UNDERGRADUATE RESEARCH AND INQUIRY ACROSS THE DISCIPLINES

ORAL PRESENTATION ABSTRACT BOOK

APRIL 18TH, 2026

Table of Contents

Individual Oral Presentations

Abart, Riley

University of Wyoming (UW)
Honors College Capstone

Influence of fire on skink and gecko distribution in New Zealand alpine shrubland

Little is known about how fire impacts New Zealand's native lizard populations. Studies suggest the immediate effect of fire is negative, as fire frequently results in a decline of habitat heterogeneity. The long-term impact of fire on these lizards is more difficult to understand, as habitat partitioning makes their niches more complex. In 2008, a fire burnt through an area near Goldney Saddle – home to populations of alpine skinks and geckos. We investigated the impact of fire on these populations by sampling from shelters in paired groupings from burnt and unburnt portions of the area. We assessed lizard abundance in relation to different factors – including location (burnt/unburnt), percent cover of vegetation (grass/shrub), and distance to the nearest shrub. We report more skinks present in the burnt area (0.85 skinks per retreat) than the unburnt area (0.40 skinks per retreat). We found a positive correlation between distance to nearest shrub and skink abundance. Additional work is needed to fully assess the impacts of habitat loss on these lizard populations, especially with rates of anthropogenically-induced fire projected to increase in subsequent years.

Anderson, Kelsey

University of Wyoming (UW)
Honors College Capstone

Organometallic Lab Experiment and Characterization of Fe_2 (μ-S_2) (CO)_6

Organometallic Lab Experiment and Characterization of $Fe_2(\mu - S_2)(CO)_6$

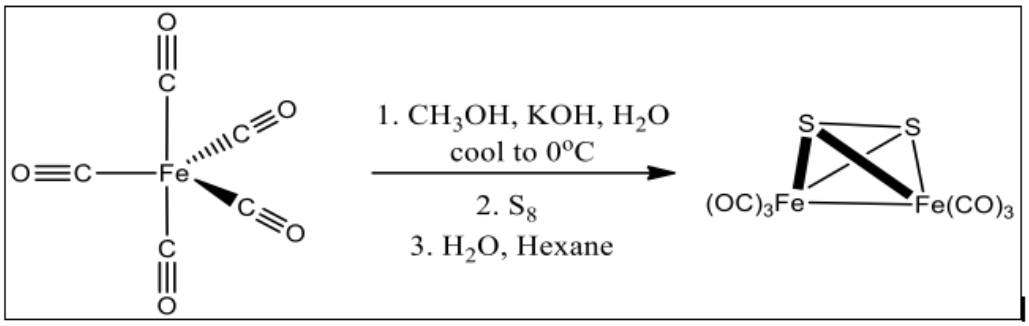
While organic chemistry is heavily attributed to significant biological importance such importance in inorganic chemistry is often overlooked. This independent project seeks to explore the biological relevance of inorganic chemistry.

Hydrogenases are enzymes that catalyzes the reversible oxidation of molecular hydrogen (H_2) into protons and electrons (equation 1).[1] These enzymes are widespread and at least three broad classes of hydrogenases have coevolved: [NiFe]- hydrogenases, [FeFe]- hydrogenases, and [Fe]-hydrogenases.[2]

$$H_2 \rightleftharpoons 2H^+ + 2e^- \qquad \text{equation 1}$$

Bacteria that does not use oxygen (anaerobic) uses this enzyme to use molecular hydrogen as a reactant for carbon fixation as well as to produce energy. Iron-iron hydrogenase has only been identified in certain anaerobic bacteria and some anaerobic eukaryotes. All known syntheses of iron-iron hydrogenase use $Fe(CO)_{12}$ or $Fe_2(\mu - S_2)(CO)_6$ as starting materials. The former can be purchased commercially but the later cannot be.

The following experimental outline was adapted from Barrett et Al.[3,4]



Unbalanced Chemical Equations

$$Fe(CO)_5 + OH^- \rightarrow HFe(CO)_4^- + CO_2(OH)^- \qquad \text{equation 2}$$

$$HFe(CO)_4^- + S_8 \rightarrow Fe_2S_2(CO)_6 + Fe_3S_2(CO)_9 \qquad \text{equation 3}$$

Bifulco, Ella Sharon

University of Wyoming (UW)
Honors College Capstone

Improving Hypoglycemia Detection in NPO Hospitalized Patients Through Evidence-Based Blood Glucose Monitoring

Through appraisal of relevant hospital literature, and consulting nurses within my nursing capstone, I will explore the PICOT question: In hospitalized patients how does implementing standardized blood glucose monitoring protocols during NPO periods compared with the lack of glucose testing in nondiabetic patients affect detection and appropriate early treatment of life-threatening hypoglycemic episodes?

Birge, Ellie

University of Wyoming (UW)
Honors College Capstone

Visual Mapping of Human Trafficking Workshops

Visual Mapping of Human Trafficking Workshops Ellie Birge, University of Wyoming, Shanshan Li, University of Wyoming, and Terri Markham, Uprising.

Human trafficking is a serious crime that occurs across all geographic regions, and therefore, is a spatial problem. Human trafficking includes sex trafficking and labor trafficking. Sex trafficking involves any sex act done in exchange for any item of value. Labor trafficking is the exploitation of an individual for the purposes of compelling their labor by force, fraud, and coercion. Despite its prevalence, many people are not educated or misinformed on what human trafficking is, how it happens, and how they can protect themselves. Uprising, a human trafficking awareness, education, and outreach organization, conducts workshops, discussions, and events across Wyoming to educate communities. Spreading awareness is a great way to combat human trafficking, and so the key question we aim to address through this project is: "how may the visual mapping of Uprising workshops help inform future education and grow advocacy efforts in Wyoming?" To enhance Uprising's efforts, we propose using Geographic Information Systems (GIS) technology to map the locations of agencies that have received training. We would then create a dashboard on Google Looker Studio to present the mapped locations alongside statistical information. By creating a dashboard, we can visualize where awareness efforts have been made and identify gaps in outreach. We plan to make it so that the dashboard will include elements that will present the different types of awareness techniques agencies have received, the number of workshops per year, the number of workshops per city, and the number of cities that have not received any workshops. By growing the advocacy efforts of Uprising, Uprising can inform more people about the issue and help more people stay safe.

Bohlender, Ava Estella

University of Wyoming (UW)
Honors College Capstone

The Manufactured Silence: Cultural Expectations, Maternal Idealization, and the Neglect of Postpartum Depression

How do societal expectations for women to find fulfillment through motherhood reflect broader gendered expectations about women's roles, emotions, and identities in motherhood? During my time at the University of Wyoming Honors Program, I developed this project to examine the effects of mass media as it romanticizes childbearing and motherhood. I am also investigating how this impacts the lack of discourse surrounding postpartum depression. Including a discourse on societal expectations for women to find fulfillment through motherhood. Therefore, gendered expectations often leave no room for the acknowledgment of postpartum depression. I believe that as a communications major, my knowledge of various theories in the field will prove to be fundamental to my continued research. My methodology will focus on an interactive space at the Gryphon in Laramie, Wyoming, where I will demonstrate the interdisciplinary connections between sociology, religion, and gender studies. I would like to use this physical space to focus on how mass media and the entertainment industry represent a woman's transition towards motherhood. I believe I will find a correlation to represent why modern social norms neglect to hold a space, both literally and metaphorically, for these types of conversations. I will do so by investigating the context of historical traditions wherein women's health and the treatments thereafter have been physically and mentally ignored. Alongside a series of photos, this presentation will take on a photojournalism style, as each photo will represent a woman's experience navigating childbearing.

Bohlman, Jace

University of Wyoming (UW)
Honors College Capstone

Listening to Families, Supporting Youth: A Needs Assessment and Resource Guide for Big Brothers Big Sisters of Wyoming

Listening to Families, Supporting Youth: A Needs Assessment and Resource Guide for Big Brothers Big Sisters of Wyoming evaluated and strengthened Big Brothers Big Sisters of Wyoming's (BBBS) ability to connect clients to community resources and provide holistic support. Grounded in Bronfenbrenner's Ecological Systems Theory, the project examined how BBBS could better serve participants by identifying and addressing interconnected biological, emotional, environmental, social, and academic needs. Its purpose was to assist BBBS in bridging service gaps by developing county-specific resource guides while also highlighting broader resource shortages across Wyoming. The project began with a review of existing data and scholarly critiques of Big Brothers Big Sisters, similar mentoring programs, and research on protective and risk factors in child development. This annotated bibliography informed the development of a digital needs assessment survey for families with children ages 5–17 enrolled in BBBS. The survey, available in English and Spanish, was reviewed for linguistic accuracy for a Latin American participant and alignment with the National Association of Social Work's Code of Ethics. It was distributed across eight BBBS sites for three months, with participation encouraged through a gift card raffle for each county participating. Survey data was analyzed to identify trends and unmet needs. Based on these findings, county-specific resource guides were developed to connect families with local services. A resource gap review was also compiled to identify areas where Wyoming counties lacked adequate resources. Overall, the project provided BBBS with data-driven tools to enhance holistic care and strengthen community collaboration.

Brown, Lachlan

University of Wyoming (UW)
Honors College Capstone

Religion in the American Public Education System: The Establishment and Consequences of a Protestant Doxa

The public education system in the United States, despite being secular in theory, is currently and has historically been influenced by Protestant Christianity. Relying on primary source documents from the seventeenth and eighteenth century Massachusetts Bay Colony, scholarship on the nineteenth century standardization of educational curricula in the United States, current scholarship on the implementation of Bible courses in Texas' public high schools throughout the twentieth century, and new research on the current Bluebonnet English curriculum in Texas' elementary schools, this research establishes and investigates the presence of Protestantism within public education through a historical and religious studies lens. Central to this research are the terms doxa, habitus, capital, and field as understood by Pierre Bourdieu in his book Practical Reason (1994). These terms are used to academically understand how Protestantism is present in public education, the resulting impacts, and finally to argue the existence of possible educational advantages for students with a Protestant background.

Buffington, Harley

University of Wyoming (UW)
Honors College Capstone

Teaching in the Modern World: My Experiences in an Education Residency

This presentation will cover my experiences completing my student teaching residency on the path to obtaining my degree. This will include the experiences I have had working with professionals in my aspired field, such as learning the value of collaboration, as well as the amount of thought, planning, and talented people that go into creating a lesson for students. I will also discuss my interactions with students, what I have learned, and how that has affected me, including the immense growth I have seen in both my students and myself in only a couple months. And finally, I will discuss what this means for my future career, both as a student and as an educator.

Burgess, Adeline

University of Wyoming (UW)
Honors College Capstone

We Are the Village: The Need for Collective Action in Reforming Foster Care

Children in the foster care system frequently experience trauma, instability, and disrupted attachments, all of which can significantly impact brain development and long-term well-being. This project explores the intersection of neuroscience, trauma, and legal framework. While research has shown how neurodevelopment is impacted by trauma, there are often missing pieces that tell the whole story. In order to fill in those gaps, my project integrates science and qualitative testimonies from those involved around and in the system. By combining research and lived experience, my project advocates for a more informed, compassionate, and effective foster care system.

Casey, Abigail

University of Wyoming (UW)
Honors College Capstone

DYNAMIC ASSESSMENT OF DECODING FOR SCREENING DYSLEXIA : A Tier-1 Diagnostic Screener for K-2

This presentation examines the use of a dynamic assessment of decoding as a Tier-1 screening tool for identifying students at risk for dyslexia in kindergarten through second grade. Dynamic assessment incorporates brief instruction within the testing process, allowing for evaluation of students' responsiveness to learning and their ability to acquire decoding skills. Findings suggest that this approach may improve screening accuracy by maintaining strong sensitivity while increasing specificity compared to traditional static measures. By directly targeting word reading acquisition and measuring learning potential, dynamic assessment may better differentiate between temporary delays and more persistent decoding difficulties. Overall, these findings support the use of dynamic assessment as a Tier-1 screening tool and highlight its potential to improve early dyslexia identification and promote more accurate and equitable classification of students.

Catlin, Bryn

University of Wyoming (UW)
INBRE

Identifying the Hippocampal Citrullinome in Wild-Type Mice

Peptidylarginine deiminases (PADs) are a family of enzymes that post-translationally citrullinate proteins, altering protein structure and function. They are present in the hippocampus and cerebral cortex of the brain among other tissues. PAD enzymes are regulated by estrogen, and their expression fluctuates with hormone levels across the estrous cycle in female mice where the highest levels are in the estrus stage as compared to the lowest during the diestrus stage. As a result, PADs are investigated for their role in autoimmune and neurodegenerative disorders in females. Alzheimer's Disease (AD) is a neurodegenerative disorder that impairs thinking, reasoning, behavior and memory. In relation to AD specifically, PADs citrullinate amyloid-β peptides, facilitating the aggregation of these peptides into amyloid plaques that result in neurodegeneration and the manifestation of pathological AD symptoms. AD affects women at disproportionately high rates, with nearly two thirds of the five million Americans living with AD being women. Women also experience more severe pathology and faster disease progression, and the mechanisms behind this sex disparity are not fully understood. To investigate the role of citrullination in relation to the progression of cognitive decline between the sexes, hippocampi were collected from 3- and 7-month-old wild-type female mice in estrus, and from 3- and 7-month-old male wild-type mice. Cit-proteins were then identified by mass spectrometry analysis. Proteomic analysis shows a unique subset of cit-proteins that are only present in female mice as compared to males, and another subset that are only present in the 7-month females. Additionally, pathway analysis reveals Alzheimer's related cit-proteins as one of the predominant pathways in the hippocampi citrullinome. Comparing and contrasting the citrullinome in the hippocampi of both estrus wild-type female mice and wild-type male mice may aid in investigating the progression of cognitive decline between the sexes, improving our understanding of this neurodegenerative disorder and pointing towards possible therapeutic strategies.

Chatterley, Dylan Jade

University of Wyoming (UW)
Honors College Capstone

Mock Juror Decision-Making in Intimate Partner Violence Cases with Victims with Borderline Personality Disorder

Research indicates victim gender significantly predicts mock juror decision-making in intimate partner violence (IPV) cases. Additionally, individuals with borderline personality disorder (BPD), an extremely stigmatized disorder, are at increased risk for being victims of IPV. The current study examined the effects of victim gender and BPD psychoeducation on mock juror biases/decision-making in IPV cases. Researchers hypothesized that mock jurors presented with the female victim and no psychoeducation would render more guilty verdicts compared to the male victim with psychoeducation. Results indicated that psychoeducation reduced the likelihood of a guilty verdict, while victim gender did effect juror perceptions. This research will increase understanding of the stigma that victims of IPV with BPD face due to their gender and diagnosis.

Chaudhari, Priya

University of Wyoming (UW)
Honors College Capstone

From Caricature to Complexity: The Evolution of Queer Representation In Bollywood Media

In post-colonial India, laws that dictate queer rights have been around since the times of the British Raj. One such law was Section 377, a law that stated that any sexual act that "goes against the order of nature" would be heavily punished. Through this law, the LGBTQ+ population faced police brutality, domestic violence and even death. Since the 1990s queer people and their allies have fought against Section 377, with back-and-forth progress. It wasn't until late 2018 where the section was finally stuck down—ideally for good—that queer rights began to see forward momentum. Although being queer was not officially legal until 2018, Bollywood movies that included queer characters have been around since the 1970s. Bollywood have used queer people as comedic relief, often staging them as heavily feminized caricatures of themselves. Another common trope was having a transgender person be the villain, often with heavily applied make-up, as if to play off a "men in makeup" joke. It was only until the mid 2010s where this began to change. Seeing queer people as characters whose stories could be told without comedy, they were left in the background, but it became the start of a movement. After the legalization of LGBTQ+ people in 2018, came the first movies that featured queer people at the forefront. Queer Bollywood films are currently focused on the love story, with a classic coming out storyline. While the portrayal is not perfect, it gives the queer youth of India a reason to continue pushing forward.

Cleland, Isabel

University of Wyoming (UW)
Honors College Capstone

The Anxiety Algorithm: Social Media's Influence on Mental Health

Over the last 20 years, technological advancements have dramatically changed the daily lives of adolescents, who now spend an estimated 40–50 hours per week engaging with screens. At the same time, psychologists have observed a notable increase in mental health concerns among children and young adults. This capstone project is a documentary that explores the relationship between heightened anxiety and emotional stress in the daily lives of college students. To what extent does social media contribute to increased anxiety and emotional stress in the daily life of a college student? Using scholarly research including research from Jonathan Haidt's book The Anxious Generation, informal conversation with college students, and personal experimentation to produce a documentary that highlights my own and fellow students' reflections and challenges with screen use. The findings suggest that frequent engagement with social media exacerbates anxiety and emotional strain, highlighting the need for individuals to reconsider their digital habits. This study emphasizes the broader importance of promoting healthier technology use to protect both current and future generations' mental well-being.

Cornella, Riley

University of Wyoming (UW)
Honors College Capstone, Geology Capstone

Geological Enigmas: Three Mysterious Landforms of the United States

My presentation will be about enigmas in geology. I'm going to choose 3 locations on Earth that aren't fully understood geology-wise. I plan to do research on these locations to learn what is known about them, what isn't, and what specifically is mysterious about them. I also want to explore the different theories that have been proposed as explanations for the unanswered questions surrounding each location, how someone could actually go about solving these mysteries (as far as what research and experiments could be done), and how answering these questions could be useful for society beyond just indulging curiosity. I'm from Austin, Texas and I go to school here in Laramie, Wyoming so I'd like my 3 places to be in Wyoming or Texas so that I have the option of going to them or I may choose places I've already been to so that I can get field observations, make sketches, and/or take photos at the various sites. My presentation will be a summary of all the research I did and my findings. I am also going to add watercolors of the sites or maybe cross-sections, sketches, or photos to provide a visual reference of the areas I researched.

Coxbill, Bree

University of Wyoming (UW)
INBRE

Impact of early life overnutrition on synaptic function in the dorsal vagal complex

Childhood obesity is a prevalent health issue, yet adolescent obesity rates have quadrupled since the 1990's. Obesity predisposes young children to be at risk of developing other diseases later in life, including chronic diseases like Type 2 diabetes, cardiovascular diseases, and mental health disorders. A major gap in knowledge is how early-life overnutrition impacts brain-body communication. The hindbrain is the first area of the brain to receive information from the gut and is critical for the regulation of food intake. In this study, we use a mouse model of early-life overnutrition to address how this environmental perturbation impacts synaptic signaling in dorsal vagal complex (DVC). The NTS receives excitatory glutamatergic inputs from the gut through the vagus nerve, which leads to feelings of fullness. There are also inhibitory interneurons in the DVC that can influence how these signals are relayed to the rest of the brain. The specific aim of this is study is to determine how early-life overnutrition impacts synaptic function in the DVC. We used immunohistochemistry techniques to stain for markers of inhibitory transmission. Specifically, we will look at GABA receptors that contribute to relaying information from the gut to the brain. This work lays the foundation for future studies, where we can utilize these mechanisms to develop both drug targets and behavioral interventions to restore proper brain-body communication in children and adults suffering from obesity and related metabolic disorders.

Crown, Kaitlyn G

University of Wyoming (UW)
Honors College Capstone

The Value of Play-Based and Authentic Learning Experiences in Early Elementary Literacy

This presentation will demonstrate my research regarding how a combination of play-based learning and authentic kinesthetic learning experiences positively contributes to students' literacy knowledge in the early elementary setting. It will showcase three lessons created by me for a first-grade story sequencing unit utilizing games and physical activities for students.

Crozier, Cymbaline

University of Wyoming (UW)
Honors College Capstone

Forging a Pathway to Future Education

A shift in public education is being sought after by students, families, and teachers alike across the United States, including in several Wyoming towns. Providing students with, not only engaging instruction, but hands-on opportunities that are built upon real-world contextual experiences is becoming the most favored educational format among several communities that implement alternative education. This capstone project highlights a proposed PK-12 public charter school within the area of Cheyenne, WY, that focuses on delivering a fully inclusive alternative curriculum built around a Multi-Tiered System of Supports and STEAM-based Project-Based Learning framework. Currently, there are three public charter schools in the area that are providing alternative formats of education to elementary and secondary students. Community voices were collected through an online survey (n = 52 participants) to gather levels of interest, knowledge, and confidence in public charter education and inclusive education. Findings show that, although there is not a particularly strong interest for charter education in the community, many families are not satisfied with the education that their child/children have received, showing a possible need for this type of education nonetheless. This is particularly true for families of students that have disabilities or require extra instructional services. Modern education is seeing an overwhelm of needs being unmet, however, with a change in instruction and the concept of school as a whole, a brighter future for students may soon be uncovered.

Custard, Annie

University of Wyoming (UW)
Honors College Capstone

The Analysis of Sexual Offenses against Children in Wyoming

Sexual abuse of children remains a critical, yet underexplored, public health and criminological issue. Existing literature often focuses on adolescent victims, leaving the causes of physiological arousal that often precedes offending against younger children poorly understood. This study proposes a mixed-methods investigation, based on offender-provided data, of leading arousal factors in cases of sexual assault involving victims who do not show secondary-sex characteristics in Wyoming. Using archival case file analysis from the Wyoming Corrections Information System (WYCIS) and semi-structured interviews with incarcerated offenders, we will examine psychological, physiological, situational, and environmental triggers that precede offending behavior. By addressing challenges that come with victim interviews, including risks of re-traumatization, reliance on caregiver reporting, and malleable memory, and by analyzing offender narratives and objective case records. Findings will be used to propose an offender-based typology of arousal factors, designed to inform clinical assessment, treatment, and prevention strategies.

Davies, William

University of Wyoming (UW)

Snake River Headwaters Storymap

Present a presentation on the impacts of climate change in the Snake River headwaters.

DeBoer, Thomas M

University of Wyoming (UW)
Honors College Capstone

How Observing Daylight Savings is Contributing to Heart Disease.

This presentation will be summarizing and discussing the content of my argumentative comprehensive research paper that focuses on circadian rhythm and its link to cardiovascular health. Specifically, it will argue for the removal of daylight savings time as it poses cardiovascular health (including obesity, prevalence of heart disease in the U.S., etc.) through disrupting consistent circadian rhythm schedules. Further, the paper discusses the biological concepts and physiological mechanisms involved in the relationship between cardiac health and circadian rhythm. The paper also addresses study limitations as well as future implications and practical applications of circadian rhythm and cardiovascular health. The paper synthesizes these concepts and ideas and addresses the need to remove daylight savings as well as adjust working, and even eating schedules to promote circadian consistency and develop improved patient health outcomes. The presentation specifically will summarize these findings and provide commentary on the analyses, studies, and future implications.

Dechert, William J

University of Wyoming (UW)
INBRE

Lipid Droplets at the Heart of Metabolic Diseases

For decades, lipid droplets (LDs) were dismissed as inert triacylglycerol storage units. Modern research has demolished this paradigm, revealing the LD as a sophisticated, highly regulated organelle essential for cellular signaling and energy homeostasis. This presentation tracks the LD life cycle—from its intramembranous birth in the Endoplasmic Reticulum (ER) via the Kennedy pathway to its role as an active platform for systemic inflammation. We examine the biophysical mechanics of LD hypertrophy, where CIDE-mediated fusion driven by the Laplace Equation results in oversized, "leaky" droplets. These dysfunctional LDs serve as "danger signals," triggering the NLRP3 inflammasome and synthesizing pro-inflammatory eicosanoids. This "slow burn" of chronic inflammation is identified as a primary driver in Non-Alcoholic Fatty Liver Disease (NAFLD), Type 2 Diabetes, and atherosclerosis.

Deming, Adriana

Laramie County Community College (LCCC)
INBRE

Illuminating the Path: Tracheal System Adaptations Supporting Bioluminescence in Ignelater havaniensis

Bioluminescence is the emission of light by living organisms. About 20% of all bioluminescent species are terrestrial, the majority of which belong in the order Coleoptera (beetles). Within Coleoptera the family Elateridae (click beetles), contains ~ 150 bioluminescent species. In Elateridae, bioluminescence is expressed in two ways: first through two circular photic organs on the pronotum, commonly referred to as "headlights," and second through a plate-like section on the abdomen, which is obscured by cuticle segments. In the chemical reaction that fuels bioluminescence, the enzyme luciferin is oxidized into a cyclic peroxide. Due to the dependence on oxygen, photic organs must have a ready supply of the element. In beetles, oxygen is delivered directly to tissues through the tracheal system, an extensive network of tubes that branch throughout the body. The tracheal system is thus vital in light emission as it supplies the oxygen needed for the chemical reaction of bioluminescence. This project explores the interaction between the tracheal system and photic organs in bioluminescent Elateridae, specifically seeking to find any differences in tracheal structure in delivering oxygen to the two forms of photic organs. A micro-CT approach was conducted on the species Ignelater havaniensis (Laporte, 1840). Scans were analyzed using DragonFly 3D World Software and a 3D visualization of the tracheal system was painted to compare structural differences. In total, 3292 slices of the specimen were analyzed, depicting a higher density of tracheal structures near photic organs. Structures in each photic organ were relatively similar, with no striking differences.

Deru, Monica

University of Wyoming (UW)
Honors College Capstone

Mind Over Media: Learning About Media Literacy

Mind Over Media: Learning About Media Literacy explores what media literacy is and what it looks like in a rapidly evolving digital age. Too often, individuals struggle to distinguish between fact and opinion in the content they consume. Whether reading a newspaper, watching live news, engaging with academic articles online, or scrolling through social media platforms, understanding what is presented as factual information versus personal perspective is essential to becoming media literate and developing strong critical-thinking skills. While research and analytical skills are commonly cultivated throughout secondary education, many people do not realize these same skills can and should be applied to the media they encounter every day. As technological advancements continue to shape society and artificial intelligence becomes increasingly prominent, the ability to critically evaluate information is more important than ever. Media literacy is not just an academic skill; it is a necessary tool for navigating an ever-advancing society and thinking independently in a complex information landscape.

Durkee, Connor Alan

University of Wyoming (UW)
Honors College Capstone

Hybrid Storytelling: A Plot Without a Timeline

All semester, I have been adding one line to a play a day. Now, I am at the point were I have enough content to create my own one act play based on the daily entries I have been writing. However, there is a catch, when writing the play there were certain restrictions or "disruptions" in my process. Mainly, each entry is written out of sync, they are not in a specific chronological order. Much like puzzle pieces, I wanted to write a plot that can be configured in multiple orders or events, not just one. With my audience, I invite them to create their own order of events based on the lines I wrote. Likewise, I will be doing the same, as I will interpret what I think the order of events should be. While writing in this process, I thought this transparency allowed both my audience as well as myself to freely express and appreciate both process and product.

Edwards, Andrea

University of Wyoming (UW)
SURE program, School Of Computing

Sensitivity Analysis of Threshold Values in MNDWI and NDWI Using Pre-flood and Post-flood Landsat Images

Remote Sensing is an incredibly helpful tool for disaster response. In the case of flooding, remote sensing allows agencies like the Federal Emergency Management Agency (FEMA) to determine the extent of flooding, and thus concentrate their efforts in affected areas. Previous research has developed rapid flood-mapping (RFM) techniques to efficiently assess the extent of inundated areas. However, trained analysts are required to create the maps, each determining an optimal threshold value (OTV). This leads to variation in OTVs, impeding the speed of relief efforts. This project conducts a sensitivity analysis of TVs used in the RFM technique to determine a range of OTVs that will produce accurate maps. We created a series of maps at different TVs (ranging from 0% to 100%) in MNDWI and NDWI using a RFM technique, conducted an accuracy assessment, and analyzed the changes in accuracy across the TVs. Maps generated with MNDWI showed less sensitivity across a range of TVs than the maps generated with NDWI. This research will be useful to disaster response agencies by increasing the confidence of flood maps generated by volunteers within a range of suitable OTVs and speeding up disaster relief efforts.

Eigenberger, Holden

University of Wyoming (UW)
NASA Space Grant, Wyoming Research Scholars Program, Donald Adams Distinguished Undergraduate Researcher Fellowship

Vat Photopolymerization of Ultra-Soft Polymer Foams

We have developed a novel method that uses Vat Photopolymerization (VP) Additive Manufacturing to print 3D parts that are then converted to extremely soft foams through a post processing step. We first print parts from a hydrogel-based resin, dry them, re-swell them with a copper nitrate-based solution, and finally heat the parts. Heating the copper nitrate infused parts induces a chemical reaction that foams the printed material while also preserving the original 3D shape. We can tailor the resulting mechanical properties of the foam by controlling parameters such as the formulation of the copper nitrate-based solution and hydrogel resin, the temperature of the heating, and the duration of the heating. The extremely soft and flexible foams help expand the materials available for VP AM. We demonstrate the potential of this approach by utilizing the foam's soft mechanical properties and geometric freedom of AM to create effective impact dampeners.

Erickson, Ashlyn K

University of Wyoming (UW)
Honors College Capstone

EasyBake

The EasyBake mobile app is an innovative way to improve cooking for experts and beginners alike. EasyBake is designed to help smooth the cooking process and keep the user's device clean by giving clear audible directions and receiving voice commands from the user, allowing for hands-free interaction with the app. EasyBake was created with basic-level cooking in mind. Its primary goals are efficiency and convenience, aiding the user in the everyday task of meal preparation.

Fauber, Terrin

University of Wyoming (UW)
INBRE

Chronic Stress as a Catalyst for the Progression of Alzheimer's Disease

Compared to the general public, the U.S. military veteran population has a significantly higher risk of developing Alzheimer's disease (AD) and related dementia. However, the underlying biological mechanism is largely unclear. This study aims to determine how chronic stress influences the onset and disease progression of AD pathology. The chronic social defeat stress (CSDS) paradigm is a commonly used mouse model of chronic stress, and often triggers heterogeneous responses. Some mice display social avoidance (and are classified as susceptible), while others display normal sociability (resilient). In this study, a 10-day CSDS paradigm was applied to two different transgenic AD mouse models, 3xTg-AD (promotes both Aß and pTau pathologies) and 5xFAD (promotes rapid Aß accumulation), as well as their non-carrier littermates. After multiple behavioral assessments, including the pre-stress and post-CSDS behavioral tests, the mouse brains were harvested and immunostained to assess Aß pathology and neuroinflammatory markers (IBA1 and GFAP), in the amygdala, hippocampus, and prefrontal cortex. Our preliminary results revealed that all AD model mice were resilient to chronic stress and showed unchanged sociability, while non-carriers displayed both susceptible and resilient responses. Importantly, 3xTg-AD mice with CSDS exhibited early cognitive decline compared to non-stressed 3xTg mice. Additionally, immunostaining revealed excess intracellular Aß, as well as increased neuroinflammatory markers in the amygdala and hippocampus of 3xTg-AD mice with CSDS, compared to their age-matched and non-stressed controls. This study supports chronic stress as a potent risk factor for AD, associated with the accelerated progression of AD-relevant pathologies.

Flesvig, Abigail

University of Wyoming (UW)
INBRE

Evaluating a Role for Non-erythroid Hemoglobin in Female and Male Reproductive Tissues

Within the female and male reproductive systems, there is tight regulation on the amount of oxygen available during pregnancy and spermatogenesis, respectively. Erythroid hemoglobin is the main carrier of oxygen throughout the body and in different systems. Our lab has determined that there is another type of protein used to carry oxygen within the reproductive system, specifically to control oxygen concentrations and the metabolism of oxygen into reactive oxygen species (ROS) and reactive nitrogen species (RNS). Our hypothesis is that non-erythroid hemoglobin has important and required functions in female and male reproductive tissues. In the females, subfertility was observed in conditional knockout mice that did not have the beta subunits present. This type of hemoglobin is not found in blood cells and is therefore considered non-erythroid hemoglobin since it is localized to specific tissues. These tissues would be uterine cells for the females and the spermatogenic cells for the males. Conditional mutagenesis will be used to ablate the beta subunit genes from the germline of males to determine how the sperm are affected when there is no non-erythroid hemoglobin present. To confirm the beta subunits have been ablated from the germline in the males, our lab will conduct in situ hybridization to stain the cells that express hemoglobin beta in visual confirmation. These mice without the beta subunits will then be compared to the control mice for validation. Our lab has already confirmed, through a breeding trial done with the females, that uterine hemoglobin beta subunits are required for normal fertility and lifelong fecundity in the developing young mice. With the males, a similar breeding trial will also be conducted to determine how beta subunits affect the fertility and germline of the males. The males involved in this breeding trial will have the beta subunits conditionally ablated from sperm producing male germ cells. A histological evaluation will also be conducted from a control and hemoglobin beta conditional knockout mice to determine if non-erythroid hemoglobin is required for normal spermatogenesis and male fertility.

Forbis, Ethan

University of Wyoming (UW)
Honors College Capstone, INBRE

Refining Circadian Biomarkers: Core Temperature Logging as an Alternative to Exercise-Derived Metrics

Circadian rhythms regulate daily physiological and behavioral cycles. The suprachiasmatic nucleus (SCN) serves as the central circadian pacemaker, coordinating peripheral clocks and aligning processes such as hormone secretion, metabolism, and body temperature with environmental cues. Core body temperature (CBT) is a reliable marker of circadian rhythmicity, maintaining an approximately 24-hour cycle even without external input. Voluntary running wheel (RW) activity is also commonly used to assess circadian rhythms in rodents due to their nocturnal behavior. Exercise can function as a non-photic zeitgeber capable of shifting circadian phase.This study evaluated circadian rhythmicity using CBT and RW activity while introducing scheduled treadmill (TM) exercise as an additional zeitgeber. Male C57BL/6 mice were assigned to four groups (n = 5/group): control, RW, TM, or RW+TM. Mice were maintained on a 12:12 light–dark cycle. CBT was continuously recorded using implanted Star-Oddi data loggers, and RW activity was measured for two weeks in RW and RW+TM groups. TM exercise occurred at ZT12 (dark phase onset) for 40 minutes at ~60% intensity. Data were analyzed using ClockLab (Actimetrics) to generate actograms and periodograms, and one-way ANOVA was used for comparisons.No significant differences were found between groups for CBT period ($p = 0.8768$), CBT amplitude ($p = 0.5883$), RW period ($p = 0.0939$), RW amplitude ($p = 0.2713$), or total RW distance ($p = 0.4838$).These findings support CBT and RW activity as markers of circadian rhythmicity and highlight exercise as a potential zeitgeber, providing a basis for future studies in constant darkness and aging models.

Garrison, Kane Raye

University of Wyoming (UW)
Independent study after Performance Art History Seminar

The Transcendence of Performance Art, an Introspective Analysis of Cassils

Popularized by artists in the 1960s and 1970s amid civil rights, feminist, and anti-war movements, performance art has long relied on endurance, vulnerability, and physical risk to make the body a site of political meaning. Cassils, a contemporary transgender visual and performance artist, uses the visceral language of the body to confront systems of violence, visibility, and power, positioning their body as both a site of resistance and resilience. In Becoming an Image (2012) and its related works, Monument Push (2017) and Resilience of the 20% (2017), Cassils extends the lineage of performance art as a mode of protest and transformation of both the art realm and the political world established by artists such as Marina Abramović, Ron Athey, and Tehching Hsieh. Abramović's explorations of endurance and audience complicity, Hsieh's durational performances that expose the constraints of time and labor, and Athey's radical use of pain and queer ritual to confront taboo all serve as historical frameworks through which Cassils' work can be understood. By reactivating and transforming these strategies, Cassils situates their practice within a tradition of embodied activism that compels audiences to confront the ongoing social and symbolic violence enacted upon transgender lives. Through absence, exertion, and distortion, Becoming an Image, Monument Push, and Resilience of the 20% destabilize how trans bodies are framed, consumed, and erased within visual culture. In doing so, Cassils expands a lineage of performance that uses the trans body not as spectacle, but as a means of survival, solidarity, and world-building.

Georges, Nick

Central Wyoming College (CWC)
INBRE, Advanced Technological Education Program

From Blue to Black: How Ocean Exploration Is Preparing Humanity for Space

To prepare for orbit, we begin underwater. This presentation argues that ocean exploration is not merely analogous to space exploration—it is already functioning as its most practical and operational training ground. Both environments impose the same fundamental constraint: survival is a systems problem. Air, pressure, power, heat, waste, and the absence of immediate rescue define mission success or failure.Through examples including neutral buoyancy training, subsea habitats, and tele-operated robotics, this talk demonstrates how ocean-based systems are actively shaping the technologies, protocols, and human factors required for sustained spaceflight. The ocean provides a uniquely accessible environment where failure modes can be tested, refined, and understood under real physical constraints.However, the analogy has limits. Differences in radiation, vacuum exposure, and orbital dynamics require careful separation between what transfers directly and what does not. By identifying both the overlaps and the boundaries, we gain a clearer framework for accelerating progress in space systems design.Ultimately, this presentation reframes exploration as a continuum rather than a sequence. The path to living and working in space does not begin at launch—it begins here, in the depths of our own planet.

Giraldo, Aidan

University of Wyoming (UW)
Computer Science Senior Design (CS 4955)

Third Eye: Momentum Platformer

Run and slide to soar off wavy floors and traverse through a psychedelic environment in Third Eye. Third Eye aims to create a fun-to-learn momentum system as the base for fast and creative level traversal in this momentum platformer.

Glennie, Sophia

University of Wyoming (UW)
INBRE

The Role of Visual Stimulation on Axon Outgrowth Temporal Dynamics

How neurons self-assemble into circuits is a fundamental question in the field of developmental neuroscience. We study this question in the developing visual system of the Xenopus tadpole. The major component of the amphibian visual system is the retinotectal projection, the synaptic connection between the axons of retinal ganglion cells (RGCs) of the eye and postsynaptic tectal neurons of the optic tectum. It is well established that circuit formation consists of these two phases– the guidance of axons via molecular cues followed by activity-dependent refinement of the synaptic connections. We additionally now know that tectal neurons of the optic tectum display spontaneous (not driven by visual stimuli) activity before the RGC axons have reached them. This gives rise to our hypothesis that spontaneous activity in the optic tectum – and not solely molecular cues – may play a role in guiding RGC axons from the eye to the optic tectum. We test this hypothesis by exposing Xenopus tadpole embryos to the sodium channel blocker MS-222 to block neural activity and use lipophilic diI to label RGC axons. We observed significant pathfinding abnormalities, including "rogue" axons and growth cones that failed to terminate within the optic tectum or tegmentum- extending beyond their normal targets and indicating disrupted termination and target recognition. These initial findings support a role for activity-dependent signaling in early axon guidance and targeting. Reduced activity may impair growth cone responsiveness or the proper release of guidance cues. Future aims include determining specific mechanisms by which activity regulates RGC axon guidance.

Greene, Brody

University of Wyoming (UW)
Honors College Capstone

Japanese Martial Arts as a Practice for Holistic Well-Being

The Capstone project investigates Japanese martial arts as holistic practices that cultivate physical, mental, and social well-being. Drawing on qualitative interviews with martial arts practitioners, the study explores how sustained training influences strength, coordination, stress regulation, emotional control, focus, and self-discipline. Rather than treating martial arts solely as combat systems or competitive sports, the project frames them as embodied disciplines that integrate mind and body through structured practice, ritual, and community participation. Each thematic section of the project presents a discussion-based analysis: first summarizing interview findings on topics such as physical health, stress reduction, cognitive focus, and social belonging, then situating those findings within peer-reviewed scholarship from sports medicine, psychology, sociology, and Japanese philosophical traditions. Concepts such as mind–body integration and disciplined repetition are examined alongside practitioner testimony to assess how lived experience aligns with established research. By combining experiential data with academic literature, this project argues that Japanese martial arts function as comprehensive well-being systems rather than isolated fitness activities. The study contributes to interdisciplinary conversations about alternative approaches to health and demonstrates how embodied practice can serve as both a research method and a pathway to personal development.

Hall, Constance Nina-Gloria

University of Wyoming (UW)
INBRE

Effect of Lowering Core Body Temperature on Brain Structure and Function: Using Natural Torpor to Model Therapeutic Hypothermia

This study aims to determine that variation in torpor, periods of low body temperature used in hibernation, influences brain structure and function in chipmunks. The effect of which can be measured by studying overwinter torpor pattern on hippocampal cell density and overall changes in brain structure. This effect will also be seen in changes to behavior like learning and memory. By first examining chipmunk brains before torpor in comparison to the structure of the brain after torpor, we can determine the influence of low temperatures on structure. In support of this, pre-collected data shows cell loss in specific subregions of the hippocampus. To understand torpor's influence on behavior, we will run the chipmunks through spatial learning tasks before and after overwinter torpor has occurred, comparing the two scores for every subject. In regard to human health, studying the influence of low body temperature on chipmunks can serve as a model for understanding how therapeutic hypothermia can influence cognition in humans. The importance of which can be applied to the treatment of stroke and cardiac arrest.

Haufler, Hailey

University of Wyoming (UW)
Civil Engineering Senior Design (CE4900)

Timberline Business Park Development

This presentation will outline the civil engineering design of Timberline Business Park, a proposed commercial and industrial development located south of Laramie, Wyoming, along U.S. Highway 287. The project examines how a complex site can be engineered to meet regulatory approval requirements while balancing safe roadway access, efficient site circulation, and effective grading and drainage under local environmental and hydrologic constraints. The 105-acre site, currently undeveloped, presents real-world challenges related to stormwater management, transportation connectivity, soil conditions, and constructability. The presentation will describe a multidisciplinary design approach that integrates transportation, hydraulic, geotechnical, and structural engineering. Key components include improvements to Huron Street and its intersection with U.S. Highway 287, design of Cherrywood Loop and internal circulation, parking layout, and pavement design. Hydrologic analysis using the rational method and 10- and 100-year design storms informs the design of swales, culverts, and a detention basin to maintain pre-development discharge rates and prevent downstream impacts. Grading strategies are developed to ensure positive drainage while accommodating roadway profiles and building pad elevations. Geotechnical findings guide earthwork recommendations, subgrade preparation, and foundation design for a two-story office and maintenance facility.

Design alternatives are evaluated for regulatory compliance, safety, functionality, and constructability, with iterative refinements guided by faculty mentor feedback. The final outcome is a comprehensive site design package suitable for agency review. This project demonstrates the application of civil engineering principles to a realistic land development scenario and highlights the importance of interdisciplinary coordination in delivering safe, functional, and approvable infrastructure.

Herceg, Ava

Laramie County Community College (LCCC)
INBRE

Clicks in Cliques: Maximum Likelihood Insights into Elateroid Paraphyly and Trait Evolution

Elateroidea are a superfamily within the class Coleoptera (beetles) and consist of 31,500 current and extinct species. While Elateroidea itself is constantly recovered as monophyletic, the relationships of the families within the group have a troubled taxonomic history. For example, members of the Lampyridae, Phengodidae, Rhagophthalmidae, and Sinopyrophoridae are sometimes recovered within the Elateridae , and sometimes in their own clade, depending on the taxa and data (e.g. molecules vs morphology) included in the analysis. All of these families share characteristics, including bioluminescence and female paedomorphosis, so the classification of this group is puzzling and widely debated. Current classifications are unreliable, especially when diverse families, such as Lampyridae, are represented poorly.For this study, a maximum likelihood phylogenetic reconstruction for Elateroidea was completed using IQ-TREE. Within the taxon sampling, a quarter of the specimens were species belonging to the Lampyridae family to ensure a more accurate representation of the family compared to previous studies. This study was unable to support the monophyly of Elateridae as the family is currently classified, but the monophyly of Lampyridae, Phengodidae, Rhagophthalmidae, and Sinopyrophoridae as independent families is further supported. Further, this study explored the divergence and convergence of bioluminescence and paedomorphosis across Elateroidea. The non-bioluminescence and non-paedomorphy of the Elateroidea common ancestor are highly supported. In turn, this study supports the multiple origins of both bioluminescence and paedomorphisis within the superfamily.

Hernandez, Gustavo Adolfo

University of Wyoming (UW)
NASA Space Grant, Wyoming Research Scholars Program

Tik-Tock, Exercise O'clock: Investigating the Role of Exercise in Restoring SCN Function and Circadian Health

The circadian clock regulates essential biological and physiological processes by generating endogenous ~24-hour rhythms that coordinate behavior and metabolism. The suprachiasmatic nucleus (SCN) of the hypothalamus serves as the master clock, synchronizing peripheral clocks across the body. A key pathway from neuropeptide Y (NPY)-expressing neurons in the intergeniculate leaflet to the SCN (IGL^NPY→SCN) helps drive circadian phase shifting and entrainment to behavioral cues such as voluntary wheel running (VWR), a well-established rodent model of exercise. Aging-related circadian disruption is strongly linked to metabolic, cardiovascular, and neurodegenerative disease, yet the neural mechanisms by which exercise supports circadian function remain unclear. This study tested whether late-life exercise enhances SCN activity and circadian-related neural signaling in very aged male mice. Young (~4 months; n=5) and aged (~22 months; n=9) mice received 24-hour access to a running wheel for four weeks, while age-matched controls remained sedentary (young n=5; aged n=8). Wheel-running activity was recorded using Columbus Instruments running wheels. Immunohistochemistry assessed neural activation in circadian-related SCN pathways, including NPY projections and c-FOS expression. Within-group exercise versus control differences were analyzed by ANOVA. Preliminary findings show that greater voluntary exercise is linked to stronger circadian entrainment and higher c-FOS expression, consistent with enhanced SCN activation. Although aged mice showed reduced c-FOS and fewer NPY appositions than young mice, late-life wheel running partially restored SCN neuronal activation. Ongoing analyses will further define how exercise preserves circadian function during aging.

Huffman, Lancelot

University of Wyoming (UW)
Honors College Capstone, Mechanical Engineering Senior Design (ME 4070)

2026-2027 Micro-g NExT Challenge #2 - NASA Passive Capture Tool Dock

The Micro-g Neutral Buoyancy Experiment Design Teams (Micro-g NExT) has allowed the Mechanical and Energy Systems Engineering Department of the University of Wyoming to provide an undergraduate team of mechanical engineers to design, build, and test a Passive Capture Tool Dock to be used by astronauts on the International Space Station (ISS). The project aims to develop a docking system that enables astronauts to efficiently store and retrieve extravehicular activity (EVA) tools with one hand while wearing bulky, pressurized suits that restrict mobility, flexibility, and line of sight. This aims to be a major upgrade to the current docking systems, in which astronauts are often required to use both hands in positions that made such movement difficult and, over time, incredibly exhausting. This was done via an assembly with two major interfaces, focused on providing a single-fault tolerant release system with multiple safeguards in order to prevent accidental release and encourage the use of the tool itself in order to engage or disengage the device. Docking a tool requires only a smooth, linear movement while release requires a simple push-and-twist movement. The final product delivers a lightweight, reliable, and ergonomically optimized docking mechanism that enhances operational efficiency during extravehicular activities.

Hutchins, Karley

University of Wyoming (UW)
First-Gen Capstone Research Project

Obeah and Anglican Missionaries in Barbados

Obeah is a complicated and often overlooked aspect of the religious landscape in Barbados. African diasporic religion was vital to enslaved individuals living in Barbados and the broader English colonies. It is important to look at how Obeah was practiced in Barbados and how Anglican missionaries understood Obeah. Sources illustrate how Anglican missionaries inconsistently acknowledged the reality of power gained through traditional African religious practice, while also viewing it as a "fake" religion. My research looks at how religion moves through space and time, how individuals conceive their existence through religion, and how that is impactful today. I understand that the religious landscape of the Caribbean is complicated and includes many different traditions. In my research, I am not trying to lessen the complicated nature of religion in the Caribbean but instead look specifically at two aspects of the religious landscape that impacted many individuals. It is important to study African diasporic religion in Barbados because of the large number of enslaved Africans who were forcefully relocated to Barbados. Obeah is a symbol of resistance to colonialism because of how African diasporic traditions persisted through space and time. In addition to being understood as a symbol of resistance, Obeah is also understood to be a way that enslaved individuals-maintained continuity with their past and created new kinship networks. Highlighting the religious landscape of Barbados during the seventeenth and eighteenth centuries is key to analyzing how individuals, both the English and enslaved people, understood their existence during times of extreme change.

Hutchison, Alayna

University of Wyoming (UW)
Honors College Capstone, International Studies Capstone

From Norm to Action: Bridging the Human Security Gap in the R2P

This project examines the effectiveness of the Responsibility to Protect (R2P) as a mechanism for advancing human security within the United Nations system. Developed in response to the failures surrounding the Rwandan Genocide, R2P redefined sovereignty as a responsibility and established a framework for preventing mass atrocity crimes. Despite its strong normative foundation, its implementation has been inconsistent, raising critical questions about its reliability as a tool for civilian protection. The central research questions ask why does R2P produce uneven human security outcomes, and under what conditions does it enhance or undermine civilian protection? Using a comparative case study approach, this project analyzes three key cases, Darfur, Libya, and Syria, to identify patterns in implementation and outcomes. These cases illustrate how political selectivity, institutional constrains, and sovereignty-based resistance shape whether and how R2P is operationalized. The findings demonstrate that R2P functions less as a consistent protection mechanism and more as a conditional framework dependent on geopolitical alignment within the United Nations Security Council. This creates a persistent gap between the doctrine's human security objectives and its real-world application. Therefore, without structural reforms, especially within the decision-making processes, mandate design, and accountability mechanisms, R2P will remain a symbolic norm rather than an effective operational system.

Killmer, Samantha

University of Wyoming (UW)
Wyoming Research Scholars Program

Investigating the efficacy & accuracy of AI software in determining bat use & activity at cave roosts in Wyoming

Bats are small, nocturnal mammals of which there are 20 species known to occupy Wyoming. While some species migrate seasonally, many species rely on subterranean environments as their primary roosting locations. Use of sites, specifically caves and mines, can be divided into two categories: maternity roosts (i.e., summer) and hibernation (i.e., winter) roosts. Human activity greatly affects the presence and condition of subterranean environments. To prevent disturbance as well as protect visitors, cave gates have become a common solution. Cave gates are metal gates of various configurations used to block the entrance of a cave while allowing for the passage of bats and other small vertebrates. However, the effect of how cave gating may influence bat activity within caves in Wyoming is not well understood. To address this concern, camera traps were deployed at four cave sites in Wyoming. One major difficulty associated with this method is the need to manually quantify a large quantity of near-infrared footage multiple times. To assist in managing and analyzing the camera trap data, the AI modeling architectures 'YOLO' and 'Faster R-CNN' have been trained and evaluated for efficiency and accuracy in identifying and reporting bat presence and behavior around cave gates.

Kinney, Jordan

University of Wyoming (UW)
Wyoming Research Scholars Program

Mycoplasma in dogs

Mycoplasmas are a large family of gram-negative bacteria that lack a cell wall. While some Mycoplasma species are commensal, others are pathogenic and can contribute to conditions such as kennel cough, an infectious canine respiratory disease. Mycoplasma cynos, M. canis, and M. edwardii are known to be linked to respiratory illness in dogs, either independently or in conjunction with other pathogens. Although Mycoplasmas are often found in the upper respiratory tract of healthy dogs, they can cause more severe infections, including pneumonia, when they spread to the lower respiratory tract. This study aims to compare mycoplasma isolates from symptomatic dogs with those from healthy controls. In 2021-2022, n=20 Mycoplasma species were isolated from dogs with clinical signs of kennel cough at the bacteriology section of the Wyoming State Veterinary Laboratory, but additional isolates from healthy dogs are needed for a meaningful comparison. We will collect nasal swabs from healthy dogs in Laramie to compare with 20 isolates from symptomatic dogs already obtained. Whole Genome Sequencing (WGS) will be used to analyze genomic differences between isolates, and phylogenetic relationship. This analysis will help identify specific species and strain-specific variations associated with disease symptoms. This study aims to identify potential genetic factors that contribute to the pathogenicity of mycoplasmas in canine respiratory disease.

LaRosa, Skyler

University of Wyoming (UW)
Wyoming Research Scholars Program

Age and Growth Dynamics of White Suckers in the Upper North Platte Reservoirs, WY

Intermediate fish species, or species that occupy the core of food webs linking lower trophic levels to apex predators and vice versa, are often understudied despite often dominating consumer biomass and playing a crucial role in aquatic food web dynamics. Recruitment, growth, and mortality rates are key demographics that define population dynamics of fish species and can be assessed through age and growth analyses to determine frequency and magnitude of reproduction, growth rates, age of maturity, and population age and size structure. To quantify these metrics for white sucker (Catostomus commersonii), we aged 75 individuals using otoliths from three distinct populations in Wyoming, USA reservoirs. These reservoirs span a gradient of environmental conditions, food web structure, and management strategies, allowing us to investigate the role of both biotic and abiotic factors on the growth of white suckers. We used stable isotope analysis to quantify food web interactions between white sucker and walleye (Sander vitreus) and compared population structure between the two species to identify biotic drivers of white sucker age, growth, and size structure. We also modeled annual growth of white sucker against air temperature and water level to identify abiotic drivers of growth. By understanding population dynamics of these species across multiple ecosystems, fisheries managers can identify how populations, communities, and food webs may be altered by changing environmental conditions, shifts in apex predator populations, and management actions.

LaRue, Landen

University of Wyoming (UW)
Summer research funding from the Department of mathematics.

Families of Irrational Pseudo Integral Triangles

In many scientific and industrial applications, the feasible solutions to an optimization problem are represented in n-dimensional space by points with integer coordinates in a convex polyhedral region. To understand such a set of solutions, Ehrhart theory studies the geometry and combinatorics of the set of integer lattice points in a convex polyhedron, especially how this set changes as the data defining the polyhedron varies. In the context of Ehrhart theory, integral polyhedra (whose vertices have integer coordinates) are especially nicely behaved. However, this nice behavior extends beyond integral polyhedra to the so-called pseudo-integral polyhedra, or PIPs. Despite their nice Ehrhart theoretic properties, PIPs can have non-integral and even irrational coordinates. We will discuss triangular PIPs that have exactly one interior lattice point, expanding recent work by McAllister and Williford. In this case, it is known that there may be at most nine integer lattice points on the boundary and never seven. This number theoretic fact can be combined with a recurrence relation to produce new sequences of rational PIPs. It can be shown that this family of rational PIPS converges to irrational PIPS. Finally, we investigate concrete examples of these PIPs and showcase unexpected behavior where in the limiting PIP the interior lattice point lies on the boundary.

Lass, Luke

University of Wyoming (UW)
Honors College Capstone

Fear, Loss, and Other Conditions

This Honors Capstone Project is a collection of short stories. This book of fictional short stories is set largely in a context of science fiction and fantasy, with elements of horror, psychology, and philosophy sprinkled throughout. The purpose of the book is to entertain with short fiction stories that explore deep themes of fear, loss, hope, despair, anxiety, regret, remorse, and acceptance. Many of the stories focus on the hidden things left unsaid between people, the anxiety and fear of losing someone close, and dealing with the short time each of us has to make a life for ourselves and live it well. Though very short, the stories succinctly express deep emotional ideas and themes within interesting frameworks and settings, from post-apocalyptic wastelands, to alien worlds, and a simple office space.

Lockwood, Thomas D

University of Wyoming (UW)
INBRE

How the Brain Ages: Spatially Mapped Gene Expression Changes in a Mouse Model

Aging is a natural biological process characterized by progressive physical, cognitive, and physiological decline. Although life expectancy has increased substantially via medical advancements, chronic noncommunicable diseases, such as Alzheimer's disease, are becoming a growing burden in older populations. To help address this challenge, transcriptomics offers a systems level snapshot of the proteome's functional state, revealing key cellular and cell type specific drivers of natural aging. Spatial gene expression profiling, using high resolution Visium HD technology, enables mapping of these changes within native tissue architecture.Comparison of 18 month versus 1 month old mouse hippocampal formation revealed global upregulation of genes across CA1,CA2, CA3, dentate gyrus, and subiculum subregions. Differential gene expression analysis volcano plots show a pronounced shift towards upregulated genes (log2FC > 0) in the 18 month hippocampi compared to 1 month old mice, with a subset of genes reaching statistical significance (p-adjusted < 0.05).Gene ontology analyses reveal these upregulated genes are strongly enriched for (i) biological processes involved in regulation of synapse organization, synapse structure, and synapse activity, (ii) molecular functions involved with actin binding, calmodulin binding, and phosphatase binding, and (iii) cellular components such as presynaptic, synaptic, postsynaptic, and axonal structures. These alterations suggest enhanced synaptic remodeling and cytoskeletal dynamics as enhanced features of hippocampal aging, with potential impact on neural plasticity and cognitive resilience.Together, this technique uncovers key molecular drivers of brain aging and reveals key mechanisms underlying hippocampal plasticity and cognitive function, providing a foundation for therapeutic strategies targeting age related neurodegenerative diseases.

Lueloff, DJ

University of Wyoming (UW)
McNair Scholars Program, Honors College Capstone

Bottlenecks Shaped Us: Neanderthals and Modern Human Population Structures

Neanderthals and Anatomically Modern Humans (AMH) have introgressed or mated since about 250 thousand years ago (kya), all the way up to the Neanderthal extinction around 40kya. In that time these populations were plagued by evolutionary forces such as genetic bottlenecks. Genetic bottlenecks, a sharp reduction in the size of a population typically resulting in lower genetic diversity, are a common evolutionary force that have affected the evolutionary history of both AMH and Neanderthals as well as their population structures. This study aimed to evaluate the impact of incorporating bottlenecks in population structure simulations and research. We ran genetic simulations using msprime, which stores hypothetical genetic sequences, with different parameters including bottlenecks to gage their impact on population structure. Using principal coordinate analysis, we evaluated genetic separation and diversity of the populations analyzed. Bottlenecks are crucial in creating accurate population structures amongst modern populations. In this study, the bottlenecks we applied reduced genetic diversity amongst the Eurasian population to accurately represent what we expect to see from Eurasian populations today. Results from this research show that simulating bottlenecks and other evolutionary forces can greatly improve our understanding of ourselves, where we come from, and where we fit amongst the world.

Lynde, Lauren

University of Wyoming (UW)
Honors College Capstone

Evaluating Narrative-Based Education for Improving Food Allergy Literacy in Families

Food allergies represent a significant pediatric health challenge, often accompanied by anxiety due to the complex and "invisible" nature of the body's immune response. This Honors Capstone project investigates whether narrative-based learning can effectively demystify the biological mechanisms of an allergic reaction for children and their caregivers. I authored and self-published an original children's book that personifies immune cells as "helpers" to provide an age-appropriate explanation of the physiological changes that occur during an allergic event. The project evaluates the book's efficacy through community-based readings across various Wyoming towns. Following each reading, parents and caregivers completed a mixed-methods survey designed to measure the child's ability to describe an allergic reaction, the parent's own understanding of the biological mechanism, and their overall confidence in discussing health topics with their child. This presentation will analyze Likert-scale data and qualitative feedback to determine if a storybook format increases engagement and retention of scientific concepts. By translating complex immunology into a relatable narrative, this research aims to provide families with a shared vocabulary that reduces fear and empowers proactive health management.

Maez, Sabien

University of Wyoming (UW)
Honors College Capstone

Stories from the Corners of Nowhere

This project set out to illustrate conversation on stories and topics about Wyoming in an accessible podcast format. For being 9th largest state, not much about it gets out to the rest of the world on account of a small population, lack of industry, and western-cultural stereotypes. While its true that a lot of Wyoming is snow, sagebrush, and cowboys, the stories reach much further than surface level observations. A range of topics about issues and culture in Wyoming are investigated and discussed with a variety of guests to gain perspective of these stories. The goal is to bring perspective and interest on the Cowboy state to the world audience.

Mahoney, Jasmin

University of Wyoming (UW)
NASA Space Grant, INBRE, Honors College Capstone

From Hallucinations to Therapeutics: Investigating the Molecular Basis of Psychedelic Action on Sensory Processing

The powerful effects of psychedelics have long been recognized and used by humans for millennia in various cultural and ritual practices. Modern science shows the potential therapeutic benefits of psychedelics include their ability to treat neurobiological disorders through disrupting established neural connections and promoting new ones. Unfortunately, the hallucinogenic nature of psychedelics is a barrier to the clinical use of the drugs; therefore, the key to harnessing psychedelics is the development of non-hallucinogenic analogs. This requires a greater understanding of the molecular pathways that psychedelics activate. The current behavioral model for hallucinogenic-like effects in mice is the head twitch response; this model is limited by being an imperfect predictor of hallucinations in humans and not resembling human hallucinations. These problems make it necessary to find a new way to study hallucinations that is more readily connected to what humans experience, such as synesthesia, wherein one sense gives the impression of another. This project explores how psychedelics, specifically psilocybin and LSD, affect sensory processing in the brain and whether they induce synesthesia-like responses in mice. Using TRAP2 mice crossed with Ai14 reporter mice we mapped sensory cortex activation in response to sound, light, and odor to assess how psychedelic drugs alter neuronal activity across sensory regions. Using this novel approach, we hope to provide an orthogonal method for investigating psychedelic-induced hallucinations, improving our ability to uncover the molecular pathways involved in sensory perception changes, and identifying mechanisms that could support the development of safer, non-hallucinogenic psychedelic treatments.

Martin, Faith

University of Wyoming (UW)
Senior capstone research project for BFA in theatre and dance concentration dance science.

Lower Body Weight Training to Improve Endurance and Strength in Collegiate Ballet Dancers.

Grande allegro consists of large explosive jumping movements that are usually performed at the end of a ballet class, approximately lasting 10-15 minutes. In previous research conducted on cross-training in dancers there has been shown a positive correlation between using weights and/or plyometric training as a methods to increase jump height, endurance, and strength. In this study, colligate ballet dancers were asked to perform a two grande allegro phrases and fill out a questionnaire following performing the phrases in initial data collection. The intervention included two sessions per week for 6-weeks. The first session was a resistance training session, using the Keiser leg press, leg curl, and leg extension machine to train the muscles of the lower body with the intention to increase lower extremity strength. The second session of the week included a plyometric session that focused on power and quick rebound off the ground. Participants than performed the same grande allegro phrases and filled out the questionnaire concluded the intervention. Questionnaires pre and post data collection were compared to see if there was a change in how the dancers felt performing the grande allegro phrase. Data collection sessions were videoed to compare if what participants were answering in their questionnaires lined up with their appearance int the video

McClung, Carly Jane

University of Wyoming (UW)
Honors College Capstone

"Conservation Through Culture: How Human Values Guide Management of Native and Exotic Species"

Conservation strategies across the world are influenced by cultural values, beliefs, and social priorities. This paper explores how varying cultural perspectives shape the management of native wildlife compared to exotic species, highlighting the role of human values in defining what is considered "worth protecting." Native species often carry symbolic, ecological, and historical importance within a region's identity, leading to strong public and governmental support for their preservation. In contrast, exotic species, those introduced intentionally or accidentally, are frequently perceived as invasive or unnatural, resulting in policies that prioritize eradication or strict control instead of coexistence. However, the distinction between "native" and "exotic" is not always clear and often reflects cultural backgrounds rather than ecological facts. In some societies, cultural respect (or disrespect) for native species, such as animals with spiritual meaning or keystone species, drives community-based conservation efforts rooted in tradition or a lack of conservation efforts. However, in other contexts, exotic species that hold cultural, economic, or aesthetic value receive protection and admiration despite their non-native status. By comparing these dynamics, this research highlights how conservation is as much a social process as it is a biological one. Understanding the cultural dimensions of conservation allows for more inclusive and effective management strategies. Recognizing that human perceptions of nature are guided by values, beliefs, and past experiences, it challenges scientific approaches and demands culturally sensitive conservation methods. These methods can combine ecological goals with human interests, encouraging coexistence and sustainability across both native and exotic species habitats.

McGuire, Aidan S

University of Wyoming (UW)
Honors College Capstone

Against Empathy: How Fascism Wields our Conscience Against Us

This project examines the relationship between empathy and resistance to fascist ideology, challenging the common assumption that cultivating empathy is the most effective antidote to authoritarian politics. While empathy is frequently promoted in civic education and anti-extremism discourse as a means of fostering tolerance and reducing intergroup hostility, recent theoretical and empirical work suggests that empathic concern can be selective, exclusionary, and susceptible to political manipulation. Fascist movements have historically mobilized emotionally charged narratives that encourage deep empathic identification within narrowly defined national, ethnic, or cultural communities while legitimizing hostility toward perceived outsiders.Building on this critique, the study investigates whether alternative moral frameweorks, such as rational compassion, provide more robust protection against fascist attitudes and movements. Using a mixed-methods approach combining survey experiments, discourse analysis, and comparative historical case studies, the project evaluates how different psychological and normative frameworks shape political judgment, group boundaries, and tolerance for authoritarian leadership. By reassessing the political function of empathy and identifying more durable foundations for democratic resilience, the research aims to contribute to debates in political theory, social psychology, and democratic studies about how societies can most effectively resist the appeal and consolidation of fascism.

Mitchell, Samuel

University of Wyoming (UW)
Honors College Capstone, NASA Space Grant, Wyoming Research Scholars Program

Acoustic characterization of vibration damping of particle dampers

Particle damping is a promising vibration-damping technology that has the potential to enable vibration damping in high-performance applications such as aerospace, robotics, and precision manufacturing. Particle dampers (PDs) consist of a cavity filled with particles that dissipate vibrational energy through particle-particle and particle-wall collisions, as well as friction. However, designing PDs is challenging because particle damping is a highly nonlinear phenomenon, and the unpredictable nature of particle collisions makes it difficult to characterize their vibration-damping capability. The lack of robust, physics-based design tools has led to the significant underutilization of this promising vibration-damping technology. This presentation addresses this challenge by developing an experimental design methodology that leverages the high-fidelity acoustic signature of particle collisions within a PD to assess its vibration-damping performance. We hypothesize that the characteristics of the rattling sound emitted by a PD can accurately capture the vibration-damping effects of the collisions and friction occurring inside the damper. To test this hypothesis, a PD cavity is excited using a chirp signal, causing the steel particles inside to move and generate a sound. The vibration-damping capability of the PD is then evaluated by measuring the resonant frequencies of a cantilevered aluminum beam with and without the PD attached. This testing procedure is applied to nine different PD configurations, varying particle sizes and infill densities. The experimental results presented in this presentation provide evidence of a strong correlation between acoustic characteristics and vibration-damping. This simplified design methodology will enable application of PDs as vibration-damping treatments for structures in high-performance applications.

Mohr, Matalin

University of Wyoming (UW)
Honors College Capstone

Crying Into Cake Batter: An Exploration of Connection and Rejection Through Food

I am an introvert. I've struggled talking to people, and making friendships. But one thing I can do is cook. I can bring someone a batch of cookies - that's easier than talking to people sometimes. My relationship with food has become intertwined with my relationship to people. In this project, I explore how sharing food affects interpersonal relationships from adolescence to adulthood. I do this through a cookbook, reflecting on meals I associate with certain memories, both good and bad.

Moseley, Magdalena

University of Wyoming (UW)
Honors College Capstone

The Scraps to Soil Initiative: A Composting Program

Drawing on my experience as an exchange student at the University of South Australia, this project seeks to implement a composting protocol within the HNF food labs. The goal of this project, deemed "The Scraps to Soil Initiative," is to establish a protocol and policy where all food waste generated during food labs is disposed of in an indoor composting bin rather than the regular bin. I have been working closely with Jaden Tatum, who is in charge of the food labs. As the person who will be largely overseeing this program once I have graduated, a main priority has been to ensure that the composter and the adjacent protocol are actively chosen to work seamlessly into Jaden's labs and any future labs that take place. Additionally, my second mentor, Richard Woodward, has been an incredible resource as he is the faculty leader for ACRES Student Farm, an official partner of the project. Richard is also a composting expert, and his oversight in choosing a composting machine has been invaluable. With the help of Jaden and Richard, we have created a preliminary protocol. The compost will be picked up approximately every other month and transportation will include scooping out the compost into easily transportable garbage bins. These bins can then be transported by members of the ACRES Farm team to be used as compost at the farm. This policy not only reduces the massive amounts of food waste generated in our labs each week but also benefits ACRES.

North, Kyle

University of Wyoming (UW)
INBRE

Preventing Solid State Crystallization of Indomethacin

In the pharmaceutical industry, many amorphous drugs offer advantages in solubility and bodily absorption compared to crystalline drugs. However, drugs in the amorphous state can undergo solid-state crystallization (the transition of an amorphous solid to a crystalline solid) resulting in a loss of solubility and efficacy. Knowing the threshold of solid-state crystallization is crucial for optimizing drug formulations and storage conditions to avoid crystallization. This process has been thoroughly researched, but little is known about how protective organic molecules affect solid-state crystallization. To research the effects of protective molecules on solid-state crystallization, I use differential scanning calorimetry (DSC) to measure the percent crystallinity of indomethacin, an amorphous pharmaceutical susceptible to solid-state crystallization. Using indomethacin, my goal is to determine if added organic protective molecules decrease the speed and extent of solid-state crystallization. The results of these experiments provide insights into whether protective molecules influence the solid-state crystallization of indomethacin, and can address concerns about pharmaceutical degradation during long-term storage.

Oetken, Emma

University of Wyoming (UW)
SURE program, School Of Computing

Comparative Analysis of Pronghorn Return Movements and Escape Movements during the Extreme Winter of 2022-2023 in Wyoming's Red Desert

Wyoming is a stronghold for pronghorn (Antilocapra americana) populations across the species range, providing economic and cultural value to communities across Wyoming. Increasing climate invariability, including extreme weather events that threaten survival (e.g., wildfires, extreme snowfall), can force animals to move into unfamiliar habitats. Furthermore, extreme events serve as a type of natural experiment, that displaces site-faithful individuals into novel areas. These types of displacement experiments are commonly used to study navigation in some model species but are typically infeasible in large terrestrial mammals due to ethical and logistical constraints. Leveraging a case study of 16 GPS-collared pronghorn that experienced a once-in-two-decade extreme winter with deep and long-lasting snow, we investigated the navigational capacity of pronghorn displaced by this extreme event. Specifically, we compared their lengthy escape journeys into novel areas during the extreme winter of 2022-2023, and their return journeys back to familiar habitats in Wyoming's Red Desert. All collared pronghorn that survived the harsh winter returned to their familiar habitats the following spring. Return movements were more direct (paired Wilcoxon signed-rank test, p-value=0.001), quicker (p-value=0.002) and resulted in less human-infrastructure-related relays (p-value=0.03979) than escape movements. Most individuals' return journeys had less than 50% overlap with their escape journeys, indicating that individuals used new, and more efficient routes during their return journeys. Together, our findings suggest that pronghorn have a more advanced navigational capacity that previously recognized. This work can be used by wildlife managers, policy makers and other stakeholders to understand pronghorn movement in increasingly volatile conditions.

O'Hara, Cagney

University of Wyoming (UW)
INBRE

Cellular Determinants of Aging in Insect Flight Muscle

All animals senesce. Even under ideal conditions, as time passes, function declines. But the progression of aging varies among animals. Some insects live only for a few hours whereas others thrive for decades. Many social insects have striking differences in lifespan among castes: a bumble bee queen lives for over a year whereas her sisters, the workers, may only survive for a few weeks, despite being 75% genetically similar and being housed in the same benign conditions. What accounts for such striking differences in aging? Recent work in the Dillon lab has found pronounced declines in flight endurance for bumble bee workers, likely due to senescence of the thoracic muscles that power flight. What drives this decline at a cellular level is still poorly understood. This project will investigate the role of flight muscle repair via muscle stem cells in the aging process. Connecting tissue-level changes to behavioral outcomes will clarify the mechanisms driving worker flight decline. Understanding how bumble bee flight muscles fail will help reshape our understanding of pollinator health and aging more broadly.

Ottoes, Emily

University of Wyoming (UW)
Honors College Capstone

"Daisy the Drumstick" and Why Children's Books Matter

I have created a children's book for my capstone project, which serves as a culmination of both my personal and academic interests. This creative project is based on research, skills and knowledge I've gained through my time here at UW. This presentation will address my research process and how it supported my creative decisions, the creative process itself, and the positive impacts of my project once completed. This project is impactful for me both personally and professionally. I've been able to employ my creative writing knowledge and passions, while also keeping in mind the importance of children's literature. The purpose of this book is to address the core questions of my project, the importance of children's literature, and how effective pieces of children's literature are created. I have completed outside research regarding the importance of children's books, and which elements work together to create a good children's book. I have used my knowledge of English, creative writing, and children's development and learning. I have studied English and creative writing during my time here at UW, and I have utilized the skills I have gained from that experience to demonstrate my knowledge of, and interest in early literacy throughout the book.

Perkins, Campbell

University of Wyoming (UW)
INBRE

Overcoming and Exploiting Coagulation Kinetics for 3D Printing of Fibrin

Tissue engineering is a multidisciplinary field of research that combines various scientific fields in order to repair/enhance malfunctioning or injured tissue. Additive Manufacturing (3D printing) is an emerging method for fabricating complex structures by extruding material layer by layer. Fibrin, a native wound healing material, will be 3D printed using a novel process that utilizes rapid coagulation kinetics to control printing parameters. The project goal is to utilize the rapid conversion of soluble fibrinogen into fibrin to 3D print fibrin-based structures in order to study wound healing and cartilage regeneration. Fibrin is highly elastic with excellent cell adhesion, but rapid gelation and poor mechanical properties have greatly limited its use in tissue engineering. At Dr. John Oakey's lab, several technologies have been patented that allow for increased fibrinogen macromer concentration, which increases mechanical strength, and enable the production of fibrin-based constructs with far better mechanical properties than previous fibrin-based materials, allowing for fibrin to be printed directly, rather than as a component. To achieve our goal, we plan to inject the catalyzing enzyme thrombin into a concentrated solution of fibrinogen, which will rapidly convert the surrounding fibrinogen into fibrin, trapping the remaining thrombin in a diffusion-limiting cocoon of now-polymerized fibrin. Fibrin is implicated in nearly every pathology, from acne to Alzheimer's, and our novel approach to fibrin printing makes it much simpler to study the interplay of fibrin and disease states in more complex in vitro environments than what is achievable by current tools.

Peters, Grace

University of Wyoming (UW)
Honors College Capstone

Activity pattern similarities between North American and Southeast Asian squirrels

Scientists study wildlife activity patterns to better understand life history. These patterns show how species occupy their ecological niches and respond to predation pressure, competition, and seasonal rhythms. Comparing activity patterns between species of similar taxa can highlight the effects of different environmental and ecological factors. The North American red squirrel (Tamiasciurus hudsonicus) is found in temperate ecosystems, is known to exhibit diurnal activity patterns, with peaks in early morning and afternoon/dusk. They often change these patterns in response to competition and human presence. Similarly, limited research suggests two species of tropical tree squirrels, the plantain squirrel (Callosciurus notatus) and Prevost's squirrel (Callosciurus prevostii), exhibit similar diurnal patterns to red squirrels despite living in a different habitat. This would suggest that they occupy similar temporal niches. To study these similarities, we placed 140 game cameras at red squirrel middens in conifer forests in the Greater Yellowstone Ecosystem and 40 cameras across habitats within the Lower Kinabatangan Wildlife Sanctuary in Malaysian Borneo to collect photos of our target species. We analyzed their activity patterns to compare diel activity between the three species. This provides an opportunity to examine how latitude, photoperiod, thermal environments, and resources can shape temporal behavior.

Pieper, Bernadette

University of Wyoming (UW)
INBRE

From Purees to Plates: Caregiver Perspectives on Transitioning to Solid Foods for Infants

Purpose: The purpose of this research study is to find and gain an understanding of parents' and caregivers' experience supporting a child with a cleft palate during the transition to solid foods. The primary outcome was involved with challenges encountered, strategies used, sources of guidance, and individuals who provided support throughout the process. Background: Children with a cleft palate will have surgery around 1 year of age to repair the hole in the roof of their mouth (Kotlarek et al., 2024). However, infants usually start transitioning from a solely liquid diet to solid foods starting at four months and continuing through 12 months of age (Norlyk, Larsen, Kronborg, 2019). While feeding children with cleft palate with special bottles is common practice, very little information is available for caregivers and healthcare providers when it comes to transitioning to solid foods. Methods: Parents and caregivers of children ages 1 to 5 years old with cleft palate were invited to participate in this study. Participants were organized into focus groups ranging from four to five participants in each group. The focus groups met over Zoom to discuss their experiences with the transition of their children to solid foods. Discussions were recorded, transcribed, and transcripts were reviewed to identify overall themes, such as strategies that worked, challenges faced, and what support and guidance given and helpful. Results: Data is being analyzed and finalized.

Reitz, Nolan

University of Wyoming (UW)
SURE program, School Of Computing

Best Practices for Machine Learning In Industrial Ecology

Machine learning is a rapidly expanding technology, but its widespread adoption in research has outgrown its technical understanding among practitioners. This knowledge gap becomes clear when comparing how researchers use machine learning tools against established best practices for model development. This study reviewed papers in the field of industrial ecology using a modified framework originally proposed by Kapoor and Narayanan in their work "Leakage and the Reproducibility Crisis in Machine Learning." Their framework evaluates data preparation, model training, data leakage, reproducibility, and transparency. Additionally, a model from a previous study was retrained on the same dataset with different initial conditions to examine how these evaluation criteria affect model outcomes. This study found that, of the 50 papers reviewed, all violated the defined best practices to varying degrees. One area where nearly all studies failed was transparency, with only a handful disclosing their model code and hardware list. These findings suggest a strong need for a more standardized approach to conducting and reporting research that utilizes machine learning, which would result in better models, increased transparency, and more reproducibility.

Robért, Alexandra

University of Wyoming (UW)
Honors College Capstone

Hoops for Little Lives— Prematurity Awareness Campaign

The objective of this project was to raise awareness and knowledge about the signs and symptoms of premature birth. By partnering with the Men's Basketball Team and dedicating their December 6th game to the March of Dimes, I reached a large audience and helped strengthen the community's understanding of prematurity. The goal was to educate attendees about the March of Dimes' role in research, education, and advocacy for policies that reduce birth defects, premature births, and infant mortality. To complete this project, I coordinated communication among the Honors College, the University of Wyoming Athletic Department, the Mountain West Conference, the March of Dimes, the Western Thunder Marching Band, and the University's Cheer Team. Managing these collaborations strengthened my time management and organizational skills while planning an event of this scale. Throughout the game, statistical facts were displayed on the Jumbo Tron, and an informational table at the main entrance provided handouts and additional resources. At halftime, an informational video featuring my family and my brother's story was shown. During the second half, custom UW/MOD T-shirts were tossed into the crowd, each printed with the message: "1 in 10 babies is born premature. "Flyers highlighting the signs and symptoms of premature birth were posted around the concourse. An online survey found that 82% of 100 respondents reported increased awareness.

Robertson, Samuel

University of Wyoming (UW)

From Leaf to Landscape

Climate records are limited and only span a very small chunk of earth's history. Paleobotanists have sought to extend climate knowledge further into the past by analyzing leaf fossils and using them to proxy past climate. We have developed robust methods for estimating mean annual temperature (MAT) using leaf fossils, but moisture metrics (such as precipitation) have proven difficult to estimate from leaf fossils. I performed several analyses on trembling aspen (Populus tremuloides) at different spatial scales because it is the most suitable specimen available. Aspens are interesting subjects because they are light intolerant, which means that light has a minimal effect on leaf morphology Additionally, the clonal life habit of aspens means that we can attain larger sample sizes at small spatial scales with almost no genetic contributions to variation. In spite of this, aspens exhibit a very large amount of variation even amongst leaves which are mere centimeters apart on a branch. However, by taking the average of this variation, numerous trends exist at different spatial scales. By analyzing climate models at several spatial scales, we can assess 1) what climate factor is most suitable for assessing moisture at each spatial scale, 2) which spatial scale works most effectively for assessing moisture, 3) Whether or not a model is useful across multiple spatial scales. Initial assessments point to soil moisture or Palmer Drought Severity Index as more appropriate ways of assessing past climate than mean annual precipitation. Additionally, extreme dry environments like Wyoming typically exist as outliers in current datasets and need to be incorporated more thoroughly.

Robinson-Kim, Abigail

University of Wyoming (UW)
Honors College Capstone

EXAMINATION OF DIFFERENT MEDIATION MODELS ON THE RELATIONSHIP BETWEEN SOCIAL ANXIETY AND ALCOHOL CONSEQUENCES

Undergraduates with social anxiety are at a heightened risk for experiencing alcohol-related consequences, potentially because they pregame to manage their social anxiety before attending social events. Prior research links social anxiety to stronger pregaming motives and greater pregaming frequency and quantity, yet their combined influence on alcohol-related problems has not been comprehensively examined. This study examined whether the relation between social anxiety and alcohol-related consequences is explained through pregaming motives, pregaming frequency, and pregaming quantity. Among a multi-site sample of undergraduates (N=1834; Mage=19.32; 80.3% female; 69.1% white) reporting past-month pregaming, we tested a saturated path model with social anxiety modeled as a predictor of alcohol consequences via pregaming motives (interpersonal enhancement, situational control, intimate pursuit, barriers to consumption), and pregaming frequency and quantity, while adjusting for biological sex. Although social anxiety was not directly related to alcohol problems, it was positively associated with all pregaming variables. Social anxiety had a positive indirect effect with alcohol consequences through several pathways: (a) higher endorsement of interpersonal enhancement, situational control, and barriers to consumption motives, (b) more frequent pregaming, (c) greater pregaming quantity, (d) double mediation effects through higher endorsement in all pregaming motives and more frequent participation in pregaming, and (e) double mediation effects through higher endorsement in all pregaming motives and greater pregaming quantity. Interventions that target pregaming motives among undergraduates with social anxiety may be effective in reducing alcohol-related consequences among those who engage in pregaming. Replication in more diverse samples is needed given the predominantly White and female sample.

Rubio, Ily Nicole

University of Wyoming (UW)
SURE program, School Of Computing

Do Genetic Algorithms perform better than brute-force optimization for solar calibrations? : Distributed Inference Solar Calibration Optimizer (DISCO)

Solar calibration is a critical step in stellar modeling. However, traditional methods like brute force grids are computationally expensive, even in adaptive implementations. We explore an alternative approach using genetic algorithms (GAs) in combination with the stellar evolution code MESA (Modules for Experiments in Stellar Astrophysics). We compare GA based optimization against adaptive brute force grids by evaluating convergence behavior, computational cost, and resulting best-fit solar parameters. A total of 60 GA runs were performed, of which 55 completed and were included in the analysis. We find that GAs achieve comparable accuracy while reducing computational cost relative to adaptive brute force methods. However, GA solutions exhibit random convergence behavior and consistently undershoot the convective mixing length parameter, α_{mlt}, found using the adaptive brute force grid. We also studied when the GAs found a solution, the number of times a solution was found, and how long it took to find the first solution. Traditionally, GAs will terminate at the first solution. By running our GAs to their prescribed terminal generation, we can also study their post-convergence behavior. These results suggest that genetic algorithms provide a potentially more efficient framework for solar calibration. Future work would include fine-tuning GA hyperparameters for more reliable and consistent convergence behavior and testing different initial conditions.

Shoales, Seneca

University of Wyoming (UW)
Honors College Capstone

Dying Well

This presentation focuses on the use of ‘comfort care medication’ such as morphine during the active dying process, and explore if the use of morphine hastens the dying process.

Simons, Hailey

University of Wyoming (UW)
Honors College Capstone

Mushrooms Across Campus: How We Can Minimize Their Growth

A visual collection and analysis of fungal growth across the University of Wyoming campus spanning four years (2022-2026), this presentation features photos and identification of fungal growths found around the UW main campus, relevant information regarding the fungi and their preferred habitats, and possible methods for controlling their propagation in the future. Some mushrooms and fungi can be harmless to humans, but as a bustling community center for Laramie's students and residents, UW needs to be proactive in curbing dangerous fungi in its public spaces. This presentation outlines possible, pragmatic solutions to this problem.

Sinnott, Amanda F

University of Wyoming (UW)
INBRE

Natural Variation in Brain Size Across Wild-Type Lines of Drosophila melanogaster

Drosophila melanogaster is a widely used model organism that can be used for studying human diseases. The Drosophila Genetic Reference Panel (DGRP) is a resource for investigating natural genetic variation in wild-type lines of Drosophila because each line has a stable genotype and most have fully sequenced genomes. Many trait analyses have been conducted using these lines, but very few have studied variation in brain size. This study aims to quantify natural variation in brain sizes across wild-type lines from the DGRP using micro–computed X-ray tomography (μ-CT), as a non-invasive imaging technique. I hypothesize that there will be significant differences in brain volume across the different genetic backgrounds. Understanding the natural variation in brain size across these lines could provide data for future genotype to phenotype mapping which may contribute to understanding of genetic mechanisms involved in brain development.

Straight, Abagail

University of Wyoming (UW)
INBRE

Mechanisms of PopZ-Mediated Client Recruitment

Several bacterial species are polarized, meaning they have specialized structures at one or both ends. Depending on the species, polarization can be critical for cell cycle regulation, chromosome segregation, motility, and even pathogenesis. PopZ is a pole-localized scaffolding protein that interacts with more than eleven known client proteins and recruits them from the cytoplasm to polar microdomains. PopZ contains a hub-like protein-binding domain, within which a small subregion of fewer than 28 amino acids appears to determine binding specificity. The goal of this project is to investigate client protein-binding specificity by identifying which amino acids in PopZ's hub domain are critical for binding to four different client proteins. Protein interactions are visualized and quantified by co-expressing PopZ and client proteins in Escherichia coli as fluorescently tagged fusion proteins. Using a library of all 560 possible point mutations within the 28-amino-acid hub region of PopZ, more than 5,200 individual colonies have been screened for loss of fluorescence colocalization with four different binding partners. Over 600 different mutants have been identified, many on repeated occasions. Their locations and identities reveal a distinct "fingerprint" of amino acid-sequence dependence within PopZ for each client protein.

Taylor, Kooper Lee

University of Wyoming (UW)
INBRE

Sex Differences in Alzheimer's Disease-Related Pathology and Circadian Dysfunction and the Role of Follicle Stimulating Hormone

Alzheimer's disease (AD) is a form of dementia categorized by the presence of misfoldedproteins in the form of amyloid plaques (a-beta) and tau tangles in the brain. AD is the fifth leading causeof death for people aged 65 and older in the United States, and two-thirds of AD patients are women. Thissex difference is thought to be at least partly due to the hormonal changes caused by menopause, whichnormally begins in women between the ages of 45 and 55 but can ultimately span over several years. Oneof the earliest symptoms of AD is circadian disruption, which emerges well before cognitive symptomsarise and contributes to the increased deposition of a-beta and Tau pathology. Circadian disruption in theform of sleep disturbances is one of the most reported symptoms of menopause. While the linkbetween AD and menopause is unclear, the similarity of symptoms suggests that further studies couldreveal shared mechanisms. We recently showed that an AD mouse model develops Tau pathology inlateral parabrachial (LPB) neurons of the brainstem that project to the circadian structures of thehypothalamus, at the same time that circadian dysfunction emerges. We found that both LPB Taupathology and circadian dysfunction developed much earlier in female AD model mice compared tomales. AD pathology is not seen in the canonical circadian regions of the hypothalamus in earlier Braakstages, yet it is present in the LPB as circadian dysfunction begins to arise. Our preliminary evidenceshows that gonadectomy increases LPB Tau pathology and circadian dysfunction in male and female ADmodel mice. Additionally, the gene for follicle stimulating hormone receptor (FSHR) is expressed in theLPB of wild-type (WT) mice and is upregulated in females compared to males. Follicle stimulatinghormone (FSH) levels increase following both gonadectomy and menopause, and exacerbate ADpathology and cognition decline. However, the role of FSH on circadian function and AD-relatedcircadian dysfunction is unknown. In this proposal we will use hormonal manipulations andneuroanatomical analyses to test my central hypothesis that FSH action in the LPB underlies sexdifferences in the onset of AD-related pathology and circadian dysfunction.

Vicari, Julianne

University of Wyoming (UW)
Dance Science Capstone Research Project (THEA 4990)

Effects of Aerobic Cross-training on Collegiate Dancers' Aerobic Capacities and Aerobic Efficiency

Aerobic training often gets overlooked in traditional dance technique classes. A dancer trains their aerobic system when they practice continuous, consecutive physical activity for more than 20 minutes. However, most exercises in traditional dance classes only last 2-3 minutes and are lower intensity which is more consistent with anaerobic training. While a dancer primarily uses their anaerobic system more than their aerobic system, training the aerobic system can improve a dancer's endurance and stamina. Aerobic levels are often measured based of the body's ability to utilize oxygen to support longer durations of physical activity. This is measured by VO2max levels which represent the max amount of oxygen the body can take in, transport and utilize during peak physical activity. Previous research has determined that dancers have significantly lower aerobic capacities and VO2max levels compared to other competitive athletes. The purpose of this study is to determine if partaking in aerobic cardio exercises will increase or affect a collegiate dancer's aerobic capacity, max heart rate after exercise and aerobic efficiency. Data is still being analyzed for this study, but the hypothesis is that throughout the six week study, participants' stamina levels will increase as well as their aerobic capacities and VO2max levels. The objective of this study is to analyze quantitative difference before and after cardio aerobic training intervention by estimating VO2max levels and max heart rate. The participants' aerobic capacities will be recorded using a Rockport One-Mile Walking test to calculate VO2max values. The participant's age, gender and weight and time it takes to walk a mile will be determined to calculate VO2max. Each participant's max heart rate and aerobic capacity values will be compared from initial and final data collection sessions before and after the six week intervention.

Vicente, Maximo

University of Wyoming (UW)
Honors College Capstone

Entangled Between Desires

My project is a large-scale drawing measuring 10 feet by 4.5 feet that investigates the impact mental health has on one's self-identity. People often leave details out when telling a story, allowing what they do reveal to benefit themselves. Stories allow me to explore this complexity of relationships, experiences, and culture through environments that blend imagination and reality, where there is no right or wrong answer, but rather an ever-evolving reality. By filling each composition with intricate detail, I express my fear of never doing enough and my need to keep creating. Each section tells its own story, encouraging viewers to slow down, observe, and find new connections. I hope that process mirrors how we should move through life—with patience, attention, and curiosity. Each story can be interpreted in different ways. An idea I enjoy toying with. Using imagery that changes based on a viewer's bias. Crows are often perceived as a bad omen due to Western cultural influences. However, in Central American cultures, they are seen as guides and messengers between worlds. An example of how our environment shapes our viewpoint and the necessity of questioning these ideas to gain a clearer understanding of our perspective and biases, to cultivate spaces where individuals can be seen, heard, and understood. While these ideas express my inner landscape, my process grounds them in discipline and restraint. I enjoy creating something out of nothing, using the simplest materials. By only using ink, I can focus on refining my skills and storytelling ability since all I must do is draw, learn, and evaluate. Learning is a large part of art and often makes up for what others consider talent. Through hard work, dedication, and desire, one improve.

Vickland Davis, Stella

University of Wyoming (UW)
Honors College Capstone

Philosophy and Paradoxes of Time: A Philosophical Exploration

I will be presenting different philosophies, perspectives, and operations of time across cultures and time periods. Examining conflicting perspectives and contrasting with lived experiences, I hope to expose that the tensions in philosophies of time are very important to understand when we want to examine human knowledge and life. I will also be sharing my creative response to the exploration.

Welch, Kira Anne

University of Wyoming (UW)
Honors College Capstone, Wyoming Research Scholars Program

Genomic characterization of a hybrid zone between North American milksnakes

Hybridization plays an important role in speciation, as it may slow or reverse differentiation, or accelerate the evolution of reproductive isolating mechanisms. The American milksnakes (Lampropeltis triangulum species complex) are a group of closely-related lineages whose species status has been long debated. Previous work has identified a hybrid zone in eastern Kansas where two of these lineages have come into secondary contact, providing an excellent opportunity to examine the divergence process. We generated whole genome re-sequence data from 32 individuals across the hybrid zone, and from our data we classified the hybrid ancestry of each individual. From this study, we have identified mostly late stage backcrosses and performed genome scans for loci under selection.

Willson, Jean-Luc Frank

University of Wyoming (UW)
Honors College Capstone

Queers in Courts: Accounts of International Courts and LGBTQ+ Rights

Courts exist to ensure we follow the letter of the law. But far too often, the people behind the law are forgotten, something that rings especially true in a human rights context. Precedence may be set, but often decades of trials and tribulations occur before that verdict is reached. This project aims to fill in that gap by giving personal experiences a place to speak, making the space of LGBTQ+ rights more accessible and unveiling the value and validity of the actions these individuals have taken. This creative project uses interviews conducted with European human rights lawyers to create a narrative about the trials, tribulations, and outcomes of working in European human rights law. This project exists at the crossroads of legal scholarship and creative storytelling, understanding how the struggle to defend queer rights in Europe has empowered advocacy but also the limits of law in achieving the goals of justice. To develop this project, I collected firsthand accounts from nine lawyers who are involved in the legal processes before European human rights court systems. Through this project, I learned that human rights law is taxing not just because it takes a lot of work for limited results, but also because the intimate relationship between lawyers and their identities creates additional pressure to succeed. It also became clear that law will never be enough to achieve justice and equality for queer people. Achieving justice will require a diverse set of strategies and law is just a part of that effort.

Winstead, Patrick Ethan

University of Wyoming (UW)
Honors College Capstone

Yudkowsky's Apocalypse: AI, Identification, and Religious Authorization

The existence of religious trends within the American technology industry, characterized by prophetic figures, apocalyptic mythology, and an eschatological interpretation of artificial intelligence (AI) research is well-documented. Using a hermeneutic of identification, I argue that this tradition, sometimes called Apocalyptic AI, is a retelling of the Evangelical Christian apocalypse. Eliezer Yudkowsky, an AI researcher and founder of the Rationalist Movement, is attempting to authorize a version of Apocalyptic AI within his own community. Using this myth to exercise control over membership, doctrine, and ritual within Rationalist spaces, Yudkowsky is attempting to create an new religious movement defined by its opposition to AI.

Woods, Zoey

Laramie County Community College (LCCC)
INBRE

Dorsal Coloration Patterns and Phylogenetic Relationships in Cryptarchinae

Beetles, like many animals, exhibit a wide range of colors and patterns. This coloration has a variety of impacts on fitness and communication. Beetles use coloration not only to help camouflage from predators, but also as mating signals, often with more vibrant colors or patterns. Beetles in the subfamily Cryptarchinae (Coleoptera: Nitidulidae) show clear differences in the coloration between species. Because of this variation, Cryptarchinae are ideal for studying how traits associated with color evolve. This study investigates whether similarities in coloration arise from common ancestry or from convergent evolution due to similar environmental pressures. Standardized photographs were used to document dorsal coloration, and DNA sequence data from multiple species were aligned to construct a maximum likelihood of phylogenetic tree in IQ-TREE. Coloration was then summarized in histograms and analyzed using PCA. This resulting phylogeny showed support for two clades of Cryptarcha. Based on analysis of the histograms, each of these clades utilizes color space differently while having a similar coloration on the PCA. On the other hand, the coloration of the non-monophyletic Glischrochilus was scattered throughout the PCA. Looking at these relationships allows us to understand the evolution of color pattern in various clades, and preliminarily analyze the connection of color evolution to the ecology of these beetles.

Worcester, Carter

University of Wyoming (UW)
INBRE, Honors College Capstone

Characterizing the 'Bulk and Cut' Diet: Impairment and Potential Risk Factors

Men experience societal pressures to be more "masculine" from romantic partners, media, friends, and family. Many men may internalize a body ideal that prioritizes high muscularity and low adiposity, leading to body dissatisfaction that results in disordered eating and muscle-building behaviors. The 'Bulk and Cut' is a common diet among younger men that involves periodically alternating eating between caloric surpluses and deficits to achieve desired muscularity and leanness. Cognitive flexibility, an individual's capacity to adapt to new information and consider nuances and alternate perspectives, is negatively associated with the development of eating disorders and may be a risk factor in individuals who engage in this diet. We aimed to 1) characterize associations between 'bulk and cut' dieting and psychosocial impairment and 2) investigate whether cognitive rigidity moderates these associations. We had two primary hypotheses: 1) past 100-day engagement in 'bulk and cut' dieting would be positively associated with psychosocial impairment, and 2) the association between 'bulk and cut' dieting and psychosocial impairment would be stronger among those who lower in cognitive flexibility. Men who report past-year engagement in the 'Bulk and Cut' diet (N=222) will complete an online self-administered neurocognitive task and self-report measures of muscularity-oriented eating, cognitive flexibility, clinical perfectionism, and psychosocial impairment. Further, we developed a novel measure to assess engagement with the 'bulk and cut' diet over the past 100 days, and will gather unique, preliminary data on the mechanics and details of the 'bulk and cut' diet that will help characterize it for future research.

Ziegler, Rece Daniel

University of Wyoming (UW)
Cobre Grant

Running Against Time: Exercise and Circadian Regulation in Aging

Circadian clocks regulate essential biological and physiological processes through endogenous ~24-hour rhythms that coordinate behavior, metabolism, and cellular function. The central clock in the suprachiasmatic nucleus (SCN) of the hypothalamus serves as the master pacemaker, synchronizing peripheral clocks and maintaining internal timing. Disruption of circadian rhythms is associated with metabolic, cardiovascular, and neurodegenerative diseases, and rhythms weaken with aging due to reduced SCN signaling. Beginning in middle age, this decline results in a shortened circadian period, or phase advance, shifting timing by ~30 minutes per decade. Although aerobic exercise provides neuroprotective and metabolic benefits, its effects on circadian function are not fully understood. This study examined how late-life exercise influences voluntary wheel-running behavior and circadian rhythmicity in aged male mice. Young (3~4 months, n=5) and aged (~22-24 months, n=9) mice were given continuous access to running wheels for four weeks. Activity was recorded and analyzed in 15-minute intervals. Circadian rhythmicity was assessed by fitting activity data to a 24-hour sine wave to determine rhythm phase and entrainment. A two-way repeated-measures ANOVA evaluated effects of age and time. Wheel-running activity differed significantly by age ($p=0.0001$), with young mice more active than aged mice. Activity varied across weeks ($p=0.0061$), peaking in week two for both groups. Aged mice showed reduced rhythm power (0.1-0.2) indicating lower amplitude than young mice (0.3-0.4). These findings suggest that voluntary exercise can modulate circadian rhythms even in advanced age, supporting its potential to improve circadian health during aging.

Group Oral Presentations

Brown, Olivia

University of Wyoming (UW)
Computer Science Senior Design (CS 4955)

Daedalus' Tower

Daedalus' Tower presents a unique 3D puzzle game wherein the player must travel up and down a rotating tower, completing puzzles throughout. This game, heavily inspired by Greek Mythology, incorporates water and electricity powers, drawing from two of the most famous Greek gods, to create unique puzzles by incorporating the tower rotation element with water levels and beams of energy. This game is uniquely interesting by placing the player squarely within the tower, allowing for more immersive and complicated puzzles that will challenge the player's spatial awareness and ability to handle the rotation of multiple floors, and creating the optimal path to victory. This project seeks to offer new approaches to both puzzle creation and gameplay immersion, taking a puzzle that usually only works in two dimensions into a 3D adventure.

Collins, Daniel

University of Wyoming (UW)
Computer Science Senior Design (CS 4955)

Go4Food

Go4Food hopes to assist in the question many ask themselves: where should I go to eat? Factors like preferences, dietary restrictions, allergens, etc. challenge this question, especially in a group setting. Other applications allow filtering restaurants near by a few filters like price and distance; however, Go4Food goes further to help those locating food they can eat near them. Using a web application, the program will quickly provide the user with restaurants that fit their various needs. For instance, if a user is allergic to peanuts, they would be able to search for restaurants nearby that have options without nuts. This involves an interactive UI so that the user can easily navigate our app. Moreover, the user will have the ability to create a local profile to save their preferences. Our ultimate goal is to improve the user experiences where we found it lacking, no more advertisements, sifting through online menus, or wondering if food meets your dietary restrictions, our web application brings the relevant information to the user.

Conway, Maya

University of Wyoming (UW)
Computer Science Senior Design (CS 4955)

Primetime Paradox: A Music-Integrated Video Game Demo

Primetime Paradox is a video game demo with a unique core concept: a soundtrack that changes dynamically with the user's gameplay. The player will defeat musically integrated enemies in order to escape a dungeon maze, with each enemy represented by an instrument in the song. An enemy's instrument only plays when the enemy is alive, so as the player depletes each enemy type, the song will decrease in intensity along with the gameplay. While many rhythm games exist in this day and age, most of them involve choreographed maps that force the user to play with extreme precision. By designing a game that forces the world around the player to be on beat instead of the player themselves, users should be able to enjoy the musical aspects of the game without having to change their play style. This video game demo was created using the Unity game engine with all of its 3D assets modeled in Blender.

Cruz, Chance

University of Wyoming (UW)
Computer Science Senior Design (CS 4955)

Wildernest: A 2D Creature-Care Adventure Game

Wildernest is a 2D top-down adventure game developed in Unity by our four person undergraduate team. The game combines creature collection, caretaking mechanics, and environmental puzzle solving within a richly themed world. Players explore three distinct biomes: the Garden, the Ocean, and the Clouds, where they discover and rescue injured creatures called Wilderkin. Through feeding, grooming, playing with, and caring for their Wilderkin, players build bond levels that unlock unique traversal abilities and progression through various puzzles. Completing all puzzles within a biome triggers an animated boss encounter, advancing the story and granting access to new areas. The project focuses on building interconnected gameplay systems from scratch, including grid based player movement with smooth interpolation, an RNG based capture mechanic, a care and bonding system, a categorized inventory, and a modular puzzle framework supporting diverse minigame types. Development follows a milestone driven approach across four phases: core movement and world foundation, capture and care systems, puzzle and boss implementation, and final content polish with play testing. Our team managed the project using Git version control with clearly defined roles spanning project leadership, sprite design, software architecture, documentation, and audio engineering. Wildernest demonstrates how small teams can scope, design, and deliver a complete game within a single semester, by prioritizing a minimal viable product and iterating through structured milestones.

Gindulis, Nicholas

University of Wyoming (UW)
Chemical Engineering Senior Design (ChE 4080)

Holly Frontier Sinclair: Propane and Butane Product Purity Improvements

The primary objective of this design project was to improve the propane and butane purities being produced by Holly Frontier Sinclair's oil refinery located in Casper, Wyoming. The existing depropanizer distillation tower is performing poorly which decreases the quality of saleable propane, and butane's value as a blending stock. Three different methods were explored; the primary method proposed to HF Sinclair focused on enabling them to produce refinery grade propane without the need for additional equipment. The other two methods focus on producing higher purity consumer grade propane, which will require additional equipment and a considerably higher capital investment.

Hascall, Benjamin Charles

University of Wyoming (UW)
Chemical Engineering Senior Design (ChE 4080)

Solvent Extraction

This study evaluates the technical and economic feasibility of producing a paving grade asphalt binder (bitumen) from Powder River Basin (PRB) coal using a solvent extraction process with 1,4-butanediol (BDO) as the solvent. The plant will be in Gillette, Wyoming adjacent to existing coal mining and pyrolysis infrastructure. Along with asphalt binder production, the process generates high purity tetrahydrofuran (THF) as a byproduct which creates a secondary revenue stream. The process was simulated using Aspen Plus software to create detailed mass balances, energy balances, equipment sizing, and preliminary economic analysis. Major process units include slurry vessels, a batch reactor, hydrocyclone cascade, a flash recovery system, and distillation columns for solvent recycle streams and THF purification. Preliminary economic analysis shows that profitability is dependent on solvent recovery and THF sales. The hydrocyclone cascade provides operational advantages such as their size, cost, easy operability, and reduced oxidation risk. Due to the plant's feasibility and current market conditions, this process presents a competitive non-petroleum alternative to current bitumen production.

Henry, Christopher P

University of Wyoming (UW)
Computer Science Senior Design (CS 4955)

EasyBake cooking app

The EasyBake mobile app is an innovative way to improve cooking for experts and beginners alike. EasyBake is designed to help smooth the cooking process and keep the user's device clean by giving clear audible directions and receiving voice commands from the user, allowing for hands-free interaction with the app. EasyBake was created with basic-level cooking in mind. Its primary goals are efficiency and convenience, aiding the user in the everyday task of meal preparation.

Jarlinski, Jennifer; Sosa Carlos, Rubi

Central Wyoming College (CWC)
INBRE, NASA Space Grant

Cutting Edge: Microplastic Exposure from Meal Preparation at Home

Kitchens are often considered the heart of the home, where people spend a substantial amount of time preparing meals for themselves and their families. With microplastic (MP) exposure posing potential risks to human health, we wanted to further investigate the repercussions of using plastic in the kitchen. The purpose of this study is to spread awareness about exposure to MP's in home kitchens, focusing on meal preparation and plastic cutting board usage. Two concurrent experiments were conducted. Volunteers (n=9) conducted home trials that assessed exposure during their standard meal preparation. Passive air samples were collected in petri dishes left open next to the prep area for an average of 46 minutes. Additionally, we conducted experiments with newly purchased cutting boards to analyze the correlation between use and the number and size of particles shed. Results from this study are intended to help confirm the presence of MP's in the kitchen, with a focus on contamination from MP's released during the use of cutting boards.

Krapes, Aaron

University of Wyoming (UW)
Computer Science Senior Design (CS 4955)

AbeonaSec: Democratizing AI-Powered Cybersecurity Infrastructure

AbeonaSec is an open-source, highly configurable, and scalable cybersecurity application that integrates the NVIDIA Morpheus Cybersecurity Framework and pre-trained machine learning models. In order to address the current gap in customizable Artificial Intelligence (AI) cybersecurity tools for small enterprise, home lab, and personal computer environments, AbeonaSec provides a readily deployable solution – packaged as Open Container Initiative (OCI) compliant containers – that empower users to build and scale their own cybersecurity infrastructure. Scalability is achieved through a plugin system that allows users to easily extend functionality with a framework for building or implementing pre-built data processing pipelines, as well as simplified access to machine learning model inference. This modularity will enable individuals, small teams, and organizations to adapt to evolving threats and simplify cybersecurity infrastructure management.

McCuskey, Christopher M.

University of Wyoming (UW)
Computer Science Senior Design (CS 4955)

Measure Once

This web-based application provides an interactive platform for users to design and plan construction projects with a focus on minimizing costs and reducing material waste. Users can freely build their own projects using a drag-and-drop interface, experimenting with layouts, materials, and scheduling in a hands-on way.

Norton, Tesla A

University of Wyoming (UW)
College of Engineering and Physical Sciences

Sisyphus' Schedule

Our app will allow users to participate in generated workouts, create their own, as well as track the weights, and completion of these workouts. Additionally, our web app allows users to track calories, including carbs, proteins, and fats.

Pilon, Risa

University of Wyoming (UW)
Chemical Engineering Senior Design (ChE 4080)

Monoclonal Antibody Production Design

This project focuses on designing a facility to produce monoclonal antibodies (mAbs) from Chinese hamster ovarian (CHO) cells. The antibodies will be produced to target and treat various cancers, neovascular glaucoma, and macular degeneration. The goal was to create a process that is efficient, safe, and capable of meeting growing demands for these important therapies. The design centers around using cells to produce mAbs, followed by several steps to separate and purify the final product, ensuring safety for patients. Throughout the project, key decisions were made to improve how the facility operates. To increase efficiency, the reactors are run in a staggered schedule to simulate a continuous process, allowing production to flow more smoothly. Different equipment options were also evaluated to balance cost, environmental impact, and ease of operation. The facility is designed to produce 1000 kilograms of product each year. In addition to process design, important considerations included safety, waste handling, and regulatory requirements. Working with both biological materials and strong cleaning chemicals requires careful procedures to protect workers and ensure product quality. Sterilization and disposal methods must also be considered because it is heavily regulated, which led to the implementation of single-use (SU) and clean-in-place (CIP) equipment to sterilize and keep the process sanitary. Overall, this project demonstrates a practical approach to producing monoclonal antibodies on a large scale. By considering multiple design choices and current industry practices, the facility aims to deliver high-quality treatments efficiently while maintaining safety and reliability throughout the process.

Electrical & Computer Engineering Senior Design Oral Presentation Schedule (April 26th)

EERB 251	**Moderator: James Branscomb, P.E.**		**Session Judges: Ben Morgan, Dongliang Duan, Jonathan James, John Clay**	
8:00-8:10	**Introductions and Ground Rules**			
Time	**Engineers**	**Major**	**Project Title**	**Mentor**
8:10 - 8:40	Carlisle, Justin Gundersen, Logan	EE EE	GaN Transistor Audio Amplifier	Jon Pikal
8:40 - 9:10	Clyde, Devin S. Harper, Myles	EE EE	Virtual Fence for Livestock	James Branscomb
9:10 - 9:40	Cunningham, Shawn	EE	Fixed-Wing Autonomous Pursuit Drone	John O'Brien
9:40 - 10:10	Ganskow, Tristan	EE	Hexapod Robot	Chao Jiang
10:10 - 10:30	**Break**			
10:30 - 11:00	Jackson, Zachary C. Wiederholt, Walter	EE EE	Power Grid Simulation / Islanding Model	Nga Nguyen

11:00 - 11:30	Nelson, Zach J.	EE	Distributed Field Tracking System	Yaqoob Majeed
11:30 - 12:00	Rice, Kaleb	EE	Audio Amplifier	
12:00 - 12:30	Vandel, Caleb J.	EE	Uplink Robotics 360 degree sensor for navigation - The Beaver	Chao Jiang

EERB 255	**Moderator: Steve Barrett, P.E.**		**Session Judges: Rob Streeter, Bob Kubichek, Dave Whitman**	
8:00-8:10	**Introductions and Ground Rules**			
Time	**Engineers**	**Major**	**Project Title**	**Mentor**
8:10 - 8:40	Barritt, Reece	CPEN	Auto-Locking Environmental Safety System	James Branscomb
8:40 - 9:10	Budge, Amber	EE	Wrist Worn Augmented Communication Device	Steve Barrett
9:10 - 9:40	Ewers, Braeden E. Limato, Tyson J.	CPEN CPEN	Automatic Plant Care Device	Andrew Kirby
9:40 - 10:10	Litzinger, Hailey	EE	Classroom Cultivator	Steve Barrett
10:10 - 10:30	**Break**			

10:30 - 11:00	Fagan, Sullivan T. Ratcliff, Zacery B.	CPEN EE	Mobile Continuum Arm Robot for Hazardous Environment Inspection	Ian Walker
11:00 - 11:30	Morrow, Rickie M.	CPEN	Trading Card Game Sorter	Chao Jiang
11:30 - 12:00	Willis, James B.	CPEN	Project Dandelion: Multipoint Portable Audio Entertainment System	Jon Pikal
12:00 - 12:30	Brown, Elle C. Dickerson, Mckendyll Powell, Kelly A.	CPEN EE EE	Solar Powered Autonomous Irrigation System	Yaqoob Majeed

12:30 - 2:00 **EERB 255 - Poster session and box lunch**