the problem of litter and encourage both current and future community residents to clean up after themselves and others, a public education outreach program was developed. Informing the public of what is at stake and the wildlife that is home to the Yakima River and being impacted can help them choose to be wiser stewards of the resource. This program will help ensure a sustainable public resource continues for all users.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Stewardship, Recreational Water Use, Yakima River, Litter, Rivers, Riparian Zone, Habitat, Wildlife

Planting Native Plants on Campus to Increase Biodiversity and Decrease Water Use

Sam Olson
Project Mentor(s): Susan Kaspari, PhD

The practices required to take care of grass lawns are unsustainable and can be environmentally damaging. On average 27,000 gallons of water per week are needed to irrigate an acre of grass, and 9 billion gallons of water are used daily to water lawns in the US. Lawns also require the use of damaging chemical fertilizers; the runoff from these chemicals causes negative effects on native ecosystems. Many of these chemical fertilizers and pesticides are known carcinogens and neurotoxins. Grass lawns are also a monoculture, which consistently remove the same nutrients from the soil, damaging soil health and causing a higher dependence on chemical fertilizers. Native plants also store significantly more carbon than grass.

This project was designed to remove an area of grass on CWU campus that is unused and replace it with native drought resistant plants. A small plot of land south of Black Hall was planted with native drought resistant plants. The grass had already been removed and there was no existing irrigation that needed to be altered. Not only does this help with water and chemical usage, it also helps to support biodiversity and improves the overall aesthetics of the CWU campus.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Native Plants, Biodiversity, Water Use, Sustainability

Empowering CWU Minority Student Clubs by Student Recruitment on Campus

Gustavo Pellegrini, Mal Stewman
Project Mentor(s): Mal Stewman; Susan Kaspari, PhD

When it comes to addressing the sustainability problem, my project seeks to address the lack of students attending Black Student Union (BSU) events. My objective with the help of the BSU club is to help attract and recruit more students to BSU events. Recruiting more students to minority events on campus takes a mix of strategies, creativity, and authenticity. One way to do it is to have BSU stand out more on campus to help catch students' attention around campus by using creative and consistent promotions. Some examples can be promoting BSU across all social media platforms like Instagram, TikTok, and group chats. Another way is to have BSU events locally and have events all around our campus, especially on special occasions like welcome week and other events where there are a lot of students attending, to help recruit. Offering free food and giveaways from BSU events, because food always draws students in, especially if it's themed or unique. Branded merch, raffle prizes, or club swag bags are great as well as part of BSU events to help recruit more students. The project solution and the outcome of my project are to increase a sense of belonging for students on campus. To help in recruiting efforts for more students to attend BSU events are done right, the impact can be powerful. This is important for students on campus who are first-generation, transfers, or underrepresented, who may feel isolated as well.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Recruitment

Implementing Oscar Sort to Increase Effective Recycling

Hana Reynolds, Max Hanyan
Project Mentors(s): Susan Kaspari, PhD; Jordan Spradlin

Most recyclable objects are used one time and discarded in the garbage. Additionally, many people do not know which items are recyclable and which are garbage, leading to many recyclable and compostable items being placed in the garbage and many garbage items placed in the recycle bin. Not recycling recyclable items leads to many negative environmental impacts including pollution of land and water, plastics in animals, and a large carbon footprint. To improve proper recycling rates, Oscar Sort was implemented in locations around CWU including the SURC, library, Village Grill, and Nicholson Pavillion. Oscar Sort is an AI recycling assistant that shows people how to dissemble an object to either recycle, compost, or throw away the different pieces. Implementing Oscar Sort has greatly increased the correct sorting of recycling, composting, and garbage. With the continued use of Oscar Sort, Oscar Sort will continue making CWU a more sustainable college by decreasing the amount of waste that is produced at CWU.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Oscar Sort, Recycling, Composting, AI

Water Refill Stations: Reducing Waste, and Improving Student Access

Eva Sten, Eric Whitaker, Jeffrey Bousson
Project Mentor(s): Susan Kaspari, PhD

Students in residence halls at Central Washington University may lack access to water bottle refill stations on campus. Having access to clean drinking water is a human right. This issue lies with the infrastructure Central Washington University has provided students. Many residence halls have water fountains but lack water bottle refill stations. This may affect how much water students drink and the convenience at which students have access to it. Students on campus who experience a lack of access resort to buying bulk water bottles from grocery stores or using vending machines for their hydration. This increases single use plastic wastes on campus. It is important to Central Washington University to increase student access to clean drinking water and decrease plastic wastes. The goal of this project was to install two to three ELKAY ezH_2O water bottle refill stations in residence halls that do not currently have this infrastructure. The buildings these instalments took place in are as follows; Quigley Hall, Wendell Hill Hall A, and Kamola Hall. These halls were prioritized because the students residing here express a higher need for this service. While the buildings are in use, the water bottle refill stations will provide students access to clean filtered water and decrease plastic wastes from water bottles and drinking containers. The implementation of the ELKAY ezH_2O is projected to support student access to filtered drinking water, encourage students to stay hydrated, and decrease plastic wastes on campus associated with water bottles.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Water, Students, Filtered, Access, Central Washington University

Reducing Paper Towel Waste in SURC Restrooms Through Dyson Hand Drier Implementation

Nathan Wells, Joe Bach, Adam Tasker

Project Mentor(s): Susan Kaspari, PhD

Paper towels from hand drying in SURC restrooms generates a significant amount of waste per day. The production of paper towels also contributes to deforestation and water pollution. This creates messy restrooms and burdens custodial staff. Furthermore, it costs CWU hundreds of dollars a week to supply these paper towels to the SURC. This project addresses these issues by updating current hand driers with energy efficient Dyson hand driers in the eight SURC restrooms. This provides an alternative environmentally friendly option for hand drying that reduces the total amount of paper towels used in public restrooms. Dyson hand driers have many benefits as they are non-contact and capture 99.9% of bacteria. Furthermore, they are much more effective in drying hands than current units while being more energy efficient.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)

Keywords: Hand Drier, Implementation, Waste, Bathrooms, SURC

Graduate Student Association (GSA)

Graduate Students at PUIs; Mastering the Art of Visibility

Weston Shipman, Harmony Lee, Lydia Smaciarz, Zack Arneson, Reyhaneh Bagherian Shamir

Project Mentor(s): Rodrigo Renteria-Valencia, PhD; Mason Low

This panel brings together a diverse group of graduate students to share their experiences at a primarily undergraduate institution (PUI). As regional comprehensive institutions increasingly focus on elevating the undergraduate experience, graduate students at PUIs often navigate an academic and professional environment that significantly differs from their undergraduate peers. Panelists will discuss the challenges and opportunities they have encountered, including balancing workloads with teaching and research responsibilities, forging relationships with faculty and students, and navigating limited support and resources.

Panelists will also reflect on how their experiences at PUIs have shaped their academic and professional development. While graduate students at PUIs may have fewer opportunities for traditional research collaborations or specialized training, many find themselves working in close-knit communities where they develop strong leadership skills, gain valuable teaching experience, and form meaningful connections with faculty, staff, and students. The panel will highlight the ways these environments can foster interdisciplinary collaboration, innovation, and elevate both graduate and undergraduate student success.

By reflecting on these experiences, this panel aims to shed light on the challenges and rewards of pursuing graduate education at a PUI—helping Graduate Deans, staff and supportive administration to improve the graduate experience at their respective institutions, emphasizing the value of mentorship, institutional support, and opportunities for professional development. This discussion will contribute to a broader understanding of how PUIs can better serve graduate students and empower them to excel within and beyond academic realities.

Presentation Type: Panel (May 14, 9:00am–4:00pm)

Keywords: Graduate Education, Interdisciplinary Collaboration, Leadership

McNair Scholars Program

McNair Scholars Program

Molly Kelly; Kiyrah Keith; Alyssa Castilla

Project Mentor(s): Rodrigo Renteria-Valencia, PhD

The Ronald E. McNair Post Baccalaureate Achievement Program (aka the McNair Scholars Program) is a highly competitive undergraduate program funded by a grant from the U.S. Department of Education designed to mentor undergraduates in their junior and senior year in undergraduate research to prepare them for graduate school. The program requires participants be low income and first generation college students or underrepresented students in graduate education according to the Dept of Ed. This program facilitates students' success by paring them with a mentor in their field to complete a paid research fellowship. Additionally, they are given opportunities to present research conferences and participate in other scholarly activities such as workshops and cultural events.

Presentation Type: Panel (May 14, 9:00am–4:00pm)

Keywords: McNair, Research

Multimodal Learning

The Role of Generative AI in Higher Education

Chad Tester, Susan Rivera, Cristina Bistricean, Gary Bartlett, David Schwan, Josh Welsh

Project Mentor(s): Chad Tester

As generative artificial intelligence (genAI) continues to evolve, its potential applications in higher education increase in impact and significance. This panel will explore the transformative impact of genAI on teaching and learning within higher education institutions, with specific emphasis on Central Washington University.

Panelists will address questions such as personal viewpoints of genAI in the college environment, the current impact of genAI on teaching and learning experiences, and various important ethical considerations.

We will also examine how institutions can ensure that AI is used responsibly and equitably, and what skills are essential for students to develop to effectively collaborate with AI technologies in their future careers. Additionally, the panel will discuss ways in which genAI can foster collaboration and creativity among students and faculty, highlighting projects and initiatives that demonstrate this potential.

Finally, we will look ahead to the future, considering how the role of genAI may evolve in the next five to ten years within higher education, and discussing the hopes and concerns for its future impact. Join us for an engaging and informative session that will provide valuable perspectives on the future of genAI in higher education and its potential to revolutionize the way we teach and learn.

Presentation Type: Panel (May 14, 9:00am–4:00pm)

Keywords: Higher Education, Pedagogy, Generative AI, Technology

Office of Sustainability

Sustainability Festival

Hannah Campbell, Jordan Spradlin, Jeff Bousson, Max Henyan, Emerson Carter
Project Mentor(s): Jeff Bousson, Jordan Spradlin
The Sustainability Festival is a two-day event, where the first day includes walking tours viewing sustainable locations around campus, and the second day will be full of exciting tabling, games, and activities. On the second day, a donor-funded #GiveCentral lunch will take place, highlighting the importance of education surrounding sustainable procurement, agriculture, and the life cycle of our food. This lunch will also have a low carbon footprint, as the menu items will be sourced locally and include mostly plant-based ingredients. The primary purpose of this event is to showcase to students and parents visiting SOURCE that there are many free and inclusive student resources prioritizing sustainability in their operations. The three pillars of sustainability, environmental, social, and economic, will be represented by the groups present. After this event, students will feel represented and empowered by the clubs and organizations here on campus. This festival will inspire students to get involved with CWU Sustainability and the student ambassadors, evolving previous ideas of sustainability, broadening understanding, and maximizing engagement with such great departments. This opportunity will also allow students to meet the faces behind such important organizations on campus, strengthening our campus community. As the CWU Sustainability Department is leading this special session, we will aim to collaborate with students to implement their creative ideas to create local and widespread change to increase overall sustainability and equity and make CWU an even more prosperous campus.
Presentation Type: Special Session (May 14 & 15)
Keywords: Sustainability, Collaboration, Departments, Clubs, Student Engagement, Resources, Environment, Society, Economy

SOURCE 2026 Poster Design

SOURCE 2026 Poster Design Competition

CWU Graphic Design Students
Project Mentor(s): Matthew Wenz
Students will design an event campaign system for SOURCE 2026. The system will include an event poster, sticker design, lanyards, tee-shirt design, social media banners, and a final campaign mockup. Students will be working with the SOURCE 2026 Committee and present design comps to the committee for feedback and direction. The project is competitive, 6 to 8 final posters will be picked by the SOURCE Committee. Student poster finalists will be picked by the SOURCE Committee and finalists will be invited present their design and approach at a SOURCE Questionnaire Panel. Finalist designs will be displayed in SURC and put into an online university wide poll to determine the winning design. The winning student will modify their designs as needed for use for SOURCE 2026.
Students will research, brainstorm, and sketch multiple conceptual solutions to communicate the essential information needed for a SOURCE 2026 that represents the main SOURCE 2026 theme *transform* or *transformation*. Students then will design two poster comps and present them to the SOURCE committee for feedback. Important information will include event title, subtitle, dates, times, locations, and utilization of the CWU brand guidelines. The design approach and strategy must communicate essential information well, but also conceptually communicate what SOURCE is, exemplifying the main SOURCE 2026 theme.
Presentation Type: Day 1 & 2 (May 14, 10:00am–4:00pm & May 15, 10:00am–5:30pm)
Keywords: Graphic Design, Art, Project Assets, SOURCE, Flyer Design

Students With A Purpose (SWAP)

Building Bridges: Unlocking the Power of Mentorship

Dylan Gilbert, Makayla Sanchez, Sam Farouk, Meghan Rothwell, Jamie Rothwell

Project Mentor(s): Deanna Marshall

Mentorship is a powerful tool for growth—not just for students, but for faculty, administrators, and community members as well. At its best, mentorship is a two-way exchange where everyone, regardless of role or experience level, can learn from one another. Whether you're guiding a student, collaborating with a colleague, or gaining insight from a community partner, mentorship strengthens our shared capacity for academic, professional, and personal development.

This interactive session, hosted by Students With A Purpose (SWAP), invites participants from all backgrounds to explore the diverse forms of mentorship that fuel success. Through a dynamic combination of guided discussion and speed mentoring, attendees will connect across roles and generations to reflect on the value of mentorship, practice initiating meaningful conversations, and build strategies for sustaining authentic, supportive relationships.

Whether you're a freshman seeking direction, a faculty member hoping to grow your mentoring practice, a community leader eager to give back, or a staff member looking to connect with peers—this session offers tools and inspiration to help you navigate mentorship with purpose and confidence.

Presentation Type: Panel (May 14, 9:00am–4:00pm)

Keywords: Mentorship, Community Engagement, Relationship-Building

Transfer Center

CWU Transfer Center Student Panel Discussion on Presenting at SOURCE

Angela Kyle, Tyler Dahl, Sydney Cater, Olene Togiailua, Malcolm Jasmin, CM Wright

Project Mentor(s): Megan McConnell

Have you transferred to Central Washington University? Are you curious about SOURCE and want to ask questions to a panel of transfer students? Great news, the CWU Transfer Center has the answers you are looking for! This panel features transfer students who have completed poster presentations, projects, and presentations at SOURCE in the past. This discussion is open to undergraduates at all stages of their academic careers and all majors are encouraged to participate.

Presentation Type: Panel (May 15, 2:00pm)

Keywords: Transfer Student, Student Panel, Discussion, SOURCE

Ellensburg School District

Ellensburg High School

Aquatic Macroinvertebrates in Reecer Creek and its Side Channels

David Katzer, Olive Buvit, Oliver Taft, Sarahi Galvan

Project Mentor(s): Jeff Hashimoto

The Reecer Creek Floodplain Restoration Project in Ellensburg, WA, has brought an aquatic habitat that has prompted the return of many species to the area. We wanted to answer the question of how much the biodiversity and population of aquatic macroinvertebrates differ between Reecer Creek and its seasonal side channels. We measured biodiversity of aquatic macroinvertebrates in Reecer Creek and seasonal side channels in April 2025. We have found more populations of aquatic macroinvertebrates in the side channels, however the main stream contains more biodiversity.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)

Keywords: Stream Restoration, Invertebrates, Ecology

Earthworm Population Dynamics: Analyzing Variations with Distance from Reecer Creek

Ethan Rorvik, Stirling Woods, Kovey Jones

Project Mentor(s): Jeff Hashimoto

Studying earthworm population dynamics is an indicator of the ecosystem's health around the Reecer Creek Floodplain Restoration Project in Ellensburg, WA. Earthworms in North America are predominantly invasive and can harm other native invertebrates. We investigated how the population density and diversity of soil-dwelling worms change with increasing distance from Reecer Creek. We collected worms at distances of 1.5 meters, 4.5 meters, 9 meters, and 30 meters from the creek. Overall, the data suggest that worm populations tend to increase farther from the creek, though the specific distribution varies among our transects.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)

Keywords: Ecology, Earthworms, Reecer Creek, Environmental, Invasive Species

Robotics

Robotics Competition

Mt. Stuart Elementary School, Ida Nason Aronica Elementary School, Lincoln Elementary School

Project Mentor(s): Jason Eng

Join us for an exhilarating showcase of innovation and creativity of three Robotics Teams from Mt. Stuart Elementary School, Ida Nason Aronica Elementary School, and Lincoln Elementary School! Witness the brilliance of our young engineers as they unveil their cutting-edge robots, meticulously crafted for thrilling competitions.

Presentation Type: Exhibition (May 15, 3:00pm–3:50pm)

Keywords: Robotics

Kurume Institute of Technology

Cucumber Quality Evaluation Using 3D Coordinate Data

Kazuto Hirata
Project Mentor(s): Mariko Oda

Currently, quality evaluation of cucumber fruit is mainly done visually. This is a labor-intensive process that requires a lot of human subjectivity. Therefore, we have attempted to use AI to evaluate the quality of cucumber fruits using 2D images of fruits. However, appropriate evaluation could not be performed because the shape of the fruit depended on the angle at which it was shot and because the 2D image did not provide enough information on fruit shape. In Graduation Research II, we extracted features from 3D coordinate data and created a quality evaluation AI model. In the future, we aim to increase the training data, improve the accuracy of the model, and systematize the model for use in actual agricultural fields.

Presentation Type: Recorded (https://www.youtube.com/@cwusource5518)
Keywords: 3D Coordinate Data, Cucumber Quality, 2D Images, Depth

Development of a Business Support System Using AI for the Kurume Vegetable Breeding Company

Yuya Ifuku
Project Mentor(s): Mariko Oda

At the Kurume Seed Breeding Association in Japan, the inefficiency of cucumber breeding work is an issue due to the individual nature of the work. In this study, we aim to improve the efficiency of cucumber fruit counting work by introducing a work support system that uses image recognition. This system uses image recognition and OCR to count cucumbers, determine their ABC class grades, and obtain variety numbers, aiming to reduce labor through AI. By introducing this system, we have achieved a reduction in work hours of about 25%. In the future, we will improve the accuracy of the ABC grade classification of cucumbers to a practical level. Specifically, it is expected that accuracy will improve by making use of information in the depth direction for analysis and performing a more multifaceted evaluation.

Presentation Type: Recorded (https://www.youtube.com/@cwusource5518)
Keywords: Computer Vision, YOLO

Weld Quality Judgment Based on Weld Bead Image Analysis for the Training of Welding Technicians

Yoshiki Inoue
Project Mentor(s): Mariko Oda

This study aims to address the shortage of arc welding technicians by developing an AI-based weld bead quality assessment system. Using image data from skilled technicians and beginner students, an AI model was developed to classify weld quality into pass or fail categories. Data augmentation techniques were applied to enhance model accuracy, which significantly improved the classification results. Although additional analysis using frequency domain features was attempted, it resulted in low accuracy. Moving forward, the focus will be on developing an application to improve usability.

Presentation Type: Recorded (https://www.youtube.com/@cwusource5518)
Keywords: Image Processing, Machine Learning, Deep Learning

Development of AI Job Interview Training System That Learns Wording and Logical Answers

Yuta Noda
Project Mentor(s): Mariko Oda

Many students experience anxiety about their lack of preparation for job hunting, particularly in interview practice [1]. This often stems from underutilization of university or public career support services, insufficient opportunities for mock interviews, and a lack of meaningful feedback on their performance. To address these challenges, this study developed an AI-powered interview training system featuring a computer-generated (CG) interviewer created using image generation AI, with synchronized speech and lip-sync animations to simulate a realistic interview environment.
In *Graduation Research II*, the system was tested with 10 participants who answered four interview questions posed by the AI interviewer. Their responses were evaluated by both ChatGPT and a professional career consultant, with a strong correlation of 0.89 observed between their assessment scores, demonstrating the system's potential as a reliable training tool. Future improvements will focus on enhancing the quality of sample answers based on expert feedback and incorporating analysis of non-verbal communication, including posture, facial expressions, and vocal clarity.

Presentation Type: Recorded (https://www.youtube.com/@cwusource5518)
Keywords: AI-Generated Text, AI-Generated Images, Speech Recognition, Speech Synthesis, AI Interviews

Strawberry Stem Crossing Detection by AI to Improve Accuracy of Automatic Strawberry Harvesting

Jin Sawada
Project Mentor(s): Mariko Oda

This study proposes an AI-based stem crossing detection method to improve the detection accuracy of strawberry fruit in automatic strawberry harvesting robots. Current harvesting robots have difficulty in determining the location of stems to be cut if the stems are intricately interlaced and crossed. In this study, we developed a method to accurately recognize the connection between strawberries and stems by combining background removal using depth-estimated images, stem detection and line segment approximation, and determination of the front-back relationship of stems using 3D model generation AI. Through experiments, we have achieved detection of stem line segments that are not easily affected by stem crossings, as well as front-back discrimination. In the future, we aim to further improve the accuracy of stem detection.

Presentation Type: Recorded (https://www.youtube.com/@cwusource5518)
Keywords: Automatic Strawberry Harvesting, Stem Crossing Detection, Line Segment Detection, Image Generation AI, 3D Model Generation AI

Development of a Grape Thinning Support System Using AI

Yudai Tsutsumi
Project Mentor(s): Mariko Oda

"Thinning" is the process of removing excess grape berries to ensure adequate space for growth. The shape of the grape cluster and the size of individual berries significantly affect market value, and thinning also impacts the sugar content of the fruit. This research aims to develop a grape thinning support system that enables new farmers to efficiently thin grape clusters without requiring specialized expertise. The proposed system uses YOLO for object detection to identify berries that should be removed and augmented reality (AR) technology to display thinning recommendations. Since proper thinning requires analyzing berry orientation and their spatial relationship (front or back position within the cluster), we employed YOLO11-OBB for orientation detection and Depth-AnythingV2 for depth estimation.

Presentation Type: Recorded (https://www.youtube.com/@cwusource5518)
Keywords: Thinning, Image Recognition, Object Detection, Berry Orientation Prediction, YOLO11, OBB, Depth-AnythingV23D Coordinate Data, Cucumber Quality, 2D Images, Depth

Automated System for Strawberry Grade Classification and Total Price Calculation in Containers

Ryunosuke Yamaguchi
Project Mentor(s): Mariko Oda

In strawberry packaging centers, the classification of strawberries by grade—based on factors such as color, shape, and size—is currently performed manually through visual inspection. This method results in inconsistent evaluations due to subjective judgment. Additionally, data on strawberry counts by grade is manually recorded and entered into a register for sales calculations, making the process time-consuming and prone to error. To address these issues, this study developed an AI-powered system that automates strawberry grade classification and sales calculation within containers.
In the first phase of this research, strawberries were classified using a bounding box area. In this second phase, a mask-based image processing approach was implemented to enable binary classification into two categories: Deluxe (DX) and Standard strawberries. A web application was also developed using Streamlit to automatically calculate sales based on the classified data and export results in CSV format. While the system could not fully annotate new images containing tip-white strawberries, partial detection was achieved using previously annotated data. This study demonstrates the feasibility of automating strawberry grading and sales computation, providing a foundation for further refinement and future real-world implementation.

Presentation Type: Recorded (https://www.youtube.com/@cwusource5518)
Keywords: Tip-White Strawberries, Mask Processing, Streamlit, Object Detection, Automated Sales Calculation

Washington State University

The VTuber Market Case Study - Hololive Production as a Business

Daniel Arinez Rios
Project Mentor(s): Mark Gibson

In October 2020, Hololive Productions, a Japanese company, launched its English-speaking branch, reshaping the online media landscape. Among its debut talents was Gawr Gura, who reached 1 million subscribers in a month, cementing Hololive as a major player in the VTuber industry. This study examines the business strategies behind Hololive's rise, addressing the question: What strategies have driven its mainstream success? Operated by COVER Corporation, Hololive transitioned from game development to VTuber content, capitalizing on Live2D animation and hiring skilled creators to master audience retention. By employing a hub-and-spoke model and integrating professionally generated content (PGC) with user-generated content (UGC), Hololive cultivated a loyal fanbase and global visibility. Milestones such as live concerts, brand licensing, and music label collaborations highlight its ability to bridge cultural and linguistic gaps. This study proposes that COVER Corporation operates three key business cycles to sustain growth:

1. **The Creator Economy Cycle** – Recruiting and developing independent creators to produce high-quality content.
2. **The PGC-UGC Synergy Cycle** – Encouraging fan-driven engagement by integrating UGC with professional content.
3. **The Global Reinvestment Cycle** – Expanding international reach while reinvesting in creators and technology.

While COVER Corp. may seem like a niche case driven by anime culture, its business model has broader implications for digital content creation. By proving that technology-driven engagement can drive both profit and audience growth, COVER has inspired companies across industries to adopt similar strategies, reshaping online entertainment as a whole.

Presentation Type: Poster Presentation (May 15, 10:00am–2:30pm)
Keywords: Japan, Business, Digital Culture, VTuber, Creator Economy, Marketing Cycles, Digital Entertainment, Content Creation, YouTube

The US Dollar Supply Crisis in Bolivia

Daniel Arinez Rios
Project Mentor(s): Hector Botello

The Bolivian economy has been facing one of its most unique crises in modern memory, and that is the dwindling supply of US Dollars in its reserves. This crisis would come to be as a result of almost two decades of long-standing government policies, economic mismanagement and external factors that would contribute to an inflationary period in the FOREX markets. This paper aims to examine the root cause of this crisis, tracing it back to the most popular nationalization policies that were implemented by the Movimiento Al Socialismo (MAS) party since 2006. The introduction of subsidies aimed to lower prices, particularly for gasoline, created fiscal burdens that combined with declining foreign investment and rising global fuel prices, would begin to drain Bolivia's dollar reserves.

The crisis deepened during the COVID-19 pandemic and the Russo-Ukrainian war, which further restricted dollar inflows and led to a widespread loss of confidence in the Bolivian financial system. The government's attempts to address the crisis—such as issuing dollar-denominated bonds and auctioning diesel—have proven largely ineffective due to structural economic weaknesses. As Bolivia grapples with dollar scarcity, an expanding black market, and growing inflationary pressures, this paper argues that meaningful economic recovery requires reducing subsidies, attracting foreign investment, and implementing broader market-oriented reforms. Without these changes, Bolivia risks prolonged economic instability and a deepening financial crisis.

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: Bolivia, United States, Crisis, Gasoline, Subsidy, Scarcity

The Economic and Geopolitical Implications of Turkey's Rise as a Producer of Affordable Military Drones in the Global Arms Trade

Daniel Arinez Rios
Project Mentor(s): Patrick Carlin

The global arms trade has been significantly reshaped by Turkey's emergence as a leading producer of affordable military drones, particularly the Bayraktar TB-2. This paper examines the economic and geopolitical implications of Turkey's growing presence in the drone market, which challenges the dominance of the United States and China. By offering cost-effective yet highly capable drones with fewer export restrictions, Turkey has positioned itself as a key supplier for smaller nations seeking military autonomy. The study explores how Turkey's drone industry has influenced global conflicts, particularly the Russo-Ukrainian War, where TB-2 drones played a pivotal role in countering Russian forces. The success of Turkey's drone program has spurred competition from nations like Iran and Russia, leading to a broader shift toward lower-cost drone warfare. Additionally, the paper discusses the strategic motivations behind Turkey's military-industrial expansion, including potential state subsidies and geopolitical maneuvering. As the demand for accessible military drones increases, Turkey's role in the international arms trade continues to grow, raising questions about the ethical and strategic consequences of widespread drone proliferation.

Presentation Type: Oral Presentation (May 14, 9:00am–4:00pm)
Keywords: Drone, UAV, Military, Ukraine, Turkey, United States, Economics, Geopolitics

SOURCE KICK OFF FASHION SHOW

Join us for the SOURCE Kickoff Fashion Show featuring original designs by Apparel, Textile, and Merchandising student designers.

Stick around after the show for the **SOURCE Designer Session** at and enjoy a **FREE Welcome lunch** in the **SURC Ballroom**!

WED. MAY 14TH

11:30AM

SURC PIT

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