

## 2018 Graduate Student Showcase

### Abstracts

Katherine Indermaur

"Facing the Mirror": A Poetic Reflection

2018 Fall - College of Liberal Arts

"Facing the Mirror" is a series of prose poems exploring the invention of the mirror and its uses over time, including its effects on cultural narrative, art, technological advancement, and ideas of self. The work also examines our habits and associations regarding mirror-gazing—from vanity to shame—weaving between revelations of academic research and the deeply personal.

Project type: Performing Arts

Susannah Lodge-Rigal

In sky so nameless

2018 Fall - College of Liberal Arts

"In sky so nameless" is a collection of poems bodying an anxiety of loss. Through formal and substantive choices, these poems grapple with that which is susceptible to change or erosion—notions of selfhood, landscape and animalism, migratory patterns, words themselves, fear and faith as they manifest in the body. More pointedly, many of these poems are the result of writing through my experience of exposure and response prevention therapy in the treatment of Obsessive Compulsive Disorder. They are little exposures in themselves, and my hope is that fear and gratitude both are legible in equal measure here.

Project type: Performing Arts

Michelle LaCrosse

NonFiction Short Essay, "Wild Swans"

2018 Fall - College of Liberal Arts

A short essay about encountering wild swans while on vacation, which causes the narrator to reflect on childhood wishes and memory.

Project type: Performing Arts

Danny Schonning

The small, too, was infinite

2018 Fall - College of Liberal Arts

A work of poetry, derived from a summer abroad, that explores the relationship between artist and art, art and its observer, and how that observer is changed on reentering the natural world.

Project type: Performing Arts

Kevin Poelking

Lucy for Brass Choir and Piano

2018 Fall - College of Liberal Arts

Lucy is based on text from the Lucy Poems by William Wordsworth. The lines of text I chose for this piece intend to convey the idea that the main subject, Lucy, was not fully appreciated until after she was gone. The music was prompted by my reflection on how many people, especially those of a younger age, relate to the feeling of being overlooked and wanting to feel that they matter while they find their purpose or place in society. Originally written for chorus, this arrangement for brass choir and piano is performed by members of the CSU Wind Symphony.

Project type: Performing Arts

Mikey Borgard

Not so Dreadful Here: A Novel

2018 Fall - College of Liberal Arts

Not so Dreadful Here, a docu-novel about the Boston Marathon bombings, explores survivor hierarchy in the aftermath of undefinable horror. It is a multi-perspective, fragmented work that conveys an experience of failed memory and meaning-making. As a survivor of the bombings, the author relies on the historical timeline as scaffolding for the protagonists' stories, allowing fact and fiction to weave together as each fragment drives readers to understanding. The novel is a collection of memory, a memorial to those whose lives were lost, and a redefinition of trauma that breathes a personal note into the post-9/11 surge of terrorism literature.

Project type: Performing Arts

Emma Hyche

"The Epidermis of Reality": Poetry of Filmic Sight

2018 Fall - College of Liberal Arts

The 21st century offers more ways to see and be seen than at any previous point in human history. This collection of poems treats film and poetry as dual forms of sight, incorporating filmic theory and diction into poems that focus on film's effect on self-perception.

Project type: Performing Arts

Margaret Browne

circumference of grief

2018 Fall - College of Liberal Arts

This is a work about grief: how it manifests, how it is experienced, how it is processed. It is also about grief caused by trauma—what it is to grieve the loss of time, of experiences, a lost sense of self. Grief is often separated into five stages: denial, anger, bargaining, depression, and finally, acceptance—but as it is experienced, grief is cyclical, disorderly, recursive. Stages converge and redefine one another. These poems seek to represent grief by exploring these stages—subverting their boundaries, disrupting their linearity, and hopefully, providing a new way of accessing grief that leads to recovery.

Project type: Performing Arts

001 - Rebecca Dias

Dissolution of the Self. The Essence of Creating a Mandala

2018 Fall - College of Health and Human Sciences

A digitally created mandala that represent the Buddhist sand mandala which symbolizes the transitory nature of all material life. Acceptance of the impermanent nature of all life is the path to enlightenment. The only way to fully comprehend the magnificence that is now, is to be present. Realizing that the past has faded away and the future will never be, is the only truth we can experience.

Project type: Visual Arts

002 - Lauren Faherty

Constructing Sense of Self Through Material Culture and Memory

2018 Fall - College of Liberal Arts

My studio practice examines memory and material culture as a part of a complex system that constructs a sense of self and community. The found individual moments in the materials I use construct narratives that overlap, weave and intermingle. It is here my materials become alive through their interactions with one another. The ability of fabric and rope to embrace the ephemeral while addressing the

multiplicity of life makes it an ideal medium to work with. The subtle movements produced by these materials act as a collection of memory taking shape in three-dimensional forms.

Project type: Visual Arts

003 - Christy Nelson

Cognitive Repair

2018 Fall - College of Liberal Arts

When dealing with childhood trauma, it is often necessary at each developmental stage to revisit the old wound to examine how it manifests itself in the new stage. If this is not done, it can lead to individuals being controlled by the past, because trauma rewires the brain. It is laborious to uncross the wires and exist in a healthier state. This body of artwork uses 3D scanning and printing to replicate a vessel that has been broken, then scanned, reprinted, repaired and rebroken in a compounding nature to illustrate the difficulty and beauty of this cognitive repair.

Project type: Visual Arts

004 - Emily Sullivan

Looking at Clouds: An Examination of Shifting Place

2018 Fall - College of Liberal Arts

My paintings emanate a sense of transience and movement. I draw upon my own transitions through space during my spouse's deployments and cross-country moves. Moving together and apart, we navigate relational and place-based shifts. My paintings speak to these switches — presence and absence, here and there, in and out — marking times between reunions and farewells. Clouds are ephemeral, ever-changing, and constantly present as part of our daily ritual. Though shifting themselves, they offer predictability during times of change and transition. Layers build within the paintings, creating a sense of long-term investment within the expansiveness of rendered space.

Project type: Visual Arts

005 - Isaac Trujillo

Process the Stone

2018 Fall - College of Liberal Arts

Join Isaac Trujillo as he discusses how his life found a new direction through the discovery of outdoor rock climbing. Isaac is a second-year master's student in the department of Art and Art History here at Colorado State University. Isaac received his Bachelor of Fine Art in 2017 at The University of New Mexico. Isaac has specialized in the traditions of stone lithography. Today his research combines both his passions of rock climbing and printmaking as a conceptual vehicle to support his ideas.

Project type: Visual Arts

006 - Evan Acerbo

The Effects of Sulforaphane on Nitric Oxide Induced Mitochondrial Dysfunction

2018 Fall - College of Veterinary Medicine and Biomedical Sciences

A disruption in the balance of mitochondrial dynamics has been implicated as the driving force for many age-related neurodegenerative diseases. Nitric oxide is a biological signaling molecule that has been shown to promote mitochondrial fission in a DRP1 dependent manner and found to be elevated in numerous age-related neurodegenerative diseases. Sulforaphane, an isothiocyanate derived from cruciferous vegetables and has recently demonstrated a novel ability to beneficially modulate mitochondrial dynamics through inhibiting mitochondrial fission. My research intends to further

investigate the effect of SFN as a treatment option to beneficially modulate mitochondrial dynamics in a nitric oxide-based neurodegenerative disease model.

Project type: Research, Scholarship, and Entrepreneurship

007 - Diane Aceveda

Engineering and Evolving Proteins with Designer Function

2018 Fall - College of Natural Sciences

Traditionally, therapeutic discovery has focused on small organic molecules (MW <800 Da) that target disease-relevant proteins. However, most proteins are deemed 'undruggable' because they lack largely hydrophobic small molecule binding sites. My research has focused on two projects, which aim to move beyond the 'small molecule – protein targeting' paradigm in therapeutic discovery. In my first project, I used mutagenesis and yeast display to optimize an RNA recognition motif (RRM) to specifically bind oncogenic microRNA-21. Additionally, I engineered chimeric proteins that will lead to a biologic that selectively and potently destroy HER2 positive breast cancer cells via antibody-dependent cellular cytotoxicity(ADCC).

Project type: Research, Scholarship, and Entrepreneurship

008 - Ethan Ader

Geomorphic Effects of Channel Spanning Logjams on Hyporheic Exchange Flow

2018 Fall - Warner College of Natural Resources

Recent studies have documented the benefits of enhanced hyporheic exchange flow (HEF) in streams. These benefits include the transfer of nutrients, solutes, and dissolved oxygen into the hyporheic zone, which can increase stream health and promote biodiversity. While it is known that the presence of individual channel spanning logjams increases HEF, there have not yet been studies on multiple consecutive logjams and on whether they have an additive or nonlinear effect on HEF. We examine relations among wood load, channel geometry, and HEF in four reaches of Little Beaver Creek, Colorado with differing instream wood abundance.

Project type: Research, Scholarship, and Entrepreneurship

009 - Aditya Aditya

Value Chain Upgradation in Indian Agriculture: A case of 'DeHaat'

2018 Fall - College of Liberal Arts

ICT based agriculture startups have been rising in the Indian agriculture and transforming the agriculture value chain with innovated offerings. The current study focuses on one such startup working with an innovative model 'DeHaat,' which, with its inclusive approach, has generated higher margins for thousands of farmers of North India in a short span of time. The study looks at the value chain transitions which took place at different levels after the intervention of 'DeHaat' and investigates the new roles of the involved actors and Institutions.

Project type: Research, Scholarship, and Entrepreneurship

010 - Becky Agard

Moving Together: Understanding Parents' Perceptions of Activity and Movement Skills

2018 Fall - College of Health and Human Sciences

Parents (n=31) of preschoolers were interviewed about their experiences with physical activity (PA) and the parenting practices they use to promote PA and the development of fundamental movement skills (FMS) in their children. Interviews were coded and analyzed using a constant comparative approach.

Parents value their preschoolers' participation in PA and the development of FMS but are not

deliberately teaching FMS to their preschoolers. Interventions should help parents engage children in FMS and PA to develop physical literacy - the ability to move with competence and confidence in a wide variety of PA in multiple environments.

Project type: Research, Scholarship, and Entrepreneurship

011 - Neha Ahuja

Myocardial Afterload is an Epigenetic Regulator of Cardiac Valve Formation

2018 Fall - University Interdisciplinary Programs

Congenital heart defects affect 2% of the population. It is becoming increasingly evident that perturbation of hemodynamics causes pathology. Here we present a zebrafish model in which we explore the impact of myocardial afterload on valve development. Myocardial afterload is defined as the resistance that the ventricle must overcome in order to successfully pump blood. Increased myocardial afterload causes an elongation of the valves, as well as increased expression of flow-responsive gene *klf2a*. Our results highlight myocardial afterload as a biomechanical regulator of valve development.

Project type: Research, Scholarship, and Entrepreneurship

012 - Ali Akherati

A Comprehensive Model to Simulate Biomass Burning Organic Aerosol

2018 Fall - Walter Scott, Jr. College of Engineering

Biomass burning, which includes wildfires and prescribed burning, is the largest combustion source of organic aerosol (OA) to the atmosphere and has large impacts on visibility, climate and human health. Despite the importance, very little is understood about the atmospheric evolution of biomass burning organic aerosol and how it varies with biomass type and burn conditions. Further, regional and global models are unequipped to simulate the atmospheric processes that eventually control the climate- and health-relevant properties of biomass burning organic aerosol (BBOA). In this work, a comprehensive model has been developed to address BBOA processes and evolution.

Project type: Research, Scholarship, and Entrepreneurship

013 - Tasnuva Alam

Bimanual Control Differs Between Force Generation and Force Release

2018 Fall - College of Health and Human Sciences

Bimanual activities require precise control and coordination of forces to achieve a common goal. We compared bimanual task performance and coordination between gradual force increment and decrement during isometric finger flexion. The task performance was less accurate and more variable during force decrement versus increment. Reduced bimanual task performance was predicted by greater coordination between two forces across the phases and was impaired while decreasing forces. Lower coordination of two forces contributes to greater task performance by allowing two hands to act independently and compensate for errors, which seems difficult while decreasing bimanual forces, adding dimensions in motor control studies.

Project type: Research, Scholarship, and Entrepreneurship

014 - Rasha Alnefaie

Characterization of Zebrafish Models of Filamin C Related Cardiomyopathy

2018 Fall - University Interdisciplinary Programs

Cardiomyopathies are a group of cardiac muscle diseases characterized by abnormal function and/or structure of the myocardium which cause arrhythmia, heart failure and sudden death. Most of genetic alterations that cause inherited cardiomyopathies are still unknown. To date, few studies have

investigated the relationship between cardiomyopathy and FLNC. The lack of an appropriate animal model system has limited search into the mechanism of pathology in this disease and the role of filamin C in cardiac muscle development. To comprehend in detail the contribution of filamin C to cardiac phenotypes, we developed zebrafish loss-of-function models for two filamin C paralogous genes.  
Project type: Research, Scholarship, and Entrepreneurship

015 - Mohammed Al-refai

Using Fuzzy Logic for Model-Based Regression Test Selection

2018 Fall – College of Natural Sciences

UML Models can be used to plan and manage the evolution of a software system. Regression testing of the evolved system is needed but can be expensive, and regression test selection (RTS) approaches are used to reduce its cost. The existing model-based RTS approaches use behavioral diagrams. These diagrams are rarely provided in practice, which limits the applicability of the model-based RTS. To improve its applicability, we propose a new model-based RTS approach that only uses the structural UML class diagram, the most provided diagram type in practice, and uses Fuzzy logic to address the unavailability of the behavioral information.

Project type: Research, Scholarship, and Entrepreneurship

016 - Noelia Altina

A Novel Susceptibility Factor for Prion Disease: Sps1

2018 Fall - University Interdisciplinary Programs

Prion diseases are a group of infectious neuronal disorders associated with the conversion of PrPC to PrPSc (pathogenic protein) that leads to the accumulation of misfolded proteins causing progressive neurodegeneration. The only known susceptibility factor in prion diseases is PrPC, however, some cells are resistant to disease with PrPC expression. To determine other susceptibility factors we studied differential expression changes in S vs R cell using RNAseq. This revealed a rise in selenophosphate synthetase1 (SPS1) in R cells. To further address the role of SPS1 we will test the addition of selenium metabolites on modulation of SPS1 and cellular susceptibility.

Project type: Research, Scholarship, and Entrepreneurship

017 - Kendra Andrie

Nrf2-Signaling in OA-Prone Hartley Guinea Pig Chondrocytes In Vitro

2018 Fall - College of Veterinary Medicine and Biomedical Sciences

Chronic inflammation and oxidative stress are key contributors to the pathogenesis of osteoarthritis. Nuclear-factor-erythroid-2-related-factor-2 (Nrf2) serves as a master regulator of anti-inflammatory genes with cytoprotective effects. The objective of this project is to characterize the role of Nrf2-signaling in directing antioxidant responses of guinea pig chondrocytes in vitro. We have demonstrated that sulforaphane, a Nrf2 agonist, increases Nrf2-signaling and diminishes intracellular reactive oxygen species (iROS). In contrast, brusatol, a Nrf2 inhibitor, mitigates Nrf2-signaling while increasing iROS. Collectively, this work provides insights into the underlying pathogenesis of osteoarthritis and aids in the development of novel therapeutics for managing disease.

Project type: Research, Scholarship, and Entrepreneurship

018 - Kaytee Ankrom

Plant-Parasitic Nematodes: Response to Changing Precipitation Regimes

2018 Fall - College of Natural Sciences

Climate models forecast an intensification of the global hydrological cycle. The distribution, structure, composition, and diversity of plant populations and communities will be affected by altered precipitation regimes, having long reaching consequences for ecosystems. Plant response to precipitation changes is of the utmost importance for an ecosystem because varied precipitation effects herbivory. Belowground plant parasitic nematodes (PPN) directly impact plant productivity and survivorship as well as indirectly affect many rhizosphere interactions, playing an integral role in soil food webs. However, the response of PPN to changes in precipitation are little known, especially in grasslands which cover 40% of our earth.

Project type: Research, Scholarship, and Entrepreneurship

019 - Ryan Arey

A Rat-Specific PBPK Model for the Antimalarial Drug Artesunate

2018 Fall - Walter Scott, Jr. College of Engineering

Several artemisinin-based drugs have proven to be effective in helping to combat the global malaria epidemic. To optimally apply these drugs, information about their tissue-specific disposition is required. Physiologically-based pharmacokinetic (PBPK) modeling is a useful technique for predicting these pharmacokinetic behaviors. In this study, a PBPK model was developed to simulate the time-dependent tissue concentrations of artesunate and its active metabolite in rodents. The model was then parameterized using data from the literature and predictions were made for a simulated population of animals. Once validated, it is expected that this model can be scaled up for dose optimization in humans.

Project type: Research, Scholarship, and Entrepreneurship

020 - Zeyad Arhouma

Decavanadate Inhibits Microbacterial Growth More Potently than Other Oxovanadates

2018 Fall - University Interdisciplinary Programs

The effect of different vanadate salts on the growth of *Mycobacterium smegmatis* (M.smeg) and *Mycobacterium tuberculosis* (M.tb) was investigated, and speciation was found to be critical for the observed growth inhibition. Decavanadate (V10) complex was found to be a stronger inhibitor of bacterial growth than the oxovanadate (V1). The vanadium(V) speciation in the growth media and conversion among species under growth conditions was monitored using 51V NMR spectroscopy and speciation calculations. The findings presented in this work investigate the interactions of oxometalates with other biological systems.

Project type: Research, Scholarship, and Entrepreneurship

021 - Addie Arnold

Access Solar: Everybody's Energy

2018 Fall - College of Business

Community solar expands solar energy access by providing homeowners, renters, and businesses equal access to the economic and environmental benefits of solar energy. However, within the industry customer acquisition is a financial and operational challenge for project developers. Access Solar's services address this by providing a turnkey solution to customer acquisition for developers. Our company streamlines the acquisition process and reaches customers through property management groups, community organizations, and electronic media marketing. The market is expected to expand, with capacity experiencing a 44-fold increase from current levels by 2030. Access Solar projects sustained growth, profitability, and positive cash flow.

Project type: Research, Scholarship, and Entrepreneurship



022 - David Atkins

Pine Wilt Disease in the Front Range Region of Colorado

2018 Fall - Warner College of Natural Resources

This project aims to describe the epidemiology and pathogenicity of pine wilt disease. Pine wilt disease the result of infection by an insect-vectored nematode (PWN) which results in a lethal wilting disease that can cause mortality in pine trees in a matter of weeks. Pine wilt disease was thought to only affect non-native pine species, but in 2016 There were reports of pine wilt in native Ponderosa pines that were believed to be resistant. This study will result in knowledge of PWN and its vectors that will help inform management practices and result in novel treatment protocols.

Project type: Research, Scholarship, and Entrepreneurship

023 - withdrawn

024 - Shadi Azadegan

Vulnerability, Resilience, and Social Justice in Disaster Recovery

2018 Fall - College of Liberal Arts

The materially destructive and socially disruptive impacts of natural hazards run parallel to patterns of historical inequality that put marginalized communities in harm's way. This qualitative research project explores disaster recovery in a low-income Hispanic community in Houston, Texas that was impacted by Hurricane Harvey (i) as a lived experience at the household level; (ii) as a process of neighborhood organization at the community level; and (iii) as part of a broader response at the city level. Research outcomes will support disaster recovery initiatives to better understand and explicitly address vulnerabilities and structural barriers to resilience rooted in social injustice.

Project type: Research, Scholarship, and Entrepreneurship

025 - Rita Azaltovic

Environmental Education Workshop for CSU Todos Santos Center

2018 Fall - College of Agricultural Sciences

This is a proposal for a workshop that will be conducted at the Colorado State University (CSU) Todos Santos Center in Baja California Sur, Mexico during the Spring 2019 semester. The purpose of this workshop is to promote community awareness by starting a lasting conversation amongst community members about the long-term health of their water supply. Going forward, the hope is that this workshop will be the first of a series of environmental education workshops in Todos Santos and will even be repeated in the future to continue the conversation amongst community members in Mexico and CSU community combined.

Project type: Research, Scholarship, and Entrepreneurship

026 - Nate Bachman

Assessment of Cardiovascular Disease Risk in Ultra-Endurance Athletes

2018 Fall - College of Health and Human Sciences

It is widely accepted that regular physical activity is beneficial for cardiovascular health. Further, aerobic exercise has been proven to reduce cardiovascular disease (CVD) risk in healthy adults. However, recent studies suggest that volumes of exercise that greatly exceed physical activity guidelines may be damaging to the heart. The purpose of this study was to determine if individuals that train for long-duration endurance races (e.g., ultramarathons) for a minimum of 10 years have a greater CVD risk compared to participants that meet minimum physical activity guidelines.

Project type: Research, Scholarship, and Entrepreneurship

027 - Sahar Bagheri Toulabi

Barriers to Adopt Potato with Enhanced Health Properties In Colorado

2018 Fall - College of Agricultural Sciences

Within a food system, adoption of new, innovative practices by growers is complex and influenced by many factors. Potato is a major part of Colorado agriculture, and while breeders have developed innovative cultivars with enhanced-health benefits, they are unavailable to consumers. Here, a mixed method survey experiment was performed to identify barriers by growers to adopt new cultivars in the San Luis Valley, CO. The survey revealed gaps among researchers, retailers and warehouses, which are the major links between growers and consumers. These data are important to develop strategies to improve food security and the Colorado agricultural economy.

Project type: Research, Scholarship, and Entrepreneurship

028 - Kevin Barry

Ice Formation in an Atmospheric River Event During ACAPEX

2018 Fall - Walter Scott, Jr. College of Engineering

Ice formation processes in mixed phase clouds are crucial to understanding cloud phase and precipitation formation, but haven't been well characterized. This project focuses on ice formation during Atmospheric River events over California, which dominate the winter precipitation in the region. Ice concentrations were derived from an aircraft-based Two-Dimensional Stereo optical array probe. This was then compared to in-situ ice nucleating particle concentrations to see where primary versus secondary ice formation dominates in clouds.

Project type: Research, Scholarship, and Entrepreneurship

029 - Katie Becker

Hearing and Seeing Emotion: An Electroencephalography Study

2018 Fall - College of Natural Sciences

Emotion perception occurs via the simultaneous integration of affective voices and faces. It's unclear how these modalities interact and influence perception when integrated. Humans possess a network of neural structures dedicated to face recognition, which is distinct from brain regions devoted to prosody recognition. This study examined changes in brain activity using electroencephalography and emotional vocalizations produced in neutral, angry, and happy tones. Face stimuli consisted of morphed continuums of an actor portraying a happy and angry face. Results showed that voice prosody biased subjects' perception of the faces and produced activity in occipito-parietal, frontal, and motor areas.

Project type: Research, Scholarship, and Entrepreneurship

030 - Braden Beckstrom

Carbon Sequestration Through Algae Based Bioplastics and Biofuel Production

2018 Fall - Walter Scott, Jr. College of Engineering

A great need exists to combat the effects of climate change through changes in traditional CO<sub>2</sub> management practices. CO<sub>2</sub> utilization through algae biomass has undergone extensive research, with most of the focus being on producing renewable fuels. In the case of algal based durable bioplastics, algae not only has the potential to produce clean, renewable fuels, but also to sequester large amounts of CO<sub>2</sub> in a useful product. A large market and high product value indicate bioplastics as promising avenue for carbon utilization. This project leverages engineering process models to analyze the economics and sequestration potential of algae bioplastics.

Project type: Research, Scholarship, and Entrepreneurship

031 - Aerial Belk

Using the Microbiome to Estimate the Postmortem Interval

2018 Fall - College of Agricultural Sciences

The time since death, also known as the postmortem interval (PMI), is a crucial metric for forensic investigations but becomes difficult to estimate after 48 hours. The objective was to measure changes in the microbiome associated with human remains and use this to create a model for estimating PMI. Three bodies each placed at three anthropological research facilities and swabbed daily for 21 days, and 16S rRNA amplicon data was generated. When included in a machine learning model, these data were able to predict PMI within +/- 3-4 days. Therefore, the microbiome has potential as a tool for forensic investigations.

Project type: Research, Scholarship, and Entrepreneurship

032 - Stefanie Berganini

Homelessness in Fort Collins: Social Services, Stigma, and Policy

2018 Fall - College of Liberal Arts

Rather than recognize the structural roots of homelessness, neoliberalism positions homelessness as an individual personal failing. This neoliberal imaginary generates extreme stigma against the homeless, with serious ramifications. In Fort Collins, a well-networked system of public services does some things well, but a lack of structural awareness means that crucial gaps exist in meeting the needs of those experiencing homelessness in our community. The city's attempts to balance public sentiment against the needs of the homeless leads to some programs and policies which – while well-intentioned – criminalize homelessness and make the lives of homeless residents worse, not better.

Project type: Research, Scholarship, and Entrepreneurship

033 - Hannah Berry

Overcoming the Plant Growth Defense Tradeoff by Manipulating Hormonal Crosstalk

2018 Fall - University Interdisciplinary Programs

Hormonal crosstalk is essential to plant survival, through the regulation of growth and responses to abiotic/biotic stresses. In plants, high levels of resistance to pathogens often lead to decreased plant growth, a process known as growth-defense tradeoff. We investigated the crosstalk between the defense-related hormone salicylic acid and the growth-related hormone cytokinin. Our findings show that manipulation of the levels and signaling of these hormones changes how plants grow and resist to pathogens. Such hormonal crosstalk may form the basis of future efforts in synthetic biology for the development of advanced crops with increased pathogen resistance and superior plant yield.

Project type: Research, Scholarship, and Entrepreneurship

034 - Deniz Besiktepe Karaman

Analysis of the Maintenance Work Order Data in Educational Institutions

2018 Fall - Walter Scott, Jr. College of Engineering

As a part of facilities management (FM), building maintenance activities occupy a significant role in reaching the goal of delivering an acceptable level of performance while minimizing costs and failures. For institutional organizations, an effective FM approach is required to ensure their buildings function properly. Historical work order data may potentially include a substantial value for assessing the condition of building systems by helping to identify common maintenance activities. This study conducts a preliminary analysis of historical work order data collected from six educational institutions in the State of Colorado and Connecticut in the United States between 2008 and 2018.

Project type: Research, Scholarship, and Entrepreneurship

035 - Harmonie Bettenhausen

New Life for Old Traits: Omics of Heirloom Malted Barley

2018 Fall - College of Agricultural Sciences

In brewing, barley (*Hordeum vulgare*) is malted to provide saccharides and enzymes for fermentation, however the malt also contains thousands of metabolites that may influence flavor. Here, we characterized metabolite variation in a collection of heirloom varieties and more current varieties gathered from various sources by the Montana State University Barley Breeding Program. The goals of this study are to determine chemical profile and metabolite variation among 160 heirloom barley genotypes. Metabolomics platforms were used to characterize chemical variation among the barley and malt.

Project type: Research, Scholarship, and Entrepreneurship

036 - Wyatt Beyers

Defining Two Pore Channel Two's Role in Melanosome Homeostasis

2018 Fall - College of Natural Sciences

Two Pore Channel Two (TPC2) has been implicated as a key player in regulating melanosomes, the organelles where melanin is synthesized. Our lab has shown that TPC2 knockout cells have melanosomes that are less acidic and larger than wildtype melanosomes. One mutation, TPC2 G734E is highly associated with the shift from brown to blonde hair. We hypothesize that TPC2 interacts with another protein that is responsible for delivering melanogenic cargo or initiating the membrane recycling process. Here, I utilize the BioID2 system to identify TPC2 interacting proteins, and demonstrate that the first of many hits, cortactin, interacts with TPC2.

Project type: Research, Scholarship, and Entrepreneurship

037 - Vishwajeet Bhosale

Automated Attack Graph Generation for The Home IoT Environment

2018 Fall - Walter Scott, Jr. College of Engineering

As the horizons of computer systems expand, the space is filled with very diverse set of devices. A large number of vulnerabilities follow this, as the complexity and connectivity increases. The epitome of this structure can be best described by IoT (Internet of Things) devices in a home environment where there is no network administrator present. The proposed tool parses the online vulnerability databases such as National Vulnerability Database, using a hybrid approach combining ML (Machine Learning) and POS (Part of Speech Tagging) and creates a host based attack graph of the entire home network based on the information extracted.

Project type: Research, Scholarship, and Entrepreneurship

038 - Tom Bickett

T Cell Independent Mechanisms of Protection Against *Mycobacterium Tuberculosis*

2018 Fall - University Interdisciplinary Programs

For almost a century the *Bacillus Calmette–Guérin* (BCG) vaccine has been used to protect against *Mycobacterium tuberculosis* infection, and today 157 countries still universally recommend it. Despite these efforts, *M. tuberculosis* currently infects one-third of the world's population and is responsible for millions of deaths annually. BCG Vaccine efficacy varies widely and protection wanes over time, but little is understood about its poor success rate. This study focuses on early immune responses shortly after BCG vaccination to understand the mechanisms through which BCG establishes protection to aid the development of a more effective alternative.

Project type: Research, Scholarship, and Entrepreneurship

039 - Tyler Biebighauser

Dynein at the Kinetochore

2018 Fall - College of Natural Sciences

There are various mechanisms in an animal cell to ensure that when it divides its chromosomes for cell division, it does so accurately, with chromosomes equally distributed between the two resulting cells. One mechanism is called the spindle assembly checkpoint (SAC), which checks to ensure that all chromosomes are bound to microtubules prior to anaphase, so that the microtubules can depolymerize to separate the chromosomes. The microtubule motor dynein helps suppress the SAC upon microtubule attachment by physically carrying proteins involved with the SAC away from the chromosome. I propose to study the regulation behind how dynein suppresses the SAC.

Project type: Research, Scholarship, and Entrepreneurship

040 - Dave Bissinger

Prions are Commonly Present in Muscle of CWD-Infected Animals

2018 Fall - College of Veterinary Medicine and Biomedical Sciences

Chronic wasting disease (CWD), a transmissible spongiform encephalopathy occurring naturally in wild cervids, represents a direct and growing threat to wildlife and an as-yet unknown threat to humans and domestic species. Muscle tissue is likely the most significant source of human and domestic animal exposure through the consumption of CWD-contaminated venison. Here we have combined two powerful in vitro amyloid amplification techniques to detect CWD muscle seeding; analysis of multiple muscle locations demonstrated that CWD prion seeding activity can be identified throughout skeletal muscle sites at concentrations too small for reliable detection using conventional protein detection assays.

Project type: Research, Scholarship, and Entrepreneurship

041 - Jenn Bjerke

Uptake and Cellular Localization of Differentially Resurfaced Cell-Penetrating Nanobodies

2018 Fall - College of Natural Sciences

Development of small molecules to target disease relevant proteins has dominated the pharmaceutical field. In reality, only ~2% of the proteome has been targeted by these molecules. Biologics benefit from size, complexity and protein-engineering methods to generate therapeutics that challenge their small-molecule competitors. However, proteins are limited by their inability to cross the lipid bilayer of mammalian cells, limiting them to disease relevant receptors and extracellular targets. We have shown that increasing the overall positive charge of surface exposed residues on small scaffold proteins increases the ability to cross the cellular membrane, and potentially access cytosolic targets.

Project type: Research, Scholarship, and Entrepreneurship

042 - Hayley Blackburn

Civic Discourse in Online Spaces Around Marvel's Black Panther Film

2018 Fall - College of Liberal Arts

This qualitative, political discourse analysis categorized 3,000 comments about Black Panther to extend the literature on civic engagement in online publics. Often the space fostered information exchange and discussion suggesting that entertainment-media offers consumers a viable entry point to public deliberation on civic issues worthy of scholarly attention. However, some users undermined the space through avoidance strategies. The frequently observed rhetoric of antiracism, reverse racism, disavowal, and skepticism operate in two problematic ways: allowing citizens to 1) rhetorically distance

themselves from discourse by not acknowledging the opportunity for conversation and 2) resist information that may challenge previously held beliefs.

Project type: Research, Scholarship, and Entrepreneurship

043 - Raven Bough

Characterization of Novel Quizalofop Herbicide Resistance in CoAXium Wheat

2018 Fall - College of Agricultural Sciences

This project characterizes non-GMO quizalofop resistance in CoAXium and related wheat lines. Despite equivalent, novel resistance mutations for the herbicide target, differences were observed between wheat lines for whole-plant resistance and quizalofop degradation over time. Enzyme-level resistance was related to the number of resistance mutations. These results confirm that the novel wheat resistance mutation is additive, yet increased resistance likely involves additional genetic factors. Further analysis is necessary to identify the unknown factors. As new, locally-adapted CoAXium wheat lines are developed, breeders should select for both the novel mutation and the other genetic factors contributing to resistance.

Project type: Research, Scholarship, and Entrepreneurship

044 - Maggi Braasch-Turi

Progress Towards the Total Synthesis of Versiquinazoline B

2018 Fall - College of Natural Sciences

As cancer treatments move toward targeted approaches, molecules that inhibit enzymes associated with the proliferation of cancer cells, for example thioredoxin reductase, are of interest.

Versiquinazoline B (VQB) is a natural product inhibitor of thioredoxin reductase isolated from *Aspergillus versicolor* LZD-14-1. Total synthesis of VQB will aid in the study of the molecule in the active site and help understand how the molecule inhibits TrxR. Analogues of VQB can be achieved throughout the synthesis to probe the active site further and improve inhibition. Once achieved, VQB and its analogues can move forward to clinical trials and advance targeted cancer therapy.

Project type: Research, Scholarship, and Entrepreneurship

045 - Jared Brewer

Ketones and Atmospheric Detergents: How the Atmosphere Cleans Itself

2018 Fall - Walter Scott, Jr. College of Engineering

Humans pollute the atmosphere, with impacts on human health, global climate, and ecosystems worldwide. When ketones interact with UV light, powerful oxidants are formed, which can destroy these pollutants. Thus, understanding precisely how ketones breakdown in sunlight is essential to understanding the atmosphere's self-cleansing capacity. This work presents novel measurements of the absorption spectra of three ketones at a range of atmospherically relevant temperatures, and uses these measurements to build a model of how temperature impacts the rate of ketone-UV interaction. Our work suggests that rate is 20-25% slower than previously believed, with potential implications for atmospheric self-cleaning capability.

Project type: Research, Scholarship, and Entrepreneurship

046 - Zachary Bruick

Subtropical South American Hailstorm Characteristics and Environments

2018 Fall - Walter Scott, Jr. College of Engineering

Subtropical South America has some of the deepest thunderstorms and most frequent large hail on earth. Hail in this region has been known to cause extensive damage to property and agriculture (e.g.,

wineries, soybean and wheat crops) due to its large size and frequency, especially in central Argentina near the Andes foothills. This study utilizes satellite observations and model reanalyses of thunderstorms to understand the characteristics and environments that distinguish hailstorms from storms that do not contain hail. The results of this study can be used to enhance public safety and economic well-being through improved forecasting of these hazardous storms.

Project type: Research, Scholarship, and Entrepreneurship

047 - Dylan Buglewicz

Carbon-Ion Radiotherapy: Radiosensitizers and Biological Effects Surrounding the Bragg Peak

2018 Fall - College of Veterinary Medicine and Biomedical Sciences

The sharp high dose Bragg peak of the carbon-ion beam helps it to deliver the highest dosage to the malignant cells while leaving the normal cells relatively unharmed. However, the precise range in which it distributes dosages that significantly induce cell death or genotoxicity surrounding its Bragg peak remains enigmatic. We have developed a technique which has allowed us to examine the full beam length in a single system to address how this range increases with increasing dosages. Furthermore, to lower the initial dosage required to treat the malignant cells we have examined utilizing copper and cobalt as radiosensitizers.

Project type: Research, Scholarship, and Entrepreneurship

048 - Zachary Butz

An In Situ Nanoparticle for Biological Electron Microscopy

2018 Fall - College of Natural Sciences

The inability to directly visualize cellular components has become a barrier in the further understanding of the mechanisms of protein interaction within a cell. Light microscopy and protein crystallography leave a gap in observed cellular phenomenon by lacking resolutions for in vivo protein. I submit the use of metal reducing enzymes as a genetically encoded tag for inorganic nanoparticle formation proximal to a target protein, i.e. an inorganic GFP analogue. This inorganic tag has already shown promise within *Escherichia coli* and will be moved into mammalian HeLa cells for further compatibility studies.

Project type: Research, Scholarship, and Entrepreneurship

049 - Matthew Cackovic

Fabrication of Superomniphobic Paper

2018 Fall - Walter Scott, Jr. College of Engineering

Super-repellant surfaces (i.e. surfaces that can repel liquids) have garnered significant interest due to their numerous applications. In this work, we fabricated a superomniphobic paper surface (i.e. a paper surface that repels most liquids including most oils). Our substrates demonstrate low roll off angle and high contact angles. We use our superomniphobic surface to demonstrate a lab-on-paper application by creating an on-paper pH sensor. We envision that due to simple fabrication, flexibility, light weight, low cost, and high droplet mobility that our superomniphobic paper will have a wide variety of lab-on-paper based applications.

Project type: Research, Scholarship, and Entrepreneurship

050 - Amanda Carlson

Disturbance Effects on Below-Canopy Temperatures Under Extreme Weather Conditions

2018 Fall - University Interdisciplinary Programs

Southwest Colorado has recently experienced severe bark beetle outbreaks, large wildfires, and extreme high temperatures and drought. These combined stressors raise questions about the future of high-

elevation forests, which are expected to decline over the 21st century as climatically suitable ranges contract. To better understand how forest change may be affected by a combination of disturbance and weather patterns, we deployed a network of temperature sensors in recently burned and bark beetle-affected forest plots across a topographic gradient. This data will allow for improved predictions of forest geographic distribution shifts as a result of warming and disturbance in mountain environments.  
Project type: Research, Scholarship, and Entrepreneurship

051 - Ellie Casas

Simplified Understanding of Boundary-Layer Structure Impacts on Tropical Cyclone Intensity

2018 Fall - Walter Scott, Jr. College of Engineering

The tropical cyclone boundary layer (TCBL) plays an important role in storm structure and intensity change, but the impacts are difficult to understand due to complex non-linear interactions with the mean vortex above the boundary layer and limited observations. In this study, we derive a new, simple logistic growth equation (LGE) for the maximum axisymmetric tangential wind speed from first principles that uses TCBL structural characteristics and the surface drag coefficient to determine potential tropical cyclone intensification rates. As a result, the simplified LGE elucidates a conceptual framework that highlights relationships between TCBL structure, surface drag, and intensity change.

Project type: Research, Scholarship, and Entrepreneurship

052 - Ting Cha

Comparison of Wind Retrieval Techniques from Single and Multi-Doppler Radar

2018 Fall - Walter Scott, Jr. College of Engineering

The wind retrieval technique either from single or multiple Doppler radar analyses to derive the tropical cyclones kinematic structure have been widely utilized for decades. Although each platform has its own advantages and disadvantages, none of previous studies conducts the comparison comprehensively between the two platforms due to lack of simultaneous observations. Hurricane Matthew (2016) was observed by the NEXRAD KAMX ground-based and NOAA P3 airborne radars when it approached the southeastern United States for five hours, providing a unique opportunity to evaluate the techniques. This study also presents an improved algorithm for the single Doppler radar wind retrieval.

Project type: Research, Scholarship, and Entrepreneurship

053 - Aung Chan

Habitat Use of Asian Elephant in Myanmar

2018 Fall - Warner College of Natural Resources

Asian elephants (*Elephas maximus*) are in a dire strait. Spanning across Southeast Asian countries, India, and China, the wild populations are facing threats as human population and development continue to expand. Elephants are an integral part of these ecosystems by serving as an umbrella species and providing other wildlife with favorable habitat structures. Being a large mega herbivore, they require a large area of habitat. Unfortunately, rapid development in the range countries is increasing the frequency of human and elephant contact. We aim to quantify important habitat features for elephants along the agricultural gradient to further management of the species.

Project type: Research, Scholarship, and Entrepreneurship

054 - Divya Chawla

Improving Training of Health Workers in Rural India Using e-Learning

2018 Fall - University Interdisciplinary Programs



Accredited Social Health Activists (ASHAs) are female community health workers, appointed in every village in India, to work as an interface between the community and the public health system and deliver basic health services to the residents of the village. According to the Indian Public Health Standards (IPHS), ongoing training of ASHAs is crucial to maintain quality of services delivered by her. e-Learning has evolved as a preferred training platform for rural health workforce, globally. The proposed solution will replace classroom-based training with e-learning, delivered via interactive modules, to enhance the training of ASHAs and improve rural health in India.

Project type: Research, Scholarship, and Entrepreneurship

055 - Rebecca Cheek

Mechanisms Reinforcing Microgeographic Divergence in an Island Endemic

2018 Fall - University Interdisciplinary Programs

Fine-scale genetic structure in natural populations is becoming increasingly ubiquitous in the fields of population and landscape genetics. But few studies have explored the relative contribution of both natural selection and gene flow within continuously distributed populations. To do this, we must disentangle effects of isolation by distance and isolation by environment in the wild and ask how these evolutionary processes drive genetic divergence at smaller scales. I will answer this question by assessing how gene flow and natural selection shape genetic divergence in an avian system exhibiting patterns of morphological differentiation between discrete habitats.

Project type: Research, Scholarship, and Entrepreneurship

056 - Peter Chen

Techno-Economic Limitations of Algal Biofuel Cultivation and Conversion

2018 Fall - Walter Scott, Jr. College of Engineering

Techno-economic analyses of current algal biomass production technologies typically value biomass at \$450 to \$500 per dry ton of ash-free dry weight (AFDW). However, in order to make algal biomass production economically favorable, the purchase price needs to be reduced by more than half based on current conversion technologies. This study leverages a detailed open raceway pond (ORP) growth model and an algal biorefinery model to define a sustainable biomass cost and what is required to achieve this goal in terms of the growth system.

Project type: Research, Scholarship, and Entrepreneurship

057 - Ming-Hao Cheng

Integrated Biosensor for Monitoring Metabolic Rate of Single Cell

2018 Fall - Walter Scott, Jr. College of Engineering

Selection of the most viable embryo for transfer after in vitro fertilization has been a critical issue for a long time. Traditionally, scientists grade the quality of each embryo base on its morphological score. However, the success rate for woman who is under 35 is only about 40%, which means that there are more than 50% possibility of failure. In this research, we try to use more objective approach, such as oxygen and glucose consumption rate, to provide solid evidence to support the selection of the embryo.

Project type: Research, Scholarship, and Entrepreneurship

058 - Shiva Chenna

Artificial Neural Networks for Predicting Fuel-Consumption and Emissions

2018 Fall - Walter Scott, Jr. College of Engineering

On-road emissions from light-duty vehicles and trucks are highly dependent on driver-behavior, road-grade and many external factors leading to values greater than laboratory type approval process, the

present study is an effort to capture vehicle specific on-road fuel consumption and emissions. On-road data was collected using a Portable Emissions Monitoring System, used to measure vehicular-exhaust emissions in real time. This data was used to develop multiple Neural Network models which were validated against various datasets. These models, when paired with traffic information, can identify and select the energy/emissions efficient route for a vehicle to travel between two points.

Project type: Research, Scholarship, and Entrepreneurship

059 - Benjamin Choat

Spatial Arrangement of Stormwater Infiltration Affects Subsurface Storage and Low-Flows

2018 Fall - Walter Scott, Jr. College of Engineering

Alteration of stream flow often leads to or exacerbates other impairments and by managing stream flow these negative effects may be mitigated. This project provides insight as to how spatial arrangements of stormwater infiltration facilities affect low-flow in streams. An integrated surface-subsurface finite difference numerical model, ParFlow, is used. Preliminary results show distributed infiltration sites lead to increased subsurface storage with increased unsaturated zone storage and decreased saturated zone storage compared to clustered facilities. This project helps close the gap in flow regime management by gaining insight into how stormwater management may be used to manage low-flows.

Project type: Research, Scholarship, and Entrepreneurship

060 - Charlotte Cialek

Visualizing Translation Repression in Live Human Cells

2018 Fall - College of Natural Sciences

All cells use specialized mechanisms to regulate gene expression. Dysregulation of gene expression is detrimental, leading to cell death or cancerous growth. One mechanism employs protein Argonaute and a small molecule of microRNA. Each microRNA is programmed to halt expression of a specific gene or family of genes. However, it's unclear how this happens on a molecular level. My project uses a powerful microscope and novel imaging technology to determine the timeframe and kinetics of microRNA-mediated gene regulation. We developed a system capable of visualizing microRNA-mediated regulation at a single-particle level. We determined that AGO can mediate multiple regulation mechanisms.

Project type: Research, Scholarship, and Entrepreneurship

061 - Caitlin Clark

Volatile Aroma Profiles of Chocolate Refined in a Stone Wet-Grinder

2018 Fall - College of Health and Human Sciences

Melanging is the only step of chocolate-making which is unique to the "craft" chocolate industry; it remains entirely unresearched. This study will employ SPME-paired GC-MS to investigate the effects of time and ambient temperature on the volatile aroma profile of chocolate refined in a stone wet-grinder ("melanger"). Information gained herein will provide much-needed data to allow small-scale chocolate makers to tailor their melanging processes for improved flavor and quality. While this study examines only the effects of time and ambient temperature, future research will test additional variables, seeking to optimize the melanging profile for chocolate products of different categories.

Project type: Research, Scholarship, and Entrepreneurship

062 - Eliza Clark

Dispersal Ecology and Evolution in a Range Expanding Biocontrol Agent

2018 Fall - University Interdisciplinary Programs

Evolutionary theory predicts that individuals from the expanding range edge will evolve different dispersal abilities than those from the range core. *Diorhabda carinulata*, the tamarisk leaf beetle, was released to control the weed tamarisk, and has rapidly expanded its range and adapted to different environments. We tested the effects of mating status, age, and collection location (edge/core) on flight. Unmated beetles flew further than mated beetles and the effect of age depended on the collection location. These parameters will be used to further explore dispersal evolution in *D. carinulata* and provide insight into evolution in biocontrol agents and expanding populations.

Project type: Research, Scholarship, and Entrepreneurship

063 - Emma Clark

Feasibility of Excess Gestational Weight Gain Prevention in Pregnant Adolescents

2018 Fall - College of Health and Human Sciences

Excess gestational weight gain (Excess-GWG) is common in adolescent pregnancy and predicts adverse maternal-fetal/offspring outcomes. There is a need for feasible/acceptable approaches to lessen Excess-GWG. This randomized controlled pilot evaluates feasibility/acceptability and explores potential effectiveness of interpersonal psychotherapy (IPT) to prevent Excess-GWG among 13-19y patients receiving prenatal care at Children's Hospital. After screening, adolescents are randomized to IPT+usual-care or usual-care-only, and followed at mid-pregnancy, end-of-pregnancy, and three-month-postpartum. Feasibility/ acceptability are determined from recruitment/retention, attendance, and acceptability ratings. Clinical outcomes include GWG, perinatal psychosocial/behavioral factors, adiposity, and insulin-sensitivity. This study contributes to development of Excess-GWG prevention in a very high-risk group.

Project type: Research, Scholarship, and Entrepreneurship

064 - Jenny Colussi

Effect of Diclofenac Ophthalmic Solution on Tear Production in Canines

2018 Fall - College of Veterinary Medicine and Biomedical Sciences

Purpose. Topical non-steroidal anti-inflammatory drugs (NSAIDS), such as diclofenac 0.1% ophthalmic solution, are commonly used for ocular inflammatory diseases in veterinary ophthalmology. No studies have examined the effect of this drug on tear production in dogs. The purpose of this study was to determine the effect of topical Diclofenac on tear production in normal dogs when administered SID, BID, TID, and QID for a 5 day period.

Project type: Research, Scholarship, and Entrepreneurship

065 - Victoria Combs

Charge Separation and Transport in Charge Ordered Perovskites for Photovoltaics

2018 Fall - College of Natural Sciences

Perovskite halide materials are a family of crystalline materials with advantageous electronic properties for a variety of applications, including solar energy conversion. Although increasing the efficiency of devices incorporating perovskites has been a central focus of the field, a deep understanding of structure-property relationships in perovskite halide materials remains lacking. Mixed valence materials give a way to study how electronic properties are affected by a built in electric field which arises as a result of charge ordering. The defect perovskite Cs<sub>4</sub>Sb<sub>3</sub>Br<sub>12</sub> is a promising system to investigate the effect of charge ordering on charge separation and other electronic properties.

Project type: Research, Scholarship, and Entrepreneurship

066 - Edson Costa Filho

## Modeling Evapotranspiration Using an Aerodynamic Temperature and Remote Sensing Approach

2018 Fall - Walter Scott, Jr. College of Engineering

Better irrigation water management requires accurate estimates of crop water use. Modeling evapotranspiration (ET) using the surface energy balance approach and remote sensing data has been showing promising results, but the complex nature of heat and momentum transfers among land, plants, and atmosphere has imposed a challenge towards obtaining more accurate crop water consumptive use results. The project aims to improve estimates of crop ET by improving the estimation of sensible heat (H), the most critical component of the surface energy balance, through a combined application of remote sensing data and an aerodynamic temperature approach.

Project type: Research, Scholarship, and Entrepreneurship

## 067 - Jimikaye Courtney

Longitudinal Association of Physical Activity with Intrinsic and Extrinsic Motivation

2018 Fall - College of Health and Human Sciences

Physical activity (PA) and sedentary behavior (SB) affect the risk for obesity and chronic disease. Only 25% of adolescents engage in sufficient PA, and they spend 50% of after-school time in SB. Intrinsic and extrinsic motivation are determinants of PA and SB. We will use data from the NEXT Study and growth modeling to examine the longitudinal relationship between intrinsic and extrinsic motivation, PA, and SB in adolescents. Our findings will inform recommendations regarding the timing/focus of interventions to increase PA and decrease SB among adolescents/young adults. We will present our findings at the Graduate Student Showcase in November 2018.

Project type: Research, Scholarship, and Entrepreneurship

## 068 - Kelley Covington

Fitness Therapy for Cancer Program: Internal and External Validity Evaluation

2018 Fall - College of Health and Human Sciences

The internal and external validity of the Fitness Therapy for Cancer (Fit Cancer) program, was evaluated using the RE-AIM framework: Reach, Effectiveness, Adoption, Implementation, and Maintenance. Participants (N=44) represented 33.8% of fitness club members diagnosed with cancer, and 2.3% of survivors in Larimer county with a similar prevalence of breast cancer (Fit Cancer= 55.6%, County= 41%). Improvements from pre- to post-program were seen in, percent of participants meeting PA guidelines ( $p<0.00$ ), quality of life measured by WHO-5 ( $p=0.03$ ) and sit-to-stand repetitions ( $p=0.00$ ). Fit Cancer was successfully integrated into wellness program infrastructure and group fitness schedule.

Project type: Research, Scholarship, and Entrepreneurship

## 069 - Katie Cronise

Targeting the MAPK Pathway in Canine Transitional Cell Carcinoma

2018 Fall - University Interdisciplinary Programs

Canine transitional cell carcinomas (TCC) of the bladder are typically inoperable tumors at the time of diagnosis and median survival time is less than a year for all treatments. 70% of TCCs harbor mutations in BRAF, a proto-oncogene in the MAPK pathway that is mutated in several human cancers. In this study, we characterize the function of mutant BRAF in canine TCC. TCC cell lines were targeted with MAPK pathway inhibitors and the effect of inhibition on cell proliferation and activation of downstream target was determined. Differentially expressed genes were identified and targeted alone and in combination with MAPK inhibition.

Project type: Research, Scholarship, and Entrepreneurship

070 - Erin Cubley

Riparian Functional Guilds on the Verde River, Arizona

2018 Fall - University Interdisciplinary Programs

Riparian zones are diverse and complex habitats that provide a disproportionate amount of ecosystems services and functions, especially in arid regions. Future climate change projections, coupled with increased anthropogenic water development, threaten riparian ecosystems by altering flow regimes. Studies of riparian vegetation dynamics have typically focused on the response of individual species or cover classes, however, the use of functional groups may allow for process-based predictions in ecological response. Our study explores how functional group abundance varies across hydrologic gradients of groundwater and disturbance on the Verde River in Arizona.

Project type: Research, Scholarship, and Entrepreneurship

071 - James Curlin

Evolution of HIV from SIV in a Humanized Mouse Model

2018 Fall - University Interdisciplinary Programs

The currently circulating HIV-1 and 2 viruses are known to have originated from SIV viruses native to non-human primates. To evaluate how SIVs transformed into deadly HIVs, we used a humanized mouse model to recapitulate the evolution of the virus. The original SIVs were used to infect hu-mice and serially passaged for several generations. Viral pathogenesis was assessed by measuring viral loads and CD4+ T-cell depletion. Genetic changes were analyzed by Next Generation Sequencing (NGS). We found that the original SIVs became more pathogenic with each passage and accumulated many adaptive genetic mutations towards evolving into HIV.

Project type: Research, Scholarship, and Entrepreneurship

072 - Alden Curtis

Nuclear Fusion with High Power Lasers

2018 Fall - Walter Scott, Jr. College of Engineering

Nuclear fusion offers the promise of a clean, renewable energy source once humans gain the capability to harness its incredible power. The goal of this experiment is to allow the necessary fusion conditions to be better studied and understood. We have used a unique high power laser in the Colorado State Advanced Beam Laboratory (ABL) to demonstrate nuclear fusion in the laboratory using special nanostructure targets. In studying the process, we have characterized the hot matter and energy which is expelled during the reaction, which have many uses of their own ranging from medical sources to basic science to defense applications.

Project type: Research, Scholarship, and Entrepreneurship

073 - Kelsie Daigle

Planning for Parental Leave: A Qualitative Analysis of Planning Decisions

2018 Fall - College of Natural Sciences

This is a qualitative exploratory study that aims to increase our understanding about the process by which expectant mothers make decisions about parental leave before they take leave, to identify personal and workplace factors that influence expectant mothers' decision-making about parental leave, and to understand how expectant mothers plan ahead at work and in their career for taking parental leave and returning to work. Semi-structured interview questions have been created based on what relevant theory suggests they may be influencing these experiences. Results will be used to build larger quantitative studies and be the basis for workplace training interventions.

Project type: Research, Scholarship, and Entrepreneurship

074 - Caitlin Daimon

$\beta$ -Endorphin From Proopiomelanocortin Neurons Can Mediate Activity-Based Anorexia

2018 Fall - College of Veterinary Medicine and Biomedical Sciences

Proopiomelanocortin (POMC) neuron over-activation may contribute to the development of anorexia, yet it is unknown whether inhibiting POMC neurons can prevent or lessen this development. Using a rodent model of anorexia called activity-based anorexia (ABA), we examined whether inhibiting POMC neurons could lessen the development of ABA. We found that inhibiting POMC neurons significantly decreases the severity of ABA. We also found that decreases in ABA appear to be mediated by  $\beta$ -endorphin, a peptide produced by POMC neurons. The results suggest a potential mechanism through which POMC neurons can mediate anorexia in a rodent model.

Project type: Research, Scholarship, and Entrepreneurship

075 - Marielle Darwin

Band Together: Community Arts Engagement Affects Age-Related Cognitive Decline

2018 Fall - College of Natural Sciences

The human lifespan has drastically increased throughout the past century. It is imperative that easily accessible preventative options are developed to decrease severity of age-related cognitive decline. BSharp is an interdisciplinary research program aiming to investigate the effect of arts engagement on cognition in older adults. Cognitive data from people-with-dementia (PWD) who attended symphonies and healthy-aging adults (HAA) who participated in dance classes were included in analyses. Paired t-tests indicate that dance classes positively affected cognition in HAA and that symphonies positively affected cognition in PWD. Results indicate that arts events may have a substantial impact on age-related cognitive decline.

Project type: Research, Scholarship, and Entrepreneurship

076 - Haley Davis

Ractopamine in Target and Off-Target Tissues from Yearling Steers

2018 Fall - College of Agricultural Sciences

Due to developing meat trade issues associated with use of Ractopamine Hydrochloride (RH) in livestock production, this study was conducted to assess the impact of imposing withdrawal procedures from RH during cattle finishing. Liquid Chromatography Mass Spectrometry (LCMS) was used to determine concentrations of both parent and total ractopamine in tissues from steers fed RH at a commonly used dose and duration after various withdrawal times (12 hours, 2 days, 4 days, and 7 days). Ten tissues, including liver (regulatory on-target tissue) and abomasum (off-target tissue), were collected at harvest and subjected to cryogenic freezing, homogenizing, and analysis via LCMS.

Project type: Research, Scholarship, and Entrepreneurship

077 - Heather Deel

The Microbial Clock of Human Ribs for Estimating Postmortem Interval

2018 Fall - University Interdisciplinary Programs

Microbial communities drive decomposition and change in a predictable, clock-like manner, and thus could be applied as a forensic tool for estimating postmortem interval (PMI), or time since death. Furthermore, microbial invasion into bones is likely a long process, suggesting that this could estimate PMI over longer time frames. Ribs were collected from human subjects at an anthropological research facility. Bacterial communities were characterized using the 16S ribosomal RNA gene, and a model was

built using machine learning. Errors of approximately five weeks over nine months of decomposition were achieved, indicating that this method has potential for estimating PMI.

Project type: Research, Scholarship, and Entrepreneurship

078 - Mortaza Derakhshani Molayousefi

Deterring Effect of Resins in Aggregation of Asphaltenes

2018 Fall - College of Natural Sciences

Asphaltenes are a class of macromolecules known to be responsible for the formation of deposits in the oil industry. The driving force for such deposition is their high tendency to form aggregates. The effect of resins in the deposition of asphaltene is not very well understood. We have employed the molecular dynamics technique to gain atomistic resolution of the aggregation processes. Our results demonstrate that resins either have no or a deterring effect on the aggregation of asphaltenes depending on their molecular features.

Project type: Research, Scholarship, and Entrepreneurship

079 - Reecie Dern

An Assessment of Dental Age from the Necropolis of Kopila

2018 Fall - College of Liberal Arts

Most archaeological sites yield few sub-adult remains but excavations at an Iron Age, Illyrian necropolis on the island of Korčula, Croatia have generated an abundant collection for analysis. Often, large assemblages of juvenile remains are interpreted as evidence for infanticide. This study primarily assesses age at death based on the stage of dental development for 1177 isolated teeth from three tombs to create a relative age profile for each tomb. Ultimately, the age distributions of these tombs do not suggest infanticide as the impetus for the assemblage. Future research will include assessments of dental non-metric traits and post-cranial remains.

Project type: Research, Scholarship, and Entrepreneurship

080 - Katie DeRose

Evaluation of the Production of Fuels from Distiller's Grains

2018 Fall - Walter Scott, Jr. College of Engineering

Distiller's grains, a by-product of corn-ethanol production, was evaluated as a feed stock for a novel fermentation process to create alternative fuels and high value products. A techno-economic analysis for the process was performed to evaluate the potential economic viability of this process. A life cycle analysis was also performed to confirm if this process could meet Renewable Fuel Standard targets.

Project type: Research, Scholarship, and Entrepreneurship

081 - Matthew Dilsaver

Dynactin, a Molecular Regulator of Motor Protein Dynein

2018 Fall - University Interdisciplinary Programs

As cells divide they undergo mitosis, where chromosomes are separated into daughter cells by a network of dynamic filaments. This network connects to chromosomes to form the mitotic spindle. In budding yeast, the spindle must be positioned at the bud neck to ensure chromosomes are properly segregated to both cells. Dynein, a molecular motor, is critical for positioning, and is regulated by dynactin, a protein complex. In cells lacking dynactin, dynein cannot reach its site of activity, nor generate sufficient force to move the spindle, leading to missegregation of chromosomes. However, how dynactin performs these functions is poorly understood.

Project type: Research, Scholarship, and Entrepreneurship

082 - Kimberly Dolphin

Flexible Decision Making with Social Experiences

2018 Fall - College of Natural Sciences

All animals (including humans) make decisions every day, often these decisions have direct impacts on reproduction and life span. In the Trinidadian guppy (*Poecilia reticulata*), males can either perform a conspicuous courtship display or they can perform a lower risk and less successful sneak behavior. We compared decisions between these alternative mating strategies after experiencing different rearing conditions and subsequent experiences females. Surprisingly, we found that male decisions are not predicted by female interest; however, their previous and acute social experiences do influence decisions. These results demonstrate that even rapid decisions are a culmination of previous experiences.

Project type: Research, Scholarship, and Entrepreneurship

083 - Rachel Doser

The Influence of Reactive Oxygen Species on Learning and Memory

2018 Fall - College of Veterinary Medicine and Biomedical Sciences

In neurons, glutamate receptor transport is vital for learning and memory. Studies show a correlation between learning and memory and intracellular levels of reactive oxygen species (ROS), which are newly recognized signaling molecules. So we ask: do ROS influence glutamate receptor trafficking in neurons, and therefore impact learning and memory? We address this using the transparent, genetically malleable *C. elegans* and in vivo microscopy to visualize glutamate receptors in real time. We have found that an increase in ROS perturbs glutamate receptor trafficking, likely through the modulation of calcium channels and regulatory kinases.

Project type: Research, Scholarship, and Entrepreneurship

084 - Enrique Doster

Antimicrobials in Beef Feedlots: Effects on Microbiome and Resistome Dynamics

2018 Fall - College of Veterinary Medicine and Biomedical Sciences

The increase of antimicrobial resistance (AMR) is a global public health concern and is commonly hypothesized to be driven by antimicrobial use (AMU) in medicine and livestock production. Therefore, it is important to understand how AMU practices in beef feedlot operations impact AMR dynamics in fecal bacteria that could spread to the surrounding environment. Aerobic culture is used to study individual species, but results differ depending on the species studied. Fortunately, high-throughput sequencing can be used to provide a holistic perspective into AMR ecology by sequencing DNA from the entire microbial community (microbiome), including the "profile" of resistance genes (resistome).

Project type: Research, Scholarship, and Entrepreneurship

085 - Erin Dougherty

Changes to U.S. Flash Floods in a Future Climate

2018 Fall - Walter Scott, Jr. College of Engineering

Global climate models suggest that flood exposure will increase globally in a future, warmer climate. However, these models are too coarse to resolve features of flood-producing storms, therefore we utilized high-resolution convection-permitting simulations to accurately represent flash-flood producing storms in a current climate over the continental United States (CONUS), and to analyze how their rainfall - characteristics might change in a future climate. Results show that future flash floods are expected to produce more rainfall - and higher rainrates over the CONUS, which is important for government



officials to consider when planning how to make communities more resilient to climate change impacts.  
Project type: Research, Scholarship, and Entrepreneurship

086 - Kati Dugan

Participants' Perception of Fit Cancer, a Group-Based Community Exercise Program

2018 Fall - College of Health and Human Sciences

Fitness Therapy for Cancer (Fit Cancer) is an 8-week, group-based exercise program designed for cancer survivors at any phase of the cancer journey. The purpose of this study was to evaluate participants' perceptions of group-based exercise classes including sense of community, value of the discussion sessions, and highlights of the program. Participants perceived the group-based format as beneficial and found the discussion sessions useful. The most prominent highlight was making new friends and exercising with a group of survivors.

Project type: Research, Scholarship, and Entrepreneurship

087 - Matt Elmer

Do Regular Wildfires Heat Up the Price of Drinking Water?

2018 Fall - College of Liberal Arts

After a wildfire, changes in soil and vegetation conditions can adversely impact downstream source water before it is treated for human use. This can elevate provisioning costs for water systems and water prices for consumers. Minimal research has examined the long-term economic costs of wildfire on water conditions, and smaller (1,000's of acres) and frequent (yearly) wildfires have been largely ignored, as have potential effects on groundwater. This work addresses these gaps by estimating the economic impact of small regular wildfires on water systems across time. These wildfires are found to significantly impact surface water and increase drinking water prices.

Project type: Research, Scholarship, and Entrepreneurship

088 - Joy Enyinnaya

A Case Study of the Economics of Criollo Cattle Production

2018 Fall - College of Liberal Arts

One of the desirable characteristics of Raramuri Criollo (RC) cattle is their unique foraging behavior and their willingness to travel long distances from water. As a result, they have the potential for decreasing grazing pressure on over-used areas. The economics of producing Criollo cattle in the deserts of New Mexico was explored and compared to production with English breeds typically found on New Mexico desert ranches. The economics of direct marketing of Criollo cattle at farmer's markets and other Arizona outlets by the 47 Ranch near Bisbee, AZ was also evaluated as a case study.

Project type: Research, Scholarship, and Entrepreneurship

089 - Colby Evans

Toward Improved Dynamic Windows: An Investigation of WO<sub>3</sub> Nanorods

2018 Fall - College of Natural Sciences

Here we employ brightfield transmission imaging with in operando potential step experiments in a novel way to investigate the electrochromic properties of small clusters and single h-WO<sub>3</sub> nanorods. The results show heterogeneity in both coloring dynamics and magnitude of optical density (OD) modulation among nanorods. On average, single particles and clusters with few nanorods both color and bleach much faster than a film and show more reversible optical modulation after electrochemical cycling. Optical data were fit using a model that considers the pseudocapacitive nature of h-WO<sub>3</sub> that allowed quantitative assignment of charging processes.

Project type: Research, Scholarship, and Entrepreneurship

090 - Jemma Fadum

The Big Deal About Small Nutrients Changes in Tropical Lakes

2018 Fall - University Interdisciplinary Programs

In the late 1970s and early 1980s, Charles Goldman and Peter Vaux conducted an extensive study of the Yojoa Watershed in Honduras with the goal of evaluating the impending impact of El Cajón dam. Thirty-six years later we return to the watershed to piece together how the mounting pressures of anthropogenic impacts are reshaping Lake Yojoa. Using a combination of nutrient bioassays, C:N:P ratios and seston  $\delta^{15}\text{N}$ , we examine the changing nutrient limitation regime in Lake Yojoa in hopes of better understanding how anthropogenic impacts, such as land use intensification, growing populations and aquaculture, are reshaping in-lake stoichiometry.

Project type: Research, Scholarship, and Entrepreneurship

091 - Michelle Fallon

Low-Temperature Synthesis of Metal Chalcogenides Using an Organic Flux

2018 Fall - College of Natural Sciences

Though solid-state materials have widespread applications, their syntheses often require high temperatures to promote diffusion. Since many materials have interesting low-temperature phases, novel syntheses to make these phases are needed. This research focuses on synthesizing metal chalcogenides using a triphenylphosphine flux. The synthesis of tetragonal iron selenide was optimized, and the synthesis of other metal chalcogenides was explored. It is hypothesized that the chalcogen interacts with the triphenylphosphine promoting reactivity between the metal and the chalcogen. This demonstrates a novel technique that enables materials discovery and simplifies the synthesis of known materials.

Project type: Research, Scholarship, and Entrepreneurship

092 - Mackenzie Ferrante

Family Mealtime with Preschoolers: Differences in Parent Ideals and Reality

2018 Fall - College of Health and Human Sciences

A qualitative study was conducted with parents of preschoolers with limited resources to examine parent practices and perspectives related to family mealtime. Focus group transcripts were thematically analyzed. Parents highly valued mealtimes with their children but found children's behavior during the meal difficult at times. Parents focused on buying children what they enjoyed and would eat for meals and they found children's refusal of a meal or its components frustrating. The parent perspective related to mealtimes with preschoolers is important to help develop interventions designed to help parents in this population with family mealtime.

Project type: Research, Scholarship, and Entrepreneurship

093 - Katie Fialko

Conifer Regeneration and Wildfire Fuels Reduction Treatment Longevity in Colorado

2018 Fall - University Interdisciplinary Programs

To prevent large, severe wildfires in Colorado, fuels treatments aim to reduce the density of mixed Douglas-fir/ponderosa pine forests. Conifer regeneration of these species can decrease the longevity of treatments by transferring surface fire into the crowns of trees and initiating a severe wildfire. This project examined how the abundance and composition of regeneration varies by characteristics including aspect and residual forest density over time since treatment. Longevity will be impacted most

by the retention of abundant Douglas-fir pre-treatment regeneration on north aspects, and by ponderosa pine increasing post-treatment due to the reduction in forest density.

Project type: Research, Scholarship, and Entrepreneurship

094 - Alison Foster

Will Colorado Forests Shift Upwards? Tree Regeneration Under Climate Change

2018 Fall - Warner College of Natural Resources

Climate change is predicted to displace species due to shifts in climatic niche. In Colorado existing broad-scale models suggest that most tree species will be able to successfully migrate, however these models are unable to account for local effects of microclimate and available resources, which are known to be important factors in tree seedling establishment. As such, we investigated seed germination and early seedling survival in a largely- undisturbed mixed-conifer forest. We observed low survival and establishment of lower elevation species, which we believe is likely due to lack of disturbance and constraints of light availability.

Project type: Research, Scholarship, and Entrepreneurship

095 - Sean Freeman

Can We Detect Tornadoic Supercell Conditions from Space?

2018 Fall - Walter Scott, Jr. College of Engineering

Supercellular thunderstorms pose a significant threat to humankind by virtue of the severe weather they produce, including tornadoes. Despite their potential for destruction, the mechanisms that form tornadoes are poorly understood and the differences in environmental conditions between tornadoic and nontornadoic supercells are small. This work focuses on the environmental conditions of tornadoes formed in supercells, which make up most of the strongest tornadoes and 90% of all tornado deaths, and the mechanisms that change with changing environmental conditions. Further, this work determines how accurate instruments, especially space-based instruments, would need to be to distinguish tornadoic and nontornadoic environments.

Project type: Research, Scholarship, and Entrepreneurship

096 - Magda Garbowski

Assessing the Role of Genetic and Trait Variability in Restoration

2018 Fall - University Interdisciplinary Programs

Until recently within-species variation has been ignored in the context of ecological restoration and few studies have considered the influence of trait variability and genetic diversity on the establishment of founding restoration populations. With my research, I aim to understand whether restoration ecologists can target genetic and trait variability to maximize initial establishment and adaptive potential of restored plant populations. I plan to conduct a series of greenhouse and field experiments to assess the role of genetic and trait variability on the establishment and survival of perennial grass populations under the opposing selective pressures of drought and non-native plant competition.

Project type: Research, Scholarship, and Entrepreneurship

097 - Christina Geldert

Exploration of Honeybee Gut Microbiomes by Veterinarians and Honeybee Researchers

2018 Fall - College of Veterinary Medicine and Biomedical Sciences

Now that honeybees are under the jurisdiction of veterinarians, it is essential for collaborative efforts to establish health markers for effective honeybee management, through a new medical lens. A major concern facing honeybees is depletion of nutritional resources and habitat. Ongoing studies confirm

increased longevity and pathogen tolerance when bees consume certain nectar-derived phytochemicals-caffeine, gallic acid, p-coumaric acid, and kaempferol. This study aims to determine how these phytochemicals may alter the honeybee gut microbiome (HBGM) composition, through NextGen DNA sequencing analysis. Our findings will provide preliminary evidence of tools that alter the HBGM, promoting bee health and sustainability.

Project type: Research, Scholarship, and Entrepreneurship

098 - Hanah Georges

Viral Infection of Bovine Fetuses Results in Impaired Immune Development

2018 Fall - College of Veterinary Medicine and Biomedical Sciences

The ability of Bovine Viral Diarrhea Virus to cross the placenta during pregnancy presents a unique challenge to the control of infection by producing asymptomatic persistently infected (PI) calves, which shed the virus postnatally, costing the industry millions of dollars. To improve prevention and control of the virus, an understanding of fetal infections is needed. Through microarray, RT-qPCR, and western blot methods, the current study revealed a chronic upregulation of the innate immune system in PI fetuses as well as an attenuated T and B-cell response, resulting in immunotolerant and immunocompromised animals, that are unable to clear the virus.

Project type: Research, Scholarship, and Entrepreneurship

099 - Mahshid Ghanbari

Coastal Flooding Risks on the Rise

2018 Fall - Walter Scott, Jr. College of Engineering

Coastal communities are increasingly vulnerable to coastal flooding due to rising sea levels. Understanding the effects of sea level rise on frequency and consequences of coastal flooding and subsequent social and economic impacts are of utmost importance for policymakers to implement effective adaptation and mitigation strategies. In the present study, a statistically coherent mixture normal-GPD method was developed, which reconciles the probabilistic characteristics of the upper tail as well as the bulk of the sea level data. The framework was employed to assess existing and future coastal minor and major flood frequency in 68 tidal stations across the coastal U.S.

Project type: Research, Scholarship, and Entrepreneurship

100 - Andy Gilmore

Vehicles of Democracy: Vernacular Monumentality and the Umbrella Revolution

2018 Fall - College of Liberal Arts

Hong Kong's 2014 Umbrella Revolution saw some of the city's busiest streets transform into temporary sites of artistic expression and freedom. As everyday items were turned into in-situ tools of protest against the Chinese government, this essay explores Hong Kongers utilization of one of these everyday items: double-decker buses. Using Jean Paul Ricoeur's (1990) strategy for appropriating historicity or the "historical condition," I argue that Hong Kongers transformed mobility from the mundane to the political through the display of Hong Kong's past (colonization), present (mainlandization), and future (democracy) through the intersectionality of UK, Chinese, and Hong Kong culture.

Project type: Research, Scholarship, and Entrepreneurship

101 - Kate Gloeckner

Effect of Gaze on Length of Stay in Shelter Dogs

2018 Fall - College of Natural Sciences

In domestic dogs, gaze predicts sociability and therefore adoptability. This behavior may be used to evaluate dogs in animal shelters to quickly predict the animals' length of stay. Dogs that become long term residents are expensive for the shelter to care for and are at risk of decreased welfare. By quickly identifying which dogs are the most at risk to become long term residents, these animals can be placed into training and marketing programs, and can be moved to more visible kennels in the shelter. Decreasing the length of stay will increase the animal welfare, and save more lives.

Project type: Research, Scholarship, and Entrepreneurship

102 - Ben Golas

Harnessing One Health: Reimagining a Growing Paradigm

2018 Fall - University Interdisciplinary Programs

"One Health" is a label attached to efforts addressing issues of human, animal, and environmental health simultaneously in interdisciplinary collaboration. Despite increasing popularity, strong definitions of variables, applications, and successes in One Health are lacking. Through an interdisciplinary classroom setting, we developed a theoretical framework based on socioecological systems that allows holistic evaluation of One Health approaches. This framework will identify factors of disease systems that promote multifaceted, interconnected, and collaborative approaches. We will identify gaps in the networks of less successful systems and predict systems that are strong candidates for intervention, reimagining how we evaluate global health issues.

Project type: Research, Scholarship, and Entrepreneurship

103 - Jenna Gordon

Development of Localized Anticancer Therapeutics

2018 Fall - College of Natural Sciences

Due to the increasing prevalence and lack of pediatric specific therapeutics, it is vital to increase research on alternative treatment options for pediatric cancer. Critically, the synergistic combination of membrane permeable nitric oxide (NO) delivery to the cancer site through NO donor platforms, GSNO and SIN-1, and nonpermeable enzyme inhibition through FDA approved tyrosine kinase inhibitors, alectinib and crizotinib, appears to provide a favorable approach when compared to traditional therapeutic methods. In this presentation, evaluation of various neuroblastoma cell lines will be presented as a proof-of-concept for site-specific delivery of NO as an anticancer therapeutic.

Project type: Research, Scholarship, and Entrepreneurship

104 - Michael Graham

Prototype Development for Enhanced Audiogram Understandability

2018 Fall - College of Health and Human Sciences

I plan to create audiogram printout prototypes that are simple, engaging, user-friendly, and intuitive; that provide patients an at-a-glance summary of their auditory health; and that foster collaboration between patients and their healthcare providers. I am looking forward to displaying these prototypes at the Graduate Student Showcase in order to gather feedback and ascertain how the various prototypes resonate with people. Ultimately, I plan to present my prototypes at the American Academy of Audiology annual conference in Columbus, Ohio in March 2019.

Project type: Research, Scholarship, and Entrepreneurship

105 - Lyndsey Gray

Mapping Potential Genetic Selection in Mosquitoes from Ivermectin Drug Administrations

2018 Fall - College of Veterinary Medicine and Biomedical Sciences

As malaria continues to burden health systems with widespread morbidity and mortality, ivermectin (IVM) mass drug administrations have emerged as a promising new tool to stymie the disease. However, concerns regarding ivermectin resistance development in malaria mosquitoes should be addressed prior to drug deployment in the field. We will use a genome-wide association study to elucidate genetic markers that were potentially selected for in wild, *Anopheles gambiae* s.s populations sampled from a 2015 cluster-randomized IVM trial in Burkina Faso. This will identify potential polymorphisms associated with IVM resistance mechanisms and provide information necessary for proper IVM administration for malaria control.

Project type: Research, Scholarship, and Entrepreneurship

106 - Jonah Greene

Modeling the Techno-Economical Feasibility of Bio-Fuels Production from Marine Macroalgae

2018 Fall - Walter Scott, Jr. College of Engineering

Marine macroalgae holds the potential to provide large amounts of renewable energy in the form of bio-fuels. With emerging technologies, it is possible to construct cultivation systems that can withstand natural forces and produce biomass in the open ocean, eliminating the need for farm land and irrigation systems. The purpose of this project is to analyze the economical viability of these systems by determining the energy and fuel required for large scale biomass production and downstream processing such as hydrothermal liquifaction. With modeling, it is possible to determine the potential impacts of marine macroalgae cultivation on the current energy grid.

Project type: Research, Scholarship, and Entrepreneurship

107 - Julia Greer

Vulnerability in the Hollow

2018 Fall - College of Liberal Arts

Western North Carolina has faced flooding events reaching disastrous proportions. The geophysical and social characteristics of the area create dynamics of inequality and vulnerability. This project examines the anthropological and geospatial methodologies used to define vulnerability.

Project type: Research, Scholarship, and Entrepreneurship

108 - Robert Griffin-Nolan

Extreme Drought Increases Plant Functional Diversity in Grasslands

2018 Fall - University Interdisciplinary Programs

Climate change is expected to cause droughts that are reminiscent of the dust bowl. Extreme droughts such as these have differential impacts on grassland communities around the world, with some more sensitive than others. Our results suggest that grasslands characterized by a high diversity of functional traits related to drought tolerance (i.e. functional diversity) are more resistant to drought. Thus, it is important to understand how functional diversity changes in response to drought. Results from a long-term drought experiment suggest that 'dust bowl'-like droughts may lead to an increase in functional diversity, perhaps priming these ecosystems for future droughts.

Project type: Research, Scholarship, and Entrepreneurship

109 - Anna Griggs

Exploring Arts Engagement's Role in Relational Maintenance

2018 Fall - College of Liberal Arts

Using the lens of relational maintenance and satisfaction, this project seeks to discover how community arts engagement programming may play a role in relationship maintenance between couples where one

individual has been diagnosed with Alzheimer's disease or dementia and the other serves as their primary care partner. To do this, observational data was analyzed using Canary and Stafford's (2004) relational maintenance typology as the guiding theoretical framework. Data was collected through video-recorded observations at a four-week arts engagement workshop in partnership with the Museum of Art in Fort Collins.

Project type: Research, Scholarship, and Entrepreneurship

#### 110 - Faith Groff

Analysis of Tropospheric Gravity Waves in a Mesoscale Convective System

2018 Fall - Walter Scott, Jr. College of Engineering

Mesoscale convective systems (MCSs) are prolific generators of gravity waves that act to stabilize the surrounding environment by transporting momentum away from the storm. This study examines a MCS that occurred on 14-15 July 2015 during the Plains Elevated Convection at Night field campaign. Using idealized simulations, connections between updraft strength, tropospheric descent ahead of the convective line, and changes in heating rates within the MCS are analyzed through spectral analysis. The frequencies of these parameters will help us to understand the influence of heating within the MCS and its influence on gravity wave generation and strength.

Project type: Research, Scholarship, and Entrepreneurship

#### 111 - Carolina Gutierrez

Aquatic Insects' Resilience to Changing Canopy Coverage, Elevation and Temperature

2018 Fall - University Interdisciplinary Programs

Organismal traits determine how species perform and contribute to ecosystem functioning. Functional diversity quantifies the value and range of organismal traits influencing species roles and performance in ecosystems. We quantified and tested differences in three components of functional diversity: Functional Richness (FRic), Evenness (FEve) and Divergence (FDiv). Our results showed that only FRic differs significantly with altitude, and this pattern of change remains constant across basins. Traits related to voltinism (number of generations per year), development, ecological habit and adult dispersal ability showed high correlation to water temperature changes over 1°C in areas with open canopy (less than 60% coverage).

Project type: Research, Scholarship, and Entrepreneurship

#### 112 - Allison Haase

Rhenium Within Biology: Current Applications Involving Cancer and Future Studies

2018 Fall - College of Natural Sciences

Rhenium is one of the earth's rarest metals, residing within the crust at concentrations around 1 part per billion. This metal is economically and scientifically important as it can serve as an alloy additive, catalyst, and paleoredox indicator. However, not much is known about its biological effects, especially for organisms that live in unusual environments. Therefore, a review of the literature is presented in order to understand what is currently known about Rhenium, specifically its speciation and toxicology within multiple organisms, as well as data from some preliminary studies of Rhenium within membrane model systems.

Project type: Research, Scholarship, and Entrepreneurship

#### 113 - Nathan Hahn

How Does Increasing Agriculture Drive Elephant Behavioral Shifts in Kenya?

2018 Fall - University Interdisciplinary Programs

In Kenya, community conservancies are designed to balance human resource needs with wildlife conservation, but conflicts between elephants and people can undermine their conservation potential. Activity budgets of elephants in Kenya's Masai mara ecosystem were examined in relation to protected area boundaries and agricultural areas to assess population and individual-level response to anthropogenic activity. GPS data on elephant movements and landscape covariates were used to define and identify behavioral states over time using hidden Markov Models. This study illustrates emerging approaches for animal movement data that can help evaluate the effects of rapid landuse change on animal behavior.

Project type: Research, Scholarship, and Entrepreneurship

114 - Alex Hajdu

Osteobiographies of Burial 4 and 26 at Patakfalva Romania

2018 Fall - College of Liberal Arts

The research at Patakfalva Romania examines the skeletal remains of two juvenile individuals known as burial 4 and 26. By looking at the information stored within the bones and building an osteobiographic profile, we hope to shed some light on the conditions under which these two individuals lived and died.

Project type: Research, Scholarship, and Entrepreneurship

115 - Derek Handwerk

Phase Equations of the Anisotropic Complex Ginzburg-Landau Equation

2018 Fall - College of Natural Sciences

The anisotropic Complex Ginzburg-Landau Equation (aCGLE) exhibits complex spatiotemporal dynamics. Phase equations are extracted from the aCGLE and numerical simulations are used to study the aCGLE dynamics via the phase dynamics. Comparisons are made between the extracted phase equations and other phase equations derived directly from physical properties.

Project type: Research, Scholarship, and Entrepreneurship

116 - Moriah Hanson

Smartphone-Based Assessment of Balance in Neurological Patients After Yoga Intervention

2018 Fall - College of Health and Human Sciences

Postural instability is commonly observed in many neurological disorders. Accurate assessment of changes in balance after therapy is clinically valuable but quality measures require trained personnel and expensive, lab-based equipment. We used a common smartphone and an expensive force platform concurrently to assess standing postural stability in stroke and neuropathy patients before and after a yoga-based therapeutic exercise program. Measures of stability were taken in two directions with the eyes open and closed. The change in stability values were correlated between the two devices. Portable smart devices may be used to assess changes in postural stability over time.

Project type: Research, Scholarship, and Entrepreneurship

117 - Priya Harindranathan

Exploring Quiz-Data for Detecting Learning Behaviors: Non-Proctored Online Assessments

2018 Fall - College of Health and Human Sciences

We examined variables logged in a Learning Management System related to students' engagement in a non-proctored online formative assessment platform. Analyzing students' interaction to identify patterns related to learning behavior helps in providing formative feedback and implementing pedagogical interventions. Five variables related to behavior were used to classify students. Cluster of students differed in performance in examinations which provides evidence for association between



learners' behavior and performance. Results may help instructors provide meaningful, personalized feedback to learners and reflect on design and implementation of quizzes. Additionally, the study provides learners an opportunity to reflect on their engagement with online assessments.

Project type: Research, Scholarship, and Entrepreneurship

118 - Edwin Harris

LiDAR and GIS: Extracting and Defining Archaeological Urbanism

2018 Fall - College of Liberal Arts

The ancient Purépecha site of Angamuco located in the Lake Patzcuaro Basin of Michoacán, Mexico provides an unrivaled opportunity to study the urbanism of the Purépecha prior to the formation of the empire during the postclassic (1350 – 1520 CE). Utilizing LiDAR data, ArcGIS and additional open source GIS software applications a methodology is presented which allows for the extraction of above ground architectural features from the surrounding complex topography. This methodology provides easier analysis of the pre-empire Purépecha urban tradition and provides an avenue to understanding the transition from multiple chiefdoms to an empire within the Lake Patzcuaro Basin.

Project type: Research, Scholarship, and Entrepreneurship

119 - Emad Hassan

Seismic Resilience and Recovery of Hospital Clusters

2018 Fall - Walter Scott, Jr. College of Engineering

Understanding behavior of hospital cluster during and after major earthquakes is now at the forefront of research. A comprehensive framework is presented to estimate social and economic losses, quantity and quality functionality, recovery and resilience of hospital clusters. The presented framework simulates recovery of hospitals' supporting lifelines, and investigates the effect of interdependence and the mutual effect between hospitals. In addition, a patient-driven model is introduced to estimate current and future demand on each hospital, which affects the quality of hospitalization service. This framework can be utilized by emergency planners for pre- and post-disaster recovery management.

Project type: Research, Scholarship, and Entrepreneurship

120 - Hannah Hausman

Effects of Memory for Errors on Error Correction

2018 Fall - College of Natural Sciences

Making errors while studying can benefit long-term learning. One possibility is that errors serve as "stepping stones." A question may activate a previously-made error, which brings to mind the correct answer in turn. If recalling errors facilitates memory for the correct answer, then making errors more memorable should also make correct answers more memorable. This prediction was tested in 4 experiments. Memory for errors was varied via several memory manipulations, which had inconsistent effects on memory for the correct answer on a final test, findings that any comprehensive theory of error correction must account for.

Project type: Research, Scholarship, and Entrepreneurship

121 - David Heath

Identification and Relocation of Earthquakes in the Mackenzie Mountains, Canada

2018 Fall - Warner College of Natural Resources

Earthquakes in the remote Mackenzie Mountains region of Canada are detected and relocated using data from the Earthscope-funded array of temporary seismometers in the Northwest Territories and Yukon regions. Using detection algorithms developed by Kushnir et al. and Roecker et al., signals are

identified and subsequently associated across the network to identify events and establish phase onsets and estimate hypocenter locations. Over 500 earthquakes are identified and located in the study region. Future work includes analyzing the full two years of data to interpret seismicity in terms of regional faults.

Project type: Research, Scholarship, and Entrepreneurship

122 - Adam Heck

Regulation of Neural Differentiation Through mRNA Methylation in Stem Cells

2018 Fall - University Interdisciplinary Programs

Stem cells possess a unique characteristic known as pluripotency which allows them to differentiate/change into other cell types. This means they play a prominent role in early growth and development, and have enormous therapeutic potential. However, in order to be used efficiently and successfully, the mechanisms stem cells utilize to modulate gene expression must be further characterized. Recently, RNA methylation has been implicated in pluripotency. This study aims to shed light on the role of the YTHDF2 RNA-binding protein in recognizing and degrading methylated mRNAs in stem cells and uncover its impact on pluripotency.

Project type: Research, Scholarship, and Entrepreneurship

123 - Garrett Heck

Risk Assessment for Vector-Borne Diseases at Gateway National Recreation Area

2018 Fall - University Interdisciplinary Programs

Autochthonous cases of tick-borne have been recently reported to the New York City Department of Health and Mental Hygiene. In 2014, at Gateway National Recreation Area, NY (GATE), a collaborative tick collection study was initiated involving the US National Park Service (NPS) Office of Public Health, the New York City Department of Health and Mental Hygiene (NYC DOHMH), and the Army Public Health Center (APHC). Hostseeking ticks were collected by NYC DOHMH and NPS personnel at monthly intervals from 24 April - 25 November, 2014. These were analyzed for human pathogens using PCR at the APHC Tick-Borne Disease Laboratory.

Project type: Research, Scholarship, and Entrepreneurship

124 - Lauren Heck

Statistical Methods for Estimating Health Effects of Multi-Pollutant Mixture Exposures

2018 Fall - College of Natural Sciences

Humans are continuously exposed to complex environmental and chemical mixtures, but there is little information regarding the health risks associated with these exposures. Quantifying the associated health risks is challenging due to the number of exposures, multicollinearity, and possible non-linear or interaction effects. Numerous statistical methods have been proposed to estimate the association between multi-pollutant exposures and health outcomes, but there has yet to be a formal comparison among methods. We compare the performance of five recently proposed methods in a simulation study and evaluate methods on their ability to identify active mixture components and estimate the exposure-response relationship.

Project type: Research, Scholarship, and Entrepreneurship

125 - Mohammadhasan Hedayati

Glycocalyx-Mimetic Surfaces Prevent Blood Protein Adsorption and Fibrin Network Formation

2018 Fall - Walter Scott, Jr. College of Engineering

Blood-contacting materials are critical in many applications where long-term performance is desired. However, there are currently no engineered materials used in cardiovascular implants and devices that completely prevent clotting when in long-term contact with blood. The most common approach to developing next-generation blood-compatible materials is to design surface chemistries and structures that eliminate protein adsorption to prevent blood clotting. This work proposes a new paradigm for controlling protein surface interactions and fibrin formation by strategically mimicking key features of the glycocalyx lining the interior surfaces of blood vessels: negatively charged glycosaminoglycans organized into a polymer brush with nanoscale domains.

Project type: Research, Scholarship, and Entrepreneurship

126 - Hadi Heidari

Water Shortage Vulnerability Under Land Use and Climate Change Scenarios

2018 Fall - Walter Scott, Jr. College of Engineering

Climate changes and rapid population growth can increase vulnerability to water shortage in water scarce regions. This study develops a nonstationary gamma-generalized pareto distribution model to determine changes in intensity-duration-frequency relationships of monthly drought events. The application of the framework was demonstrated for the city of Fort Collins. The results indicated that droughts with longer duration and higher intensity would become more frequent. Moreover, multi-year droughts bear more sensitivity to nonstationary conditions than within-year droughts. In addition, the drought amplification factor for the study system was substantially higher for a sprawl urban growth than high-density development.

Project type: Research, Scholarship, and Entrepreneurship

127 - Natascha Heise

Virtual Reality – An Intuitive Tool for Structural Visualization

2018 Fall - College of Veterinary Medicine and Biomedical Sciences

The study and practice of medicine requires a comprehensive understanding of interactions and accurate perception of spatial relationships within the body. Existing diagnostic, classroom, and patient education materials are limited by 2-dimensional representations of these 3-dimensional associations. This study compares the usage of the Visible Human Dissector (VHD) and the Human Virtual Reality Program (HVRP) in the laboratory component of BMS 301 at Colorado State University. Preliminary results suggested that students struggle interpreting structural anatomical relationships when presented with anatomical cross sections. The utilization of technology might enable students to visualize and interpret spatial relationships.

Project type: Research, Scholarship, and Entrepreneurship

128 - Alex Hendricks

Resolving the 'Contrast Problem' in Biological Microscopy

2018 Fall - College of Natural Sciences

Optical microscopes, often remembered from general science courses, can magnify objects up to ~1500x. This allows us to see cells from animals and bacteria, with a few smaller details. To see at a smaller scale and learn about sub-cellular processes, scientists must switch to electron microscopes, which can magnify up to ~10,000,000x. Unfortunately, the electrons will damage or pass through the 'lightweight' elements that make all living organisms, making it difficult to see clearly. This project's purpose is to program bacterial cells to include unnatural 'heavyweight' elements in a safe way that easily resolves their image clarity in electron microscopy.

Project type: Research, Scholarship, and Entrepreneurship

129 - Hailey Hibbard

Multifunctional Material for the Detection and Killing of Bacteria

2018 Fall - College of Natural Sciences

The epidemic of multidrug resistant bacteria calls for the improvement of both detection methods for bacterial infections and ways of killing them. The goal of this project is to synthesize an enzyme-activated antibiotic prodrug that detects and kills bacteria. The antibiotic will incorporate nitric oxide, a known antibacterial agent, and a fluorescent compound to visualize bacterial presence. A synthesis procedure was developed to synthesize a fluorescent compound attached to a small signaling compound. A nitric oxide donor was added to impart antibacterial activity. In the presence of bacteria, the antibiotic prodrug simultaneously fluoresces and releases nitric oxide to kill bacteria.

Project type: Research, Scholarship, and Entrepreneurship

130 - Jasmin Hicks

Synaptic Ultrastructure at the Drosophila Neuromuscular Junction

2018 Fall - College of Veterinary Medicine and Biomedical Sciences

The neuromuscular junction (NMJ) acts as a bridge between two important cell types in higher organisms: nerve and muscle. At the "active zone", a specific presynaptic specialization of the NMJ, synaptic vesicles dock, prime, and ultimately fuse with the presynaptic membrane. Proteins required for each of these steps are highly concentrated and specifically organized at active zones. However, the ultrastructure of proteins at active zones remains unknown. My research aims to exploit the fast, cost effective, genetic system of Drosophila to discover functional relationships of active zone proteins and the molecular mechanisms mediating the vesicle cycle.

Project type: Research, Scholarship, and Entrepreneurship

131 - Mary Hidde

Self-Efficacy Changes Following Personal-Training or Group-Dynamics-Based Exercise in Cancer Survivors

2018 Fall - College of Health and Human Sciences

The purpose of this study was to examine changes in exercise self-efficacy and self-efficacy to overcome barriers to exercise following an 8-week personal training (PT) or group dynamics-based exercise intervention (GBE) in breast cancer survivors (BCS). Paired and independent t-tests showed no change in self-efficacy or self-efficacy to overcome barriers to exercise within or between PT and GBE. High levels of self-efficacy at baseline may have contributed to the observed lack of change. Additional research is needed to determine the effects of a GBE intervention among BCS with low exercise self-efficacy and self-efficacy to overcome barriers to exercise.

Project type: Research, Scholarship, and Entrepreneurship

132 - Jessica Hill

Impact of Lymph Node Dysfunction on Metabolic and Immune Function

2018 Fall - College of Health and Human Sciences

Visceral adipose tissue (VAT) accumulation is linked to several metabolic diseases, such as type two diabetes and cardiovascular disease. This is due in large to obesity-driven inflammation, which results from the excess of VAT. Lymph nodes housed within adipose tissue act as centers for immune system development and communication. Like the depots these lymph nodes reside in, there are distinct differences in their response to metabolic challenges. Data show that increases in VAT lead to mesenteric lymph node atrophy and fibrosis, which impact immune cell type, number, and function. This has systemic implications by way of dampening the immune system.

Project type: Research, Scholarship, and Entrepreneurship

133 - Sarah Hinshaw

Relative Influences of Wood and Valley Geometry on Sediment Distribution

2018 Fall - Warner College of Natural Resources

Sediment storage in mountain streams is associated with level of valley confinement. However, influence of wood on sediment distribution may be significant. Biscuit Brook, a headwater stream in the Catskill Mountains of New York, is discontinuously confined, flowing through wide reaches that alternate with incised bedrock canyons. Biscuit Brook contains substantial large wood and is actively adjusting to the sediment pulse from Hurricane Irene in 2011. This study aims to 1) quantify the extent to which wood alters sediment storage, and 2) determine whether the change due to wood is significant compared to the influence of valley geometry alone.

Project type: Research, Scholarship, and Entrepreneurship

134 - Kimberly Hiyoto

Utilizing Paper and Plasma Modification to Fabricate Better Gas Sensors

2018 Fall - College of Natural Sciences

Metal oxide nanomaterials are desirable for solid-state gas sensors because of their ability to detect a wide variety of gases through changes in resistance resulting from gas-surface interactions. Lack of selectivity and operating temperatures of  $\geq 300^\circ\text{C}$ , however, impede wide commercialization of this type of sensor. Here we describe Ar/O<sub>2</sub> plasma modification of paper based, tin (IV) oxide (SnO<sub>2</sub>) nanoparticle devices as a unique strategy to optimize both the bulk structure and surface chemistry of SnO<sub>2</sub>. Sensor response to various toxic gases of both the treated and untreated sensors will be examined to determine the success of this fabrication process.

Project type: Research, Scholarship, and Entrepreneurship

135 - Savannah Hobbs

What's in Your Pantry? Capturing the Home Food Environment

2018 Fall - College of Health and Human Sciences

The home food environment (HFE) plays an important role in the development of food preferences, habits, and health. The purpose of this study was to modify the Home Inventory Describing Eating and Activity (Home-IDEA2) checklist, a validated instrument for HFE assessment, using data collected from food photography methods and application of the Healthy Eating Index (HEI) to derive a HFE quality score. HFE quality scores, analysis of photos, and examination of current foods listed in the Home-IDEA2 revealed over-representation of healthful foods and underrepresentation of less healthful foods. These data will drive future modifications to the Home-IDEA2.

Project type: Research, Scholarship, and Entrepreneurship

136 - Matt Hogan

Experiences in High Energy Neutrino Particle Physics

2018 Fall - College of Natural Sciences

Tokai-to-Kamioka (T2K) is an international particle physics experiment generating an intense beam of subatomic particles called neutrinos. T2K is designed to measure the parameters that describe a quantum mechanical process called flavor oscillation where a neutrino of definite flavor (type) is created and later observed as a different flavor. Detecting the neutrino in T2K requires very massive detectors, one of which is the Super-Kamiokande (SK) detector, a stainless steel cylindrical tank containing 50

kilotons of pure water. Work on the T2K experiment including refurbishment of SK during the summer of 2018 is presented.

Project type: Research, Scholarship, and Entrepreneurship

137 - Julie Holder

Beyond Climate & Air Quality: How Will the Planet Smell?

2018 Fall - College of Natural Sciences

The world is a very aromatic place. When you smell a flower, freshly cut grass, or that signature scent of a pine forest, your nose is detecting what are called biogenic volatile organic compounds (BVOCs). These fragrant chemical compounds, along with a suite of other compounds, are produced by all plants and released to the atmosphere (and your nose) in response to their environment. If these conditions change, we can expect to observe a change in emissions; ergo, a change in the aromatic profile of our planet. Thus, we aim to quantify the relationship between BVOC emissions and environmental change.

Project type: Research, Scholarship, and Entrepreneurship

138 - Hajar Homayouni

Using Unsupervised Machine Learning to Generate Data Quality Tests

2018 Fall - College of Natural Sciences

Data quality tests check the properties of data stored in databases and data warehouses to detect violations of syntactic and semantic constraints. Domain experts define the constraints based on the needs of the stakeholders and knowledge of the application domain. Approaches that can automatically generate the constraints on data without requiring domain knowledge are lacking. We propose an approach that uses unsupervised learning techniques to (1) discover the constraints in data records that must be satisfied, and (2) classify the records as valid or invalid based on these constraints. We evaluate our approach using records from a health data warehouse.

Project type: Research, Scholarship, and Entrepreneurship

139 - Shabana Hoosein

Understanding Fungal Symbiotic Networks to Increase Restoration Success

2018 Fall - University Interdisciplinary Programs

The recent paradigm shift acknowledging complex fungal interactions has increased our understanding of plant community success in the face of degradation. The most ubiquitous microbial symbiont is a fungus (known as arbuscular mycorrhiza) that makes associations with 80% of land plants and mediates plant resource acquisition in degraded environments. However, ecologists lack the information to help us recreate these networks in a restoration setting. Therefore, I have conducted an experiment to understand which mycorrhizal groups persist in successful (high plant diversity) and non-successful restorations (low plant diversity) and to determine the mycorrhizal framework that contributes to restoration success.

Project type: Research, Scholarship, and Entrepreneurship

140 - Chris Hosier

Controlling Surface Structure Orientation on Gold Nanoparticles for Medicinal Purposes

2018 Fall - College of Natural Sciences

Gold nanoparticles—clumps of gold atoms coated with protective surface structures—hold substantial promise as more effective treatments for diseases such as Alzheimer's disease, cystic fibrosis, and muscular dystrophy. One challenge to developing gold nanoparticles for medicinal purposes, however, is ensuring their ability to deliver consistent medicinal dosages. One major factor in doing so is controlling surface structure orientation. We recently identified several new orientation patterns, and have shown

a simple way to identify which one is present in a sample. Additionally, we have had initial success in controlling which orientation pattern occurs when a nanoparticle crystal is created.

Project type: Research, Scholarship, and Entrepreneurship

141 - Azmal Hossan

Climate Change, Household Amenities, and Women's Nutritional Status

2018 Fall - College of Liberal Arts

Geographical location, poor household amenities, and gender disparity make women in Bangladesh vulnerable in the face of anthropogenic climate change. Bangladesh's economy is predominantly agricultural where maximum people receive their dietary iron and/or zinc from C3 grains susceptible to lose iron and zinc content due to elevated carbon concentration in the atmosphere. Using Bangladesh Demographic and Health Survey (BDHS) data, the current study explored that both climate change and poor household amenities have significant negative consequences on women's body mass index (BMI). But poor household amenities have more significant negative impact than climate change.

Project type: Research, Scholarship, and Entrepreneurship

142 - Guangyang Hou

Windthrow Fragility Assessment of Urban Trees Subjected to Extreme Winds

2018 Fall - Walter Scott, Jr. College of Engineering

Tree failures due to strong winds in urban areas cause extensive direct and indirect economic and environmental loss, including disrupting adjacent infrastructures, such as buildings, underground pipelines, and overhead powerlines. To effectively improve the resilience of a community subjected to extreme wind events through prevention, response and recovery, it becomes critical to rationally assess the risks of wind-induced tree failures and the disruptions to different types of infrastructures due to fallen trees. An integrated fragility analysis and disruption assessment approach is developed for urban trees in a typical community subjected to extreme winds.

Project type: Research, Scholarship, and Entrepreneurship

143 - John Howe

Engineering Brightness: Building a Global Network of Social Entrepreneurs

2018 Fall - College of Health and Human Sciences

Engineering Brightness: Building A Global Network of Social Entrepreneurs builds on a successful local initiative that has the dual foci of designing, building and distributing personal lights for those without and impacting light poverty. Students in K12 have been collaborating to design and build and solar charged lanterns which have been distributed to several countries. Engineering Brightness now has relationships with schools in Guatemala. The hoped-for outcome is an active network which will become a learning laboratory, facilitating collaboration and replication. UNESCO estimates that 1.3 billion people live without safe, reliable light after dark.

Project type: Research, Scholarship, and Entrepreneurship

144 - Nicholas Hulett

Agreement of Cut Point Definitions Within the NEXT Plus Dataset

2018 Fall - College of Health and Human Sciences

Accelerometry assesses physical activity intensity levels and durations across populations. This relies on cut points which divide time into physical activity intensities. Our purpose was to examine the impact of cut point choice in processing accelerometer data. NEXT Plus data was evaluated and assessed for agreement regarding whether individuals meet guidelines for physical activity. There were significant

differences of time spent in each intensity. Also, there was significant disagreement regarding individuals meeting guidelines. Cut point selection has an important effect on outcomes of accelerometry. Future studies should look for this effect in other populations and use discretion when comparing studies.

Project type: Research, Scholarship, and Entrepreneurship

145 - Alex Huss

Incorporation of CdSeTe Into CdTe Absorbers for Increased Photovoltaic Efficiency

2018 Fall - College of Natural Sciences

The voltage deficit in thin-film cadmium telluride (CdTe) photovoltaics, limiting the efficiency of CdTe devices, has been improved by incorporating a lower band gap cadmium selenium telluride (CdSeTe) alloy material. Devices with CdTe, CdSeTe, and bilayer CdSeTe/CdTe absorbers were fabricated and data acquired for band gap, open circuit voltage, current, efficiency, and electron-hole recombination rates. Laboratory measurements of current-density curves showed a 3 mA/cm<sup>2</sup> increase in current, improved voltage deficit, and an increase in efficiency from 14.1 to 16.2%, consistent with simulation. The increase in efficiency is likely due to the 100-meV conduction band offset between CdSeTe and CdTe.

Project type: Research, Scholarship, and Entrepreneurship

146 - Brandon Hylton

The Effects of CDH5 on Valve Cell Differentiation and Function

2018 Fall - College of Natural Sciences

Congenital heart disease affects 1-2% of live births. Biomechanical forces like blood flow and contraction play a vital role in proper heart development, but how these forces are transduced into chemical signals are not fully understood. We utilize a zebrafish model with a mutation in the cadherin 5 gene to alter the mechanical properties of the developing heart. Our results thus far indicate that altering mechanical properties leads to increased hemorrhaging and altered heart function. Our future work will look at how cardiac cells are affected. Together this work may provide insight and improve treatment of congenital heart defects.

Project type: Research, Scholarship, and Entrepreneurship

147 - Manraj Jabbal

Food Deserts

2018 Fall - College of Business

Food deserts are a major problem on a global scale, especially in areas with increased urbanization. Inequality in urban areas leaves many citizens without access to adequate nutrition and healthy food options. As a business venture we seek to understand this massive disparity, the communities involved and the food system in general. By creating a business model that seeks to create social well being and improves on the current successes in the market, we hope to leave these affected communities better off.

Project type: Research, Scholarship, and Entrepreneurship

148 - Cassidy Jackson

Toward Magneto-Controlled High-Spin Photoredox Catalysts

2018 Fall - College of Natural Sciences

The most prevalent transition metal (TM) photoredox catalysts, which are fundamental components of chemical transformations, are Ru<sup>2+</sup> and Ir<sup>3+</sup> with polypyridyl ligands due to their long-lived photoexcited states. Yet, these metals are rare and environmentally damaging to mine,<sup>2</sup> which shows



the need for sustainable alternatives, specifically 3d TMs. These Ru<sup>2+</sup> and Ir<sup>3+</sup> photoredox catalysts are low-spin, but 3d TMs are capable of forming high-spin (magnetic) electronic structures and accessing larger spin states could pave way to undiscovered reactivity. Herein, I report the synthesis, characterization, and future directions of low-coordinate 3d metal complexes that are a new breed of photoredox catalysts.

Project type: Research, Scholarship, and Entrepreneurship

149 - Yuqin Jiao

Dance as Cognitive, Physical and Social Enrichment in Older Age

2018 Fall - College of Health and Human Sciences

There are positive links between dance related activities and better neurocognitive outcomes in aging. Dance can be viewed as a lifestyle enrichment that consists of physical, social and cognitive engagement. In 37 healthy older adults age 55 to 84, we found that all three dance related intervention groups revealed increases in executive function, attention, working memory, and episodic memory. However, no significant time x intervention interaction of change in cognitive performance was detected. Ongoing work will focus on the results from physical balance and mobility tests in older adults to better understand effects of engaged dance on physical health.

Project type: Research, Scholarship, and Entrepreneurship

150 - Miguel Jimenez

The Role of Citizen Science in Research and Public Engagement

2018 Fall - University Interdisciplinary Programs

Citizen science is a popular model for research that recruits volunteers to collect data. In theory, the benefits of citizen science programs are that they efficiently produce useful datasets while also engaging the public in conservation initiatives. However, these programs are often criticized for their potential drawbacks regarding data quality and the degree to which their public engagement efforts are effective. Here, I adapt an outcome-oriented model to evaluate the relative costs and benefits of the Nature in the City Biodiversity Monitoring program, a citizen science program for ecological monitoring of green spaces in Fort Collins.

Project type: Research, Scholarship, and Entrepreneurship

151 - Abby Johnson

Intergenerational Alcohol Abuse: An Application of the Family Stress Model

2018 Fall - College of Natural Sciences

Using prospective, longitudinal data on 390 mother-child dyads, we examine the utility of the Family Stress Model to explain intergenerational continuity in alcohol abuse between mother and child. We find that a mother's lifetime incidence of an alcohol use disorder is associated with a higher likelihood of financial strain, which in turn is associated with mother's continued alcohol abuse as well as depressive symptoms. The confluence of financial strain and depressive symptoms appears to harm family climate, and this compromised family climate is associated with an increased likelihood of early onset alcohol use by the child.

Project type: Research, Scholarship, and Entrepreneurship

152 - Ashlie Johnson

Eye-Tracking to Explore Nutrition Label Formats on Food Selection

2018 Fall - College of Natural Sciences

Previous findings show individuals give more attention to the upper portions of nutrition labels. This study used eye-tracking measures to explore whether moving nutrients to positions higher on a label could change attention and food selection behaviors and if individuals would over-report their attention to nutrients. Results from 112 undergraduates (55.4% female) showed the modified label had no significant effects on attention or subsequent food selections. However, participants significantly over-reported their attention to sugar,  $X^2(6, N=112) = 16.309, p=.012$ . These findings suggest more complex interactions between label format and attention than previously considered and nutrient-specific effects in over-reporting label use.

Project type: Research, Scholarship, and Entrepreneurship

153 - Yani Jones

Deja Moo! History of the Farm at Lee Martinez Park

2018 Fall - College of Liberal Arts

For nearly one hundred years, cattle roamed the range land of the Farm at Lee Martinez Park. Today, the Farm is still a farm, but it is nestled against a bustling, modern downtown scene. The juxtaposition of these two environments reminds visitors of the agricultural heritage and environment on which Fort Collins was built. As an interactive recreational site, and a working farm with several historic structures, the Farm embodies this history. Produced for the City of Fort Collins, this historic context makes the story of the Farm and its owners, a history never before assembled, accessible for the public.

Project type: Research, Scholarship, and Entrepreneurship

154 - Sneha Kadyan

Bridging Economic Divides: Impact Assessment of Ten Thousand Villages Canada

2018 Fall - College of Liberal Arts

The project is driven by a commitment to examine the impact of Ten Thousand Villages Canada (TTVC), a Fair Trade certified store on artisan groups from which it buys with globally-recognized fair-trade standards. Moreover, its purpose is to determine what has been the impact of participation in fair-trade on the livelihoods of artisans. The research will enable TTVC to make more informed business decisions by better understanding the complexities involved in their own supply chains and the challenges with assessing impact.

Project type: Research, Scholarship, and Entrepreneurship

155 - Fahima Kamal

Understanding of Benzalkonium Chloride-Mediated Ocular Inflammatory Response via Computational Modeling

2018 Fall - College of Veterinary Medicine and Biomedical Sciences

Benzalkonium chloride is a surfactant necessary to maintain the integrity of ophthalmic drug formulations. However, this additive has been shown to cause adverse inflammatory outcomes on the ocular surface. Because of this, a quantitative understanding of its toxicological profile is warranted. In this study, we employed mathematical modeling techniques to better understand pharmacokinetic movement of this compound and the resulting potential inflammatory outcomes. These results substantiate experimental data on benzalkonium salts and provide predictive information about using it as a formulation additive.

Project type: Research, Scholarship, and Entrepreneurship

156 - Robert Kaplan

Mechanical Properties Influence Chimpanzee Tool Selection for Nut Cracking

2018 Fall - College of Liberal Arts

It has been shown that chimpanzees, our closest living relatives, exhibit selective preferences of materials for use as stone tools. These investigations warrant further research addressing why chimpanzees select certain lithologies over others. By investigating the mechanical properties of stone, it is shown that chimpanzee stone tool selection is driven by rock micro-hardness and elasticity. This data allows researchers to further investigate research questions pertaining to how primates interact with their various ecological niches.

Project type: Research, Scholarship, and Entrepreneurship

157 - Diptendu Kar

That's My DNA: Biology Meets Cryptology to Trace Back DNA

2018 Fall - College of Natural Sciences

Synthetic DNA generation and sharing is becoming increasingly common. Synthesized DNAs are intellectual properties and thus needs to be protected when shared. The recipient of synthesized DNA need to have assurances that the molecule contains the same sequences (ACGT) as the sender intended to share and that the sample was created by the actual entity that claim to have created it. We reduce this problem to the problem of sharing digital information with guarantees about integrity and authenticity and non-repudiation with proof of origin. We achieve this by applying concepts of digital signature techniques to the domain of DNA sharing.

Project type: Research, Scholarship, and Entrepreneurship

158 – withdrawn

159 - Sajjad Karimi

Boosting Biogas Production from Solid Waste via Moisture Enhancement Techniques

2018 Fall - Walter Scott, Jr. College of Engineering

Adding moisture to municipal solid waste (MSW) landfills has been shown at field-scale to increase the rate of waste decomposition. However, field-scale operations for moisture addition are generally ad-hoc and the amount of liquid added and frequency of dosing events varies depending on different factors. Controlling moisture addition to MSW can be achieved at laboratory-scale. The hypothesis is that an optimal moisture dosing rate in MSW exists that maximizes anaerobic waste decomposition. Two key parameters of interest regarding MSW biodegradation behavior are the lag-time between waste placement and onset of methane generation ( $t_b$ ) and the first order decay rate ( $k$ ).

Project type: Research, Scholarship, and Entrepreneurship

160 - Marissa Karpack

Quantitative Assessment of Floodplain Functionality Using an Index of Integrity

2018 Fall - Walter Scott, Jr. College of Engineering

Floodplain integrity can be defined as the ability of a floodplain to support essential functions that maintain biodiversity and ecosystem services. This ongoing research involves developing a novel framework to quantitatively assess floodplain integrity based on changes to hydrologic and landscape attributes that impact critical floodplain functions. For each floodplain function, measurable stressors that inhibit the floodplain function are identified. Each stressor variable is quantified relative to its theoretical maximum value using datasets available for large spatial scales. The floodplain integrity index for the given floodplain is assessed as the product of the indices of integrity for all floodplain functions.

Project type: Research, Scholarship, and Entrepreneurship

161 - Emily Kastendieck

MEGMobile: Creating a Bioinformatics Tool to Analyze Mobile Genetic Elements

2018 Fall - College of Veterinary Medicine and Biomedical Sciences

Mobile genetic elements facilitate horizontal gene transfer between bacterial species. Minimal study of the ecological, metagenomics relationships between mobile genetic elements and antimicrobial resistance exists. Evaluating mobile elements in a metagenomic context will provide greater insight into factors affecting the resistome. Literature review found a comprehensive genetic database of mobile genetic elements for high throughput data analysis was needed. MEGMobile was created to investigate the composition of mobile elements in shotgun sequences. We evaluated the response to prophylactic medication, and Initial results showed differences between resistome and mobile element ecology. This bioinformatics tool will facilitate future mobile genetic element research.

Project type: Research, Scholarship, and Entrepreneurship

162 - Mihyun Kim

Hill Estimator of Projections of Functional Data on Principal Components

2018 Fall - College of Natural Sciences

Functional principal component scores are commonly used to reduce mathematically infinitely dimensional functional data to finite dimensional vectors. In certain applications, most notably in finance, these scores exhibit tail behavior consistent with the assumption of regular variation. Knowledge of the index of the regular variation is needed to apply methods of extreme value theory. The most commonly used method of the estimation of the index is the Hill estimator. We derive conditions under which the Hill estimator computed from the sample scores is consistent for the tail index of the unobservable population scores.

Project type: Research, Scholarship, and Entrepreneurship

163 - Adam Kinney

How Does Social and Community-Based Activity Foster Wellbeing in Veterans?

2018 Fall - College of Health and Human Sciences

Despite evidence suggesting that engagement in activity contributes to overall wellbeing, the nature of this relationship among Veterans is poorly understood. In a sample of 389 student Veterans, we employed regression to establish that the meaningfulness of activity mediated the relationship between social and community-based activity and both psychological and subjective wellbeing. Coping skills and social support also partially mediated the relationship between activity and psychological and subjective wellbeing, respectively. Findings support developing interventions which utilize activity that affords a sense of 1) positive personal meaning, 2) connection with others, and 3) enhanced coping ability to promote Veterans' wellbeing.

Project type: Research, Scholarship, and Entrepreneurship

164 - Kimberly Klas

Elucidation of the Biological Pathways in Malbranchea and Penicillium

2018 Fall - College of Natural Sciences

Various fungi of the genera Aspergillus, Penicillium and Malbranchea produce prenylated indole alkaloids that possess a bicyclo[2.2.2]diazaoctane ring system and a variety of biological activities (e.g. cytotoxic and antibacterial). After the discovery of distinct enantiomers of the natural alkaloids Stephacidin A, Notoamide B and their corresponding diastereomers, from Aspergillus, the structurally diverse metabolites became of particular biosynthetic interest. The bicyclo[2.2.2]diazaoctane core of the

divergent natural metabolites may be enzymatically derived via a putative intramolecular hetero-Diels-Alder cycloaddition. We are currently undergoing synthetic efforts to unveil the role of the recently isolated Diels-Alderase, as well as discover other unprecedented transformations in nature.

Project type: Research, Scholarship, and Entrepreneurship

165 - Tara Klinedinst

Health and Sociodemographic Factors as Predictors of Activity in T2DM

2018 Fall - College of Health and Human Sciences

This research demonstrates a relationship between certain health and sociodemographic variables and performance in instrumental activities of daily living (IADL). Number of medications, presence of depression, and total nights spent in the hospital over 6 months were shown to significantly predict frequency of IADL performance. This information provides increased understanding of the underlying factors that may impact engagement in IADL for persons with type 2 diabetes, and could orient practitioners to important targets for intervention.

Project type: Research, Scholarship, and Entrepreneurship

166 - Allee Klug

Block Copolymer Nanostructure for Fatigue and Fracture Resistant Hydrogels

2018 Fall - College of Natural Sciences

Our group develops hydrogels based on block copolymers that use nanostructure to create useful mechanical properties. These materials utilize a network of tethered vitrified spheres to provide structure, elasticity, and fatigue resistance. However, this highly elastic network does not dissipate energy efficiently and is therefore prone to failure by fracture. We have hypothesized that introduction of an elastic, hydrophobic block in core-shell sphere-forming ABC triblock may allow elastic networks to selectively dissipate strain energy in regions of high stress concentrations. This presentation details the synthetic targeting of ABC core-shell sphere nanostructure by changing the volume fractions of each block.

Project type: Research, Scholarship, and Entrepreneurship

167 - Alex Koegel

Correlating Structural Dynamics and Broadband Emission in Two-Dimensional Perovskites

2018 Fall - College of Natural Sciences

Single material white-light emitters are rare and of interest for solid-state lighting applications. White-light emission is observed in two-dimensional perovskites with the formula  $(A')_2(A)_{n-1}Pb_nX_{3n+1}$ . The dependence of structural dynamics on the choice of the A'-site cation and its effect on the observed white-light emission suggest these processes are coupled. Samples have been prepared to draw correlations between A'-site cation dynamics and the origin of white-light emission in the perovskite family,  $A'_2PbBr_4$  ( $A'$  = n-butylammonium, 4-aminobutyric acid, and 1,8-diaminooctane).

Project type: Research, Scholarship, and Entrepreneurship

168 - Jordan Koehn

Synthesis and 3D-Conformational Investigation of Partially Saturated Menaquinone Derivatives

2018 Fall - College of Natural Sciences

The conformations of long polymers of isoprene units containing partial saturation (reduced double bond) such as those found in the side-chains of lipoquinones involved in bacterial (e.g., *Mycobacterium tuberculosis*) electron transport systems (ETS) have not been characterized. First, menaquinone-2(II-H<sub>2</sub>) and menaquinone-3(II-H<sub>2</sub>) were synthesized and then using 1H-1H 2D NOESY and ROESY NMR

spectroscopy, we investigated the conformation of these two molecules. The potential of a folded conformation would be in stark contrast to the extended conformations commonly seen in literature. Folded conformations likely affect reactivity, function, and recognition within the ETS and provide insight into drug development of potent inhibitors.

Project type: Research, Scholarship, and Entrepreneurship

169 - Gretchen Kroh

Molecular Changes Following Fe-Depletion Suggest a Regulated Fe Acclimation Response

2018 Fall - College of Natural Sciences

Crop plants can be a good source of iron (Fe) but are commonly Fe deficient because soil Fe is poorly bioavailable. Because photosynthesis has an exceptionally high demand for Fe we aimed to determine if plants are prioritizing their leaf Fe when deficient. We characterized molecular and physiological changes in the leaf over one week of Fe deficiency in *Arabidopsis thaliana*, and determined two major targets of Fe deficiency regulation: (1) Ferredoxin 2, a photosynthetic electron transport protein; (2) SufB, a Fe-S cluster assembly protein. These results allow us to begin testing models by which Fe status may be sensed.

Project type: Research, Scholarship, and Entrepreneurship

170 - I Ting Ku

Characterization of Cloud Water Impacted by Wildfire During WE-CAN 2018

2018 Fall - Walter Scott, Jr. College of Engineering

With increasing frequency of wildfires in the Western US, understanding the chemistry of wildfire emissions is critical for prediction of smoke's impact on air quality, aerosol-cloud-precipitation interactions and climate. Clouds play an important role in processing trace gases and atmospheric aerosols through aqueous phase chemistry and scavenging and removal of pollutants via precipitation. In this study, cloud water samples were collected using the CSU/NCAR airborne cloud water collector during the summer 2018 WE-CAN aircraft study. Cloud water chemical composition was measured to investigate the impacts of wildfire on cloud composition and properties.

Project type: Research, Scholarship, and Entrepreneurship

171 - Adam Kuehster

Synthesis and Characterization of Mayenite Electride - Ti Composites

2018 Fall - College of Natural Sciences

Mayenite electride (C<sub>12</sub>A<sub>7</sub>:2e<sup>-</sup>) has attracted interests as inexpensive thermionic emission sources. However, pure mayenite electride exhibits low fracture strength and poor machinability. Composite materials, such as a mayenite electride-titanium (Ti), that will overcome these drawbacks while retaining the electronic properties of the mayenite electride are explored. In this work, C<sub>12</sub>A<sub>7</sub>:2e<sup>-</sup> - Ti composites (50:50 wt%) were synthesized via electric field assisted sintering (EFAS). The microstructures of the composite consist of some other calcium aluminate phases (e.g., CaO·Al<sub>2</sub>O<sub>3</sub>) in addition to C<sub>12</sub>A<sub>7</sub>:2e<sup>-</sup> and Ti phases. The work function of the composite is approximated 2.5 eV evaluated by thermionic emission current measurement.

Project type: Research, Scholarship, and Entrepreneurship

172 - Grace Kuiper

Characterizing Wild Ungulate Microbiome and Resistome, and Comparison to Cattle

2018 Fall - University Interdisciplinary Programs

Characterization of entire microbial communities (microbiome) and the entire community of antimicrobial-resistant (AMR) genes in these populations (resistome) can investigate AMR emergence as a public health threat. Popular opinion holds that agriculture production practices promote development of AMR, but resistome patterns have not been compared between domestic and wild ungulates. The primary objective of this study was to use new developments in sequencing and bioinformatics to characterize the resistome and microbiome of fecal and soil samples of free-ranging ungulates in Yellowstone and Rocky Mountain National Parks. The secondary objective was to compare these to data collected from cattle fecal samples.

Project type: Research, Scholarship, and Entrepreneurship

173 - Julie Lake

Microgreen Production: An Evaluation of Types of Growing Media

2018 Fall - College of Agricultural Sciences

Microgreens are edible plants that are harvested between 7 to 15 days, when cotyledons and/or two 'true' leaves have emerged. Plants in this stage of development have a much higher nutritional value than their mature counterpart. These factors make microgreens a source of nutritious food in the U.S. and globally. Researching different methods used to grow microgreens can benefit future food supplies. Evaluation of the growth of arugula microgreens in a greenhouse, on six different media, within three trials. Results showed the germinating media mixtures had the highest harvest volumes. Future research can include more media options, such as rockwool.

Project type: Research, Scholarship, and Entrepreneurship

174 - Steven Lakin

WarpNL: Improving Microbiome and Antimicrobial Resistance Surveillance Using Statistical Supercomputing

2018 Fall - College of Veterinary Medicine and Biomedical Sciences

Globally, around 700,000 people die annually due to antimicrobial-resistant infections. Antimicrobial resistance is found naturally in the environment and can be transferred into bacteria that infect people. We currently use next-generation DNA sequencing to understand the environmental distribution of bacteria and resistance genes. However, we lack effective analytic methods to identify resistance genes from sequencing data. Thus, we developed WarpNL, a software using advanced statistics, cutting-edge DNA encoding, and supercomputing to allow for unprecedented characterization of the microbiome and resistance genes from sequencing data. WarpNL will help uncover novel interventions to prevent the global impact of antimicrobial resistance.

Project type: Research, Scholarship, and Entrepreneurship

175 - Lindsay Lammers

How Does the Protein Ndl1 Regulate Mitosis?

2018 Fall - College of Natural Sciences

The process of cell division, mitosis, is essential to develop different types of cells and tissues. The mechanics required for one cell to grow and divide into two new cells is complex and requires many layers of regulation to ensure accuracy. Problems with regulation can cause developmental disorders and cancer, yet most of the time cells divide normally with no issues. To better understand one aspect of regulation in this process, I am using the model organism budding yeast to characterize the role of a protein identified to be involved in mitosis, but we don't know exactly how it functions. Project type:

Research, Scholarship, and Entrepreneurship

176 - Ashley Larson

Myoglobin Versus Fiber Type Expression in Skeletal Muscle Cells

2018 Fall - College of Natural Sciences

Myoglobin, a hemoprotein involved in oxygen storage, could have therapeutic benefits to combat ischemic diseases. Traditionally myoglobin has been identified as following the expression of slow endurance fiber types. Interestingly, recent evidence has shown changes in myoglobin expression without changing fiber type, indicating myoglobin expression is not always fiber type dependent. Lipid supplements elevate myoglobin in mammalian cells, but it is unknown how lipid affects myoglobin expression relative to fiber type. We have found myoglobin expression prior to myosin heavy chain I, indicating that there are pathways to myoglobin expression independent from fiber type expression. Project type: Research, Scholarship, and Entrepreneurship

177 - Becca Lassell

A Logic Model of a Dementia-Specific Program of Equine-Assisted Activities

2018 Fall - College of Health and Human Sciences

This poster depicts a logic model of an innovative dementia-specific program of equine-assisted activities to guide future program replication and research. To map the program's purpose, assumptions, inputs, occupational opportunities to interact with horses, and outputs, we conducted directed content analysis of previously collected qualitative data. Outcomes of previously videotaped behavioral indicators of participants' quality of life (QoL) were linked to each of the program's occupational opportunities and mapped onto the model. Strengths of the resulting logic model included descriptions of program components, their presumed influences on QoL, and immediate outcomes; gaps included short and long-term outcomes and community impact.

Project type: Research, Scholarship, and Entrepreneurship

178 - Dustin Lee

Effect of Bifidobacteria Probiotic Supplementation in Western-Diet Fed Mice

2018 Fall - College of Health and Human Sciences

The intestinal microbiota has emerged as a critical regulator of health and disease. Based on our previous work, we tested the hypothesis that reductions in intestinal Bifidobacteria drive the development of arterial stiffness. Mice fed a western diet (WD) displayed increased body weight and arterial stiffness. A separate group of WD-fed mice were supplemented with Bifidobacteria, which had no significant improvements on body weight or arterial stiffness. Furthermore, no significant changes in glucose tolerance or intestinal permeability were observed with supplementation. Ongoing analyses will characterize the gut microbiota to better elucidate potential reasons for these results.

Project type: Research, Scholarship, and Entrepreneurship

179 - withdrawn

180 - Ashley Leek

Neuronal Kv2.1 Clusters Influence the Diffusion Landscape of Adjacent Astrocytes

2018 Fall - College of Veterinary Medicine and Biomedical Sciences

The Kv2.1 voltage-gated potassium channel, with its cell adhesion molecule auxiliary subunit, AMIGO1, form micron-sized clusters in the plasma membrane of neuronal somas. Within brain tissue, neuronal Kv2.1-induced ER-PM junctions are closely associated with astrocytic membranes. This study addresses the effect of neuronal Kv2.1/AMIGO clusters on the diffusion landscape of adjacent astrocyte membranes. Employing a neuron/astrocyte co-culture system and single-particle tracking, we examined



the diffusion of glutamate transporters (GLT1a) on astrocytes. Comparison of GLT1a trajectories from astrocyte membrane adjacent to neuronal Kv2.1/AMIGO clusters to those obtained distant from clusters suggests the Kv2.1/AMIGO clusters influence diffusion on the adjacent astrocyte membrane.

Project type: Research, Scholarship, and Entrepreneurship

181 - Sarah Leichty

Gone with the Wind: Carbon Loss in Irrigated Corn System

2018 Fall - University Interdisciplinary Programs

Carbon from plant residue is largely lost to the atmosphere in the form of the greenhouse gas, carbon dioxide. Agricultural systems have the potential to store plant-carbon in the soil, lessening greenhouse gas emissions and improving soil health. This project will determine how location of residue in relation to soil particles affects how quickly plant-carbon leaves the system using stable isotope-labeled residue in an irrigated Colorado corn system.

Project type: Research, Scholarship, and Entrepreneurship

182 - Min Li

Impact of New Levee Constructions on Variation of Sea Level

2018 Fall - Walter Scott, Jr. College of Engineering

This study aims to investigate the impact on the peak water level (PWL) over the entire San Francisco Bay (SF Bay) caused by the construction of new levees at different locations along the shoreline. The impact is quantified by sensitivity analysis, and a surrogate model assisted approach is proposed to efficiently perform the sensitivity analysis. The results of the study are useful for providing suggestions on whether new levees should be constructed at certain locations in SF bay region. The approach proposed is general, so similar analysis can be done for other coastal zones around the world.

Project type: Research, Scholarship, and Entrepreneurship

183 - Tiantian Li

Global Engagement Initiatives: Building Bridges Among International and Domestic Students

2018 Fall - College of Health and Human Sciences

Evidence shows that the interaction between domestic and international students can benefit them, but it will not happen without facilitation by skilled faculty and staff. This research demonstrates ways to encourage collaborative and meaningful interactions between domestic and international students. It provides the rationale to honor differences. It highlights cultural theories and successful approaches to emphasizing and celebrating cultural diversity. By using literature review and qualitative methodology, the research explores the possibilities to provide a welcoming and brave space for domestic and international students to engage, collaborate, coordinate, discuss and communicate.

Project type: Research, Scholarship, and Entrepreneurship

184 - Julie Liebenguth

Conceptions of Security in Global Environmental Discourses

2018 Fall - College of Liberal Arts

It is increasingly important to understand how contemporary conceptions of international security (1) influence the architecture of global environmental governance and (2) transform security strategies to meet evolving socio-ecological challenges. This paper explores the water-energy-food (WEF) security nexus as a distinct political domain in which actors utilize security language to describe environmental problems and corresponding policy prescriptions. I find that this particular policy debate represents a

unique departure from other environment-security discourses in that economic productivity is the main referent object rather than countries, individuals, or ecosystems.

Project type: Research, Scholarship, and Entrepreneurship

185 - Dani Lin Hunter

Citizen-Scientist or Citizen-Technician: Thematic Analysis of CitSci.org Projects

2018 Fall - University Interdisciplinary Programs

Citizen science engages non-science professionals in the scientific process. CitSci.org is an online platform that seeks to support citizen science projects by providing a virtual place for projects to store and analyze data. A thematic analysis of environmental and ecological projects active on CitSci.org within the past two years ( $n=167$ ) was conducted. Volunteer tasks were categorized using Bloom's taxonomy of cognition and skills associated with increasing scientific literacy. Findings indicated incongruence between project descriptions and volunteer tasks. This research suggests that there is a missed opportunity for increasing scientific literacy in citizen science.

Project type: Research, Scholarship, and Entrepreneurship

186 - Jakob Lindaas

How Much Ammonia is in Wildfire Smoke?

2018 Fall - Walter Scott, Jr. College of Engineering

We measured gas-phase ammonia ( $\text{NH}_3$ ) in wildfire smoke using a "flying laboratory" (the NSF-C130 airplane).  $\text{NH}_3$  is important to quantify in wildfire smoke as it influences smoke chemistry and forms new particles, which are harmful to humans and change cloud properties as the smoke travels downwind. But  $\text{NH}_3$  is difficult to measure well, as it "sticks" to many surfaces. We employed recently developed techniques to make the most precise measurements yet of  $\text{NH}_3$  in smoke. We found that smoke plumes contain different amounts of  $\text{NH}_3$ . This variability is driven by differences in the vegetation burned and the type of combustion.

Project type: Research, Scholarship, and Entrepreneurship

187 - Michael Link

Constraining Summertime Chemical Production of Organic Acids in Forested Environments

2018 Fall - College of Natural Sciences

Organic acids comprise a significant fraction of reactive atmospheric carbon. They are critical to the growth of organic aerosol and influence the acidity of precipitation. Specific mechanisms for organic acid formation in the atmosphere are not well resolved mostly due to a lack of measurements. We have constrained the chemical production of organic acids during the summertime from two forested environments by combining ambient measurements, laboratory results and modeling. We find that isoprene oxidation mostly dictates organic acid abundance as measured from an Alabama forest whereas emissions play an important role in abundance over a forest in Colorado.

Project type: Research, Scholarship, and Entrepreneurship

188 - Nicole Litwin

Acute Effects of Red Beetroot Juice on Postprandial Endothelial Dysfunction

2018 Fall - College of Health and Human Sciences

High-fat meal (HFM) consumption induces transient, postprandial impairments in vascular endothelial function in normal weight individuals, and is exacerbated in overweight/obese individuals. This study investigated whether acute red beetroot juice (RBJ) consumption could attenuate postprandial endothelial function following HFM consumption, and examined nitrate-dependent and-independent

mechanisms. Fourteen overweight/obese men and postmenopausal women were randomly assigned to receive a HFM with either RBJ, nitrate-free RBJ, placebo, or placebo + nitrate. Endothelial function was assessed by reactive hyperemia index (RHI) at baseline and 4-hours postprandially. No significant differences were observed. Further examination of the data is needed prior to making a conclusion.  
Project type: Research, Scholarship, and Entrepreneurship

189 - Lucas Loetscher

Application of First Principle Design Methodologies to Optimize Waste Bioconversion

2018 Fall - Walter Scott, Jr. College of Engineering

A first- principle design technique was applied to the conceptual design of a new technology suitable for the digestion of diverse waste substrates. This system, named the CSU multiple-stage anaerobic digester (MSAD) technology, is a promising technical alternative to existing anaerobic digestion technologies. The CSU MSAD technology demonstrates the ability to overcome various limitations in previous anaerobic digestion technologies. Using multiple hydraulically connected stages, this system facilitates the digestion of diverse substrates, while facilitating the recovery of economically valuable bioproducts. This approach has the possibility of improving the feasibility of on-site waste utilization for landfills, municipalities, and farms.

Project type: Research, Scholarship, and Entrepreneurship

190 - Katherine Lopez Ambrosio

Hydroxyapatite Structures Created by Additive Manufacturing with Extruded Photopolymer

2018 Fall - College of Natural Sciences

We developed a Hydroxyapatite slurry suitable for 3D printing. Initial characteristics of the slurries show promise for printing orthopedic structures such as bone. The combination of extrusion and simultaneous photopolymerization enabled the creation of complex shapes with high ceramic loading (41%) using low-cost equipment. To the authors' knowledge, this is the highest hydroxyapatite loading in a photopolymer for additive manufacturing.

Project type: Research, Scholarship, and Entrepreneurship

191 - Nicole Lopinski

Investigating the Diets of Humans and Neandertals Through Faunal Assemblages

2018 Fall - College of Liberal Arts

This research looks at the reported faunal assemblages from three modern human sites and three Neandertal sites in Europe from 126,000-11,000 years ago to see if there is evidence of food source competition which could have been a contributing factor in the extinction of Neandertals. This research finds that in the six sites studied there appears to be hominin adaption to available environments and food sources, instead of blind preference to particular food sources.

Project type: Research, Scholarship, and Entrepreneurship

192 - Hannah Love

Teaching Team Science

2018 Fall - College of Liberal Arts

The Science of Team Science (SciTS) emerged because of the idea that teams can tackle more complex problems. However, scientific literature debates whether SciTS can be taught. Literature in the learning sciences has theorized that we can teach students skills for scientific, business, and other teams that require complex systems thinking. However, these bodies of literature lack examples of practical application and empirical evidence. We conducted a mixed-methods evaluation to answer: how can we

teach SciTS to undergraduates, and what are the long-term learning outcomes from teaching SciTS? We found scientific evidence that community-based research/service-learning prepares students for future teams.

Project type: Research, Scholarship, and Entrepreneurship

193 - Matthew Lurtz

Riparian Evapotranspiration in Relation to Groundwater and Surface Water Exchange

2018 Fall - Walter Scott, Jr. College of Engineering

Evapotranspiration (ET) in riparian vegetation habitats is difficult to estimate due to relatively abundant water supply, spatial vegetation heterogeneity, and interactions with anthropogenic influences like increased salinity and shallower groundwater tables from irrigation. This work investigates the relationship between irrigation-driven groundwater levels and vegetation indices, thermography, and ET estimated from remotely-sensed data. I hypothesize that the annual-averaged simulated irrigation return flow to locations along the Arkansas River will be positively correlated with riparian habitat consumptive water use. The conclusions drawn from this work can be used to inform how water and land management decisions might alter riparian water use.

Project type: Research, Scholarship, and Entrepreneurship

194 - India Luxton

BSharp: A Community-Based Music Intervention for PWD and Caregivers

2018 Fall - College of Liberal Arts

Dementia is a worldwide phenomenon that affects 1 in 20 people over the age of 65 and 1 in 5 people over the age of 80. Recent research suggests that non-pharmacological interventions have been found to delay the progression of dementia by up to two years. The B Sharp program is an example of a non-pharmacological community-based music intervention that improves the cognitive and social well-being of individuals with dementia and their care partners. Cognitive and qualitative results illustrate a number of positive changes for individuals who participate in the program; including improved alertness, overall engagement, and mood.

Project type: Research, Scholarship, and Entrepreneurship

195 - Jared Luxton

Novel Assessment of Patient Radiosensitivity via Chromosomal and Telomeric Biomarkers

2018 Fall - University Interdisciplinary Programs

The intent of radiation therapy is elimination of malignant cells and sparing of healthy tissue. This therapeutic intent is often obscured by negative patient outcomes on account of inter-patient sensitivity to radiation. Outcomes of radiation therapy for radiosensitive patients include fibrosis, death, and secondary malignancies. Current means for determining patient radiosensitivity prior to therapy are lacking in approach and predictive capability. Here we describe our novel approach of predicting patient radiosensitivity prior to therapy using a previously inaccessible biomarker of radiation induced damage: chromosome aberrations.

Project type: Research, Scholarship, and Entrepreneurship

196 - Erin Lynch

The Cellular DXO Decapping Exonuclease is a Potent Antiviral Effector

2018 Fall - University Interdisciplinary Programs

Flaviviruses are positive-strand RNA viruses that are sensitive to cellular RNA decay pathways. We have recently discovered that the cellular exonuclease DXO plays a significant role in controlling the

replication of flaviviruses. DXO degrades RNAs that lack 2'-O-methylation, helping the cell to discriminate self from non-self RNAs. When DXO is absent during a flavivirus infection, viral RNA abundance increases dramatically compared to wildtype cells, indicating that DXO helps control flavivirus infection. Our goal is to uncover the mechanism of how DXO suppresses flavivirus replication and what viral factors are necessary for flaviviruses to evade DXO restriction.

Project type: Research, Scholarship, and Entrepreneurship

197 - Brianna Magbual

Finding the Path of Steepest Ascent- Allocating Wildfire Program Budgets

2018 Fall - Warner College of Natural Resources

With the increase in size, frequency, and severity of wildfires, there is a need to reduce wildfire impacts and suppression costs. Most wildfire budgeting research focuses on costs that occur after ignition, but there is little research on budgeting for preparedness and fuels reduction programs which help to reduce the chances of ignition and large uncontrollable fires. The path of steepest ascent method proportionately allocates funds to each program based on program performance. This method can be applied at a unit, state, regional, and national scale and helps managers to allocate funds to each wildfire program as total budgets change.

Project type: Research, Scholarship, and Entrepreneurship

198 - Blessing Magonziwa

A "Soil Tool Kit" for In-Field Soil Analysis

2018 Fall - College of Agricultural Sciences

Smallholder farmers and NGOs in agricultural development have limited access to analytical laboratories due to high costs and remote locations. We developed a tool kit that uses minimum reagents to provide useful, quantitative results in field to inform decisions. The tool kit measures important soil health indicators affecting crop yields. These measures were validated against standard laboratory with 72 soil samples taken from 36 farms across Nandi, Kenya. Statistical analysis showed that the tool kit and lab methods are highly and positively correlated and that the tool kit can explain variability in grain yield as well as lab methods.

Project type: Research, Scholarship, and Entrepreneurship

199 - Roberta Maia Sabino

Blood Plasma Protein Interaction with Superhydrophobic Titania Nanotube Surfaces

2018 Fall - College of Natural Sciences

Hemocompatibility remains a challenge to the development of blood-contacting medical devices. When implants meet blood, the initial event is plasma proteins adsorption, which can lead to thrombosis and sometimes device failure. Thus, there is a vital interest in developing novel surfaces that prevent blood from clotting. Even titanium-based implants, which have been widely used as a biomaterial, can cause the same adverse effects when interacting with blood. Therefore, one recently approach is enhancing hemocompatibility by using superhydrophobic surfaces, which can repel blood. In this work, we investigated the hemocompatibility of superhydrophobic titania nanotubes by studying adsorption of key blood proteins.

Project type: Research, Scholarship, and Entrepreneurship

200 - Andrew Mann

Tradeoffs Between Environmental Tolerance and Virulence in an Entomopathogenic Fungus

2018 Fall - Warner College of Natural Resources

Insect fungal pathogens are often applied as biological control agents, but environmental factors interact with pathogen genotype to impact virulence in situ. Multiple functional traits for a ubiquitous entomopathogen (*Beauveria bassiana*) were quantified including growth rate across a range of environmental conditions, competitive ability, and sporulation rate. Fungal virulence was also determined in replicated bioassays, and relationships between functional trait values and virulence were compared for fourteen *B. bassiana* isolates occupying fourteen genetic haplotypes.

Project type: Research, Scholarship, and Entrepreneurship

201 - Sean Markovic

Enhancing Perennial Stock Production Through Application of Plant Growth Regulators

2018 Fall - College of Agricultural Sciences

The objective of this study was to determine the efficacy for increased vegetative growth of three plant growth regulators (PGR) applied on the vegetative growth of *Heuchera sanguinea* and *Zauschneria garrettii* propagation stock plants. Three PGR were applied: Ethephon (2-chloroethyl Phosphonic Acid), 6-benzylaminopurine, and Gibberellins A4A7 (GA) & N-(phenylmethyl)-1H-purine 6-amine. Each treatment was evaluated monthly for plant growth factors. (A4A7 (GA) & N-(phenylmethyl)-1H-purine 6-amine) treatment of 50 mg·L<sup>-1</sup> is recommended in *Heuchera* stock plant production for increased cuttings. (6-benzylaminopurine) at 200 mg·L<sup>-1</sup> treatment is recommended for *Zauschneria* stock plant production due to increased quality of vegetative propagation material.

Project type: Research, Scholarship, and Entrepreneurship

202 - Craig Marshall

Integrated Physiological Correlates of Osmoregulation and Performance in Trinidadian Guppies

2018 Fall - College of Natural Sciences

Euryhaline fish can tolerate a wide range of salinities. However, the extent to which populations can tolerate different salinity levels through plasticity versus adaptation remains underexplored. Circulating plasma cortisol levels and metabolic rates are involved in both osmoregulation and stress responses. Thus, the use of such physiological measures to distinguish local adaptation from adaptive plasticity is complicated. Here, we investigated the effects of salinity on field plasma cortisol levels and oxygen consumption in swamp guppies from the island of Trinidad. Collectively, our results suggest the degree of environmental variability in salinity shapes plastic and evolved physiological responses of populations.

Project type: Research, Scholarship, and Entrepreneurship

203 - Matthew Marzo

Molecular Basis for Motor Protein Deficits in Neurological Disease

2018 Fall - College of Natural Sciences

Human neurological diseases can be caused by many genetic drivers, including spontaneous mutations to individual genes. Spontaneous mutations in the human dynein gene are emerging as a major player for a diverse group of muscular dystrophy-related diseases. These diseases are all caused by distinct mutations, and symptoms vary greatly between individuals. While studying a host of dynein mutations in human cells remains a challenge in humans, I have taken advantage of the biochemical system of budding yeast to address this question: Why do disparate dynein mutations cause cellular dystrophy at a molecular level, and can we remedy these deficits?

Project type: Research, Scholarship, and Entrepreneurship

204 - Weston Maughan

Edge Effects on Vortex Nucleation in Superconducting Granular Aluminum Films

2018 Fall - College of Natural Sciences

Type-II superconductors are characterized by an intermediate state in which quantized magnetic flux lines, or vortices, penetrate the sample. The influence of the sample edge geometry on the nucleation of these vortices has been the subject of significant theoretical discussion that has yet to be fully addressed experimentally. We have explored these edge effects by fabricating a sample with five tapered edges. Critical current measurements for each edge indicate a clear trend between longer taper length and enhanced vortex nucleation. This trend provides valuable insight into the fundamental role of the sample edges on the energy barrier to vortex entry.

Project type: Research, Scholarship, and Entrepreneurship

205 - Alex Mauro

Salinity Tolerance & Competition Interact to Limit Ranges in Guppies

2018 Fall - University Interdisciplinary Programs

An unresolved question in biology is why natural selection does not favor the evolution of greater environmental tolerance and the expansion of geographic ranges. Classic hypotheses often invoke a tradeoff between abiotic tolerance and competition, but few empirical examples exist in nature. Here we test how salinity tolerance and competition impact growth rate and body condition in Trinidadian guppies. Our results suggest that guppies distribute themselves along a salinity gradient in nature due to such a tradeoff. Our results have implications for how tropical fish will adapt to changing salinities caused by climate-change induced sea level rise.

Project type: Research, Scholarship, and Entrepreneurship

206 - Emily Maverick

Open or Closed? Probing Protein Conformation and Electrical Function

2018 Fall - College of Veterinary Medicine and Biomedical Sciences

Ion channel proteins are essential molecules in our nervous systems that control the flow of ions across cell membranes. Many neurological diseases are caused by mutations in ion channel proteins, including epilepsy, neuropathic pain, Long QT syndrome, and others. In this work, a novel assay is developed that quantifies electrically active and silent ion channel proteins in single cells in a high-throughput manner. This assay offers a new way to measure the activity of ion channel proteins, which could aid in the development of new therapeutic approaches for the treatment of excitability disorders.

Project type: Research, Scholarship, and Entrepreneurship

207 - Skyler Mavor

Geologic Mapping of the Atacama and Taltal Fault Systems, Chile

2018 Fall - Warner College of Natural Resources

The Atacama fault system (AFS) is a >1000 km long fault network in northern Chile that accommodated displacement during the Jurassic and Early Cretaceous. The AFS is cut by another large fault, the Taltal fault system, which signifies the end of AFS faulting. Despite their size and tectonic significance, the absolute timing of both fault systems is unclear. Here, we present findings from geologic mapping and radiometric dating to better constrain fault timing. Our research is the result of ongoing collaboration with geoscientists from the Pontifical Catholic University of Chile to study the tectonic deformation history of northern Chile.

Project type: Research, Scholarship, and Entrepreneurship

208 - Dillon Maxwell

Hell in the Promised Land: Environment and Mountain Meadows Massacre

#### 2018 Fall - College of Liberal Arts

In mid-September, 1857, Mormon militiamen from Iron County killed 120 members of the Baker-Fancher party, sparing the lives of several small children. Different perspectives offer different reasons as to what drove the Mormon Militia to attack the passing emigrants. Often, social reasons have been attributed to the massacre, but it must be questioned where non-human elements factor into the event. Environmental factors such as drought, disaster, and over-grazing are central to the Mountain Meadows Massacre.

Project type: Research, Scholarship, and Entrepreneurship

#### 209 - Blaine McCarthy

Growing Green Plastics Using the Sun

#### 2018 Fall - College of Natural Sciences

Polymers, or plastics, are an undoubtedly important part of our everyday lives. Our chemistry research group is interested in developing new ways to make these materials in a more sustainable manner. In this work, we discuss some of our progress developing a method to make polymers (termed O-ATRP) which enables the use of sunlight as a renewable energy source to drive the process. Moreover, this O-ATRP method has the potential to make polymers for advanced applications such as microelectronics, drug delivery systems, and sensors.

Project type: Research, Scholarship, and Entrepreneurship

#### 210 - withdrawn

#### 211 - Alyssa Melvin

Enhancing Biocompatibility of Glucose Biosensors with Nitric Oxide-Releasing Metal-Organic Frameworks

#### 2018 Fall - College of Natural Sciences

Incompatibility with the surrounding biological environment limits the lifetime and accuracy of in vivo glucose biosensors. Localized generation of nitric oxide (NO) from endogenous S-nitrosothiols (RSNOs) can be used to reduce the foreign body response. Previous research has demonstrated the ability of a copper-based metal-organic framework (MOF) to catalyze the release of NO from RSNOs. By adjusting the amount of MOF incorporated into the outer polymer membrane, it is possible to control the amount of NO released. Here we present a novel application of this MOF to catalyze the release of NO on the surface of needle-type electrochemical glucose biosensors.

Project type: Research, Scholarship, and Entrepreneurship

#### 212 - Marissa Metz

Endorphin Precursor Upregulation in Response to Pain and Reward

#### 2018 Fall - College of Veterinary Medicine and Biomedical Sciences

Proopiomelanocortin (POMC) is a precursor peptide cleaved to produce  $\beta$ -endorphin (BEND), an endogenous opioid responsible for reward and analgesia. Identifying cells specific to each of these processes may help to avoid the addictiveness of pharmaceutical analgesics. Mice underwent painful and rewarding stimuli, and the expression of hypothalamic POMC was assayed. After hot plate exposure, POMC expression was increased in 12% percent of cells. After a food reward, POMC expression was also increased in 13% of all POMC cells in the rostral arcuate nucleus. Thus, POMC production may be controlled by anatomically distinct cells in response to reward versus pain.

Project type: Research, Scholarship, and Entrepreneurship



213 - Kelton Meyer

Lichenometry at a Prehistoric Alpine Hunting Site in Colorado

2018 Fall - College of Liberal Arts

The 5BL148 archaeological site is one of many large alpine hunting areas in Colorado's Front Range, consisting of inconspicuously constructed stone walls, hunting blinds, and cairns used by Native American hunter-gatherer groups to drive and trap game animals during migratory rounds. This project uses a statistical analysis of *Rhizocarpon* lichen colonies, which grow on stone walls at the site, to discuss the age of the game drive system. The data show that the stone walls were heavily modified at the time of Euro-American contact, which is corroborated by artifact evidence and radiocarbon dating.

Project type: Research, Scholarship, and Entrepreneurship

214 - Andrew Monaghan

Effects of Footwear Cushioning on Walking Performance in Multiple Sclerosis

2018 Fall - College of Health and Human Sciences

The purpose of this study was to investigate the effects of two different midsole conditions on the spatiotemporal parameters of gait in females with multiple sclerosis (MS). Gait testing was conducted as 18 females with MS performed two-minute walk tests in 1) a high-cushion and 2) a standard-cushion midsole shoe. Spatiotemporal parameters were assessed using wireless inertial sensors. Participants spent less time in double support and stance phase with more time in single support and swing phase in the high-cushion midsole shoe. The high-cushion shoe may decrease fall-risk by improving gait parameters associated with increased risk of falls.

Project type: Research, Scholarship, and Entrepreneurship

215 - Patrick Monaghan

Smart Device-Based Assessment of Motor Function Impairment

2018 Fall - College of Health and Human Sciences

Aging and neurological disease can be accompanied by instability, slowness, weakness, mobility impairment, and reduced quality of life. Precise functional assessment is important in tracking functional decline and response to intervention, but such measures are expensive and lab-based. We developed a smartphone-based battery of functional measures for healthy and clinical populations. Using onboard sensors, the tests of balance, tremor, leg power, limb movement speed, and gait can be administered remotely and inexpensively by minimally trained personnel. We are using these tests in studies of neurological disease, exercise interventions in clinical populations and aging, and the assessment of cannabis intoxication.

Project type: Research, Scholarship, and Entrepreneurship

216 - Nichole Monhait

Assessing Health Indicators in Larimer County Sexual Minorities

2018 Fall - University Interdisciplinary Programs

Healthy People 2020 (HP2020) emphasizes the need to better understand existing health disparities in the lesbian, gay, bisexual, and transgender (LGBT) population. LGBT individuals face high rates of mental illness, substance abuse, and suicide associated with discrimination and stigma. Inclusion of sexual orientation and gender identity (SOGI) questions on national surveys is vital to understanding and addressing the unique health needs of this population. Data from the 2013 and 2016 Community Health Surveys by the Health District of Northern Larimer County was used to compare 8 health indicators in the Larimer County LGB population to HP2020 targets.

Project type: Research, Scholarship, and Entrepreneurship

217 - Dominique Montano

Are You What You Eat? Lipids and Potential Intracellular Responses

2018 Fall - College of Natural Sciences

Lipids influence aerobic ability, with marine mammals' relying on lipids as fuel and the protein myoglobin to facilitate oxygen distribution during dives. Myoglobin expression has previously been shown to increase with lipid presence. We are unaware of the specific conditions driving myoglobin expression, or how fats are utilized to create a physiological response. It is unclear if the presence of the lipids influenced the upregulation of myoglobin or if cellular uptake of lipids caused an intracellular upregulation of myoglobin. Evidence indicating direct links of an intracellular response in the cell based on lipid uptake remains to be explored.

Project type: Research, Scholarship, and Entrepreneurship

218 - Marcia Moraes

Visualizations to Support Self-Regulation of Students' Learning Behaviors

2018 Fall - College of Health and Human Sciences

This study used learning analytics visualizations in the form of visual graphics of students' spaced-retrieval practice (SRP) to support students' reflection on their learning behavior and to learn from that exposure. Students did retrieval practice activities (RPAs) and after the last RPA, they received a visualization of their RPA attempt data and then were prompted with reflection questions. Results showed that most of the students engaged in behaviors oriented toward getting the highest score; they understood the benefits of SRP but did not engage in that behavior; and they wanted to compare their work and effort with their classmates.

Project type: Research, Scholarship, and Entrepreneurship

219 - withdrawn

220 - Eve Mozur

Organic Cation Dynamics Encourage Conduction in Hybrid Perovskite Semiconductors

2018 Fall - College of Natural Sciences

Hybrid perovskites are exciting new materials for use in solar cells, but their materials properties are not well understood. Unlike traditional semiconductors, which are either organic or inorganic, hybrid perovskite semiconductors are composed of an inorganic framework ( $\text{PbBr}_3^-$ ) coupled to isolated organic cations ( $\text{CH}_3\text{NH}_3^+$ ). To probe how the presence of an organic cation changes the behavior of an inorganic framework, we have characterized the structure, dynamics, and electronic properties of the series with the chemical formula  $(\text{CH}_3\text{NH}_3)_{1-x}\text{Cs}_x\text{PbBr}_3$ . Our results elucidate the complex interactions in hybrid perovskites, a deep understanding of which is necessary to enable technological innovation.

Project type: Research, Scholarship, and Entrepreneurship

221 - Rebecca Much

Understanding Drivers of Coyote Predation on Black-Footed Ferrets

2018 Fall - Warner College of Natural Resources

The endangered black-footed ferret (*Mustela nigripes*; hereafter, ferret) faces multiple recovery challenges, including plague (*Yersinia pestis*) in prairie dogs (*Cynomys* spp), the ferret's primary food source, and predation by coyotes (*Canis latrans*). Coyote predation on ferrets is almost always nocturnal,

which raises an interesting question about why coyotes are utilizing prairie dog colonies at night given the primary biomass (i.e., diurnal prairie dogs) are mostly underground and unavailable. As a result, our study aims to understand 1) if coyotes preferentially use prairie dog colony habitat, and 2) the community dynamics that might influence this use.

Project type: Research, Scholarship, and Entrepreneurship

222 - Stephen Mugal

Metabolic Rate Drives Behavior and Life History in Honeybees

2018 Fall - College of Natural Sciences

The pace-of-life syndrome (POLS) hypothesis posits that physiological, behavioral, and life history traits should exhibit strong correlation along a single axis, which should explain a majority of inter-individual variation. We explored the nature of such correlated traits between individuals in the eusocial insect, the honeybee (*Apis mellifera*). We found that while overall support for the POLS framework is mixed, colonies do exhibit variation in the nature of the correlations. Furthermore we provide evidence that variation in metabolic rate operates as a fundamental driver for determining variation in behavior and life history trajectories.

Project type: Research, Scholarship, and Entrepreneurship

223 - Cary Mundell

Novel Roles of 5' UTR Elements in Viral Infections

2018 Fall - University Interdisciplinary Programs

XRN1 is a major 5'-3' exonuclease involved in the turnover of eukaryotic mRNA. Many members of the Flaviviridae family possess a knot-like structure in their 3' untranslated regions (UTR) that stalls/represses XRN1 activity during infection. Surprisingly, both Bovine Viral Diarrheal Virus and Hepatitis C Virus possess a 5' UTR structure that functions in the same fashion as these 3' UTR knot-like structures. Understanding the sequence and structure requirements as well as the function of these 5' structures is necessary for both understanding and perhaps controlling the replication of these two important viral pathogens.

Project type: Research, Scholarship, and Entrepreneurship

224 - Heide Murakami

Enhancing Cancer Killing Oncolytic Viruses with Vanadium-Based Phosphatase Inhibitors

2018 Fall - College of Natural Sciences

Oncolytic viruses (OVs) are viruses that target and kill cancer cells while leaving normal cells unaffected. To circumvent the negative antiviral response of the immune system, a combination of vanadium inhibitors with peptide sequences was investigated for use of increasing OV efficacy in combating hard to treat cancers. The peptide sequences of Ac-DADEYL-NH<sub>2</sub> and Ac-EYL-NH<sub>2</sub> were synthesized using solid state peptide synthesis and were characterized by 2D NMR spectroscopy before investigating the formation of vanadium-peptide complexes. We anticipate that these vanadium-peptide complexes will greatly enhance OV efficacy for use in developing new innovative methods of cancer treatment in the future.

Project type: Research, Scholarship, and Entrepreneurship

225 - Madison Myers

Reworlding and Making Kin in Jeff VanderMeer's *Annihilation*

2018 Fall - College of Liberal Arts

Jeff VanderMeer's work of fiction and recent film, *Annihilation*, uniquely suggests reworlding by reimagining human interconnectedness to other species as part of multispecies communities. VanderMeer breaks down the boundaries between human and nature by problematizing the human/nature dichotomy, VanderMeer subsequently demonstrating the possibility toward humanity seeing itself as part of a larger multispecies community through relationship building that encompasses empathy, imagination, uncertainty and mutuality. Ultimately, VanderMeer—and literature that problematizes humanity amongst non-human species—makes possible a reimagining of how making kin and kind with multispecies communities allows for transformative change toward experiencing nature and rebuilding relationships with nature.

Project type: Research, Scholarship, and Entrepreneurship

226 - Afnan Shazwan Nasaruddin

To Each Their Own: Bacterial Chemical Attractants Within Pectobacteriaceae Family

2018 Fall - College of Agricultural Sciences

The Pectobacteriaceae family consists of primarily plant pathogenic bacteria from the genera *Pectobacterium* and *Dickeya*, which cause disease in potato and contribute to at least 1% of seed potato rejection and crop losses in the United States annually, amounting to about \$400 million. Genomic analyses of the Pectobacteriaceae family reveal that *Pectobacterium* and *Dickeya* genomes are enriched in methyl-accepting chemotaxis proteins that are important for bacterial detection of chemical compounds. To determine the chemical attractants of *Pectobacterium* and *Dickeya*, qualitative plate-based chemotaxis assays of 19 bacterial strains were conducted using 23 compounds found in potato.

Project type: Research, Scholarship, and Entrepreneurship

227 - Michael Neale

Evaluating Water Reuse and Conservation Strategies in Three U.S. Cities

2018 Fall - Walter Scott, Jr. College of Engineering

Understanding drivers of urban water demand and the potential for city-scale conservation and reuse strategies is important for effective municipal water management. This study applies the Integrated Urban Water Model in three U.S cities; Denver, CO, Miami, FL, Tucson, AZ. To understand performance of alternative water demand reduction strategies under distinct climate conditions, seasonal water use behaviors, and land cover characteristics. A suite of strategies were simulated in each city to identify effective means to counterbalance demand due to population growth and effects of urban densification.

Project type: Research, Scholarship, and Entrepreneurship

228 - Nora Jean Nealon

Lactobacilli Differentially Ferment Rice Bran to Suppress Antimicrobial-Resistant Salmonella Growth

2018 Fall - University Interdisciplinary Programs

Salmonella is a leading cause of diarrhea and emerging antimicrobial resistance warrants development of alternative treatments to antibiotics. Rice bran, a prebiotic produced during rice processing, was previously shown to differentially enhance *Lactobacillus paracasei* suppression of Salmonella growth. This study examined suppression of antimicrobial-resistant Salmonella using three Lactobacilli. The hypothesis is *Lactobacillus* spp. fermented rice bran differentially suppresses Salmonella growth via enhanced antimicrobial metabolite production. *Lactobacillus*-fermented rice bran yielded 348 metabolites and Lactobacilli differentially-produced 24 antimicrobial metabolites. These results support the development of *Lactobacillus*-fermented rice bran for use in future investigations that aim to treat and protect drug-resistant salmonellosis.

Project type: Research, Scholarship, and Entrepreneurship

229 - Michael Nguyen-Truong

Different Mechanical Properties Between Adult Sheep Right and Left Ventricles

2018 Fall - Walter Scott, Jr. College of Engineering

Ventricular dysfunction contributes significantly to mortality and morbidity in modern society and is the most common cause of heart failure. In the present study, I compared the fundamental biaxial mechanical behavior of the left and right ventricles (LV, RV) in adult sheep. The LVs were found to have more equibiaxial strength, whereas the RVs were more anisotropic with a higher circumferential elastic modulus (compared to longitudinal elastic modulus). This is the first characterization and comparison of biaxial mechanical properties of LV and RV in a large animal model and can assist in the understanding of pathological mechanisms in ventricular dysfunction.

Project type: Research, Scholarship, and Entrepreneurship

230 - Kaila Nip

Investigation on how loss of  $\delta$ -catenin function induces Autism-associated dysfunction

2018 Fall - University Interdisciplinary Programs

$\delta$ -catenin is part of a synaptic adhesion complex, which regulates synaptic densities and architecture in neurons. Loss of  $\delta$ -catenin function is strongly associated with severely affected autism spectrum disorder patients, specifically a G34S mutation in the  $\delta$ -catenin gene has been identified. Here, we focus on identifying the neurobiological mechanism that causes the loss-of-function phenotype by this G34S missense mutation, and determine if we are able to rescue these mutational effects. We provide evidence that the G34S mutation causes  $\delta$ -catenin to undergo an early protein degradation, and are able to rescue G34S effects by inhibition of proteasome degradation.

Project type: Research, Scholarship, and Entrepreneurship

231 - Aleks Novak

Slump Structures as a Tool to Reconstructing Synsedimentary Tectonic Activity

2018 Fall - Warner College of Natural Resources

The middle member of the Bakken Formation is one of the major hydrocarbon producing intervals in the Williston Basin. Common but never described in detail slump structures represent deformation of unconsolidated sediment due to reactivation of major tectonic structures rooted deeply in the basement. Historically, hydrocarbons production is better from rocks with well-developed migration pathways, which are increased in the Middle Bakken Member due to deformation. This study presents an innovative approach to predicting new zones of greater hydrocarbon recovery by reconstructing synsedimentary tectonic activity based on thickness distribution of slumped units.

Project type: Research, Scholarship, and Entrepreneurship

232 - Kayla Nuss

Wrist- and Arm-Worn Apple Watch Validation

2018 Fall - College of Health and Human Sciences

This study examined the validity of heart rate (HR) and energy expenditure (EE) measured with the Apple Watch Series 1 worn both on the wrist and the upper arm compared to criterion measures. Thirty healthy, young adults wore the two monitors while participating in a maximal exercise test. Wearing the Apple Watch Series 1 on the upper arm improves the RER (less than 1% error for all exercise intensities) for HR measurements, but does not improve the EE calculations of this device when compared to a criterion measure.

Project type: Research, Scholarship, and Entrepreneurship

233 - Kate O'dell

Wildfire Smoke's Contribution to US PM<sub>2.5</sub> and Influence on Trends

2018 Fall - Walter Scott, Jr. College of Engineering

United States (US) particulate air quality has improved significantly in recent decades. However, in summer in the western US, fine particulate matter (PM) concentrations have not improved. Wildfires are a large summer source of PM in the western US that is projected to increase over the next century. Using two distinct methods: 1) observations combined with satellite smoke-plume estimates, 2) a global chemical transport model, we estimate the contribution of wildfire emissions to summer PM trends in the US. We find that without the impacts of wildfire emissions, we would observe improvements in particulate air quality in the western US.

Project type: Research, Scholarship, and Entrepreneurship

234 - Peter Olayemi

Exploring the Potential Soil Health Benefits of Lactobionate

2018 Fall - College of Agricultural Sciences

Healthy soils form the basis of sustainable agriculture and initiatives to improve soil health including novel soil amendments should be encouraged. Potassium lactobionate, a byproduct of cheese production, showed positive effects on soil carbon and moisture retention in a previous laboratory trial. Upon field application in an agronomic wheat trial, we observed a decrease in soil nitrate as well as in wheat yield nitrogen. However, we found no significant changes in wheat yield, microbial biomass, soil moisture and soil ammonium between treatments. Multiple rain episodes after application may have either diluted or washed off the amendment, hence silencing its effects.

Project type: Research, Scholarship, and Entrepreneurship

235 - Bella Oleksy

A Macrosystems Approach to Understanding Productivity Changes in Mountain Lakes

2018 Fall - University Interdisciplinary Programs

Sediment core reconstructions reveal unprecedented increases in algae in historically unproductive mountain lakes, suggesting shifts toward new trophic states. Multiple stressors like regional pollution and changing nutrient loads may be the cause. We assessed drivers of productivity across a range of Colorado mountain lakes; a macrosystems ecology approach was necessary to disentangle the complex, non-linear drivers of ecosystem productivity that can differ across spatial and temporal scales. We found that these ecosystems are highly responsive to changes in snowpack and climatic extremes, especially warmer than average summer air and precipitation, demonstrating that these water bodies are sentinels of global change.

Project type: Research, Scholarship, and Entrepreneurship

236 - Daniel Oliver

Metabolomics Profiling of Hops to Develop Storage Indices for Brewing

2018 Fall - College of Agricultural Sciences

Hops contain two main types of compounds that impart flavors to beer: bitter acids (whose behavior is well understood) and aromatic essential oils (whose behavior is less understood). The aim of this research is to characterize the behavior of the essential oil fraction of greenhouse-grown hops processed in three different ways. Solid-phase microextraction, followed by gas chromatography-mass spectrometry (SPME-GC-MS) was used to profile the essential oil fraction of hops. Approximately 80 metabolites were detected, with significant variation in essential oil composition observed. These data

provide the foundation to establish a Storage Index to predict essential oil composition of processed hops.

Project type: Research, Scholarship, and Entrepreneurship

237 - Emily Orlikoff

Neanderthal Cannibalism?: Analysis of Marks on Faunal Remains at Krapina

2018 Fall - College of Liberal Arts

The Krapina site in Northern Croatia represents the richest Neanderthal deposit in the world. Yet, it is the evidence for cannibalism in the form of cut-marked, burnt, and highly fragmentary bone intermixed with faunal remains that makes this site so intriguing. However, recent inspection of the assemblage has led to contention over this interpretation, with suggestions of other agents potentially involved in the observed pattern, such as trampling or carnivore tooth marks. Therefore, molds were taken of 10 marks from the Krapina faunal remains and compared to an experimental database of marks from various agents to identify their probable source.

Project type: Research, Scholarship, and Entrepreneurship

238 - Karyn Orth

Analysis of Microhabitat Choice & Social Dynamics of Sea Lions

2018 Fall - College of Natural Sciences

I observed six California sea lions (*Zalophus californianus*) and recorded their social interactions and use of space within the current microhabitat. The goal is to understand time spent at rest sites and relationships between locations and elicited behaviors to inform new exhibit developers. To collect data, used an ethogram framed around 36 known behaviors to study the sea lions. Pinniped keepers were asked to take a survey related to perceptions of habitat use of the Denver Zoo collection of sea lions to help make descriptive comparisons. Results can help create better exhibits that fosters natural behaviors for the sea lions.

Project type: Research, Scholarship, and Entrepreneurship

239 - Katrina Oselinsky

Effects of an Intrinsic Motivation Intervention on Exercise Behavior

2018 Fall - College of Natural Sciences

The goal of the present study was to evaluate if increasing intrinsic motivation for exercise could subsequently increase adherence to physical activity. A behavioral intervention was constructed to assess this construct. An additional goal of the study was to illuminate reasons why individual's meet and fail to meet their exercise goals.

Project type: Research, Scholarship, and Entrepreneurship

240 - Paige Ostwald

Knockout of Has2 Splice Variant-1 Results in Malformed Cardiovascular Development

2018 Fall - University Interdisciplinary Programs

Malformations in the heart are the most common congenital birth defects in the United States. Has2 is a protein that is responsible for the synthesis of hyaluronic acid, and important extracellular matrix (ECM) component. Hyaluronan synthase (Has2) is expressed in both cardiac tissue and in the developing vasculature. Here, we show that mutation of Has2 results in underdeveloped vasculature and altered cardiac function. Our results suggest the Has2 is a key component of cardiac form and function.

Project type: Research, Scholarship, and Entrepreneurship

241 - Arnold Paecklar

How Understanding Nitrogen Adsorption Can Improve Industrially Relevant Catalytic Processes

2018 Fall - College of Natural Sciences

Nitrogen adsorption in porous materials plays an important role in heterogeneous catalysis as well as the removal of greenhouse gases in industrial processes. To improve the efficiency of these applications, understanding of the fundamental procedures of gas adsorption is necessary. A steady-state transient kinetic analysis (SSITKA) instrument was implemented at a neutron beamline at the Spallation Neutron Source. This enables neutron total-scattering experiments to provide information on the chemical structure of adsorbed nitrogen molecules in zeolite X at room temperature with kinetic information. The cross-correlation can uncover currently inaccessible information about the adsorption process.

Project type: Research, Scholarship, and Entrepreneurship

242 - Ramesh Pandey

Substrate CdTe as Top Cell for CdTe/Si Tandem Solar Cell

2018 Fall - College of Natural Sciences

CdTe and Si are amongst the dominant absorber materials used in photovoltaics industry that have different optical bandgaps. A CdTe/Si tandem device has potential of absorbing large portion of solar spectrum to yield higher efficiency. A substrate CdTe top cell has been fabricated at CSU for that purpose. Optimization of various processes involved like CdCl<sub>2</sub>, CuCl treatment, front and back contact has been studied. CdTe for this purpose has been deposited by two different deposition methods, Closed Space Sublimation and RF sputtering. Current-Voltage, Quantum Efficiency, Capacitance measurements and Photoluminescence has been performed to compare the two different deposition methods.

Project type: Research, Scholarship, and Entrepreneurship

243 - Hugo Pantigoso Guevara

Phosphorus Shifts the Microbial Community in the Rhizosphere of Blueberry

2018 Fall - College of Agricultural Sciences

Phosphorus addition shifts the microbial community in the rhizosphere of Blueberry (*Vaccinium corymbosum* L.)

Project type: Research, Scholarship, and Entrepreneurship

244 - Lara Pantlin

It's About Time: Music and Resistance to Psychosis

2018 Fall - College of Natural Sciences

Music in clinical practice has been shown to be a powerful tool in rehabilitation therapies and integrating behavioral and psychological activity. This relationship insinuates why individuals with psychopathology often associate themselves with music. The present study examines the relationship between timing abilities, musical experience, and psychopathology with the introduction of intervention techniques. Findings may offer insight into whether musical experience is a protective factor against time-related psychopathologies.

Project type: Research, Scholarship, and Entrepreneurship

245 - Lindsey Paricio

Broad Range Reduction of Biofilm Formation via Nitric Oxide

2018 Fall - College of Natural Sciences



Methods to interrupt biofilm formation on medical implants have the potential to save thousands of lives and millions of healthcare dollars annually. Our strategy focuses on preventing the attachment of bacteria to the surface by means of nitric oxide (NO) release from polymer platforms. By comparing the efficacy of differing NO concentrations across bacteria species and gram strains, an understanding of the potential of NO as a broad-range antibacterial agent will be gained. Initial findings suggest NO is broadly reducing viability, to varying extents for different bacterial strains.

Project type: Research, Scholarship, and Entrepreneurship

246 - Dylan Parker

mRNA Localization in the Early *Caenorhabditis Elegans* Embryo

2018 Fall - College of Natural Sciences

Asymmetric inheritance of maternally loaded transcripts and regulation of translation is important during embryogenesis. However, the mechanisms regulating these functions are poorly understood. After the first cell division in *Caenorhabditis elegans*, hundreds of mRNAs partition asymmetrically between daughter cells. Single molecule Fluorescence In Situ Hybridization (smFISH) microscopy of asymmetrically distributed transcripts revealed subcellular localization. We have started to characterize the mechanisms of subcellular mRNA localization and translation regulation by examining the role of 3'UTRs, RNA binding proteins, and ribonucleoprotein particles in regulation of mRNA asymmetries. We continue testing for proteins and RNA motifs that guide asymmetric RNA localization during development.

Project type: Research, Scholarship, and Entrepreneurship

247 - Ben Pawlowski

Dynamic Modeling and Control of Soft Robots

2018 Fall - Walter Scott, Jr. College of Engineering

We aim to model and control the dynamic behavior of soft robots, a quickly developing field in robotics. Soft robots take advantage of soft bodies, actuators, and sensors to provide improved capabilities over traditional robots in uncertain environments, medical settings, and biological studies. However, the major limitation for these robots is the complexity of the behavior leads to computational heavy models that are impractical for control, greatly restricting the design and application of these robots. We are working to develop a general framework to model the behavior of soft robots that allows for the ability to provide real-time control.

Project type: Research, Scholarship, and Entrepreneurship

248 - Camron Pearce

Exploring Drug Efficacy in Mice Infected with Pulmonary *Mycobacterium Abscessus*

2018 Fall - College of Veterinary Medicine and Biomedical Sciences

In vitro drug inhibition can be informative and provide important insight, however, the resulting data can be difficult to reproduce when translated to an in vivo model. This study explores the drug efficacy of clofazimine in mice infected with pulmonary *Mycobacterium abscessus* (Mab), a bacterium that exploits patients already suffering from a lung immunodeficiency. Bacterial Minimum Inhibitory Concentration (MIC) assays indicate clofazimine susceptibility, yet in vivo mouse studies lack any significant reduction in pulmonary bacterial load. Further investigation suggests that post-infection immune regulation could be responsible for the loss of clofazimine efficacy.

Project type: Research, Scholarship, and Entrepreneurship

249 - Morgan Pearson

Correlates of Mucosal Immune Control of Feline Enteric Coronavirus Replication

2018 Fall - College of Veterinary Medicine and Biomedical Sciences

Mutation of the ubiquitous Feline Enteric Coronavirus (FECV) can lead to the emergence of Feline Infectious Peritonitis Virus (FIPV) that causes a deadly effusive and/or granulomatous disease. The study aims to determine correlates of infections and diagnosis and how the status of the cats change through multiple time points as cats become infected and recover. A closed cat colony with circulating FECV infection was studied longitudinally to assess mucosal immune correlates of protection. Blood, fecal, and colon biopsies were taken in order to perform immunological and virologic assessments of the cats, with the goal of yielding a vaccine against FECV.

Project type: Research, Scholarship, and Entrepreneurship

250 - Manny Pena

Enhancement of Cobalt-59 NMR Thermometry via Ligand Design

2018 Fall - College of Natural Sciences

This research reports the first systematic investigation of the role of ligand design on molecular  $^{59}\text{Co}$  thermometers. The temperature dependence of the  $^{59}\text{Co}$  chemical shift ( $\Delta\delta/\Delta T$ ) of a series of five increasingly rigid cobalt(III) complexes was tested. The compounds under study extend from  $[\text{Co}(\text{NH}_3)_6]\text{Cl}_3$ , with no interligand connectivity, to a fully encapsulated sarcophagine (sarc) complex,  $[\text{Co}(\text{sarc})]\text{Cl}_3$ . We encountered  $\Delta\delta/\Delta T$  values that range from 1.44(1) ppm/ $^\circ\text{C}$  in  $[\text{Co}(\text{NH}_3)_6]\text{Cl}_3$  to 2.04(1) ppm/ $^\circ\text{C}$  in  $[\text{Co}(\text{sarc})]\text{Cl}_3$ , which is among the highest for a molecular complex. The data suggest that high  $\Delta\delta/\Delta T$  could be achieved through the design of highly chemically stable  $^{59}\text{Co}$  NMR thermometers.

Project type: Research, Scholarship, and Entrepreneurship

251 - Brandon Perry

A Streamlined Bridge Inspection System Utilizing Unmanned Aerial Vehicles (UAVs)

2018 Fall - Walter Scott, Jr. College of Engineering

Aging and deterioration of bridges make maintenance and inspection of the current system more critical. Current, human-based bridge inspection procedures can be relatively slow, costly, subjective, and pose a danger to inspectors. A new streamlined bridge inspection system based on unmanned aerial vehicles (UAVs) is proposed to improve the efficiency, cost-effectiveness, and objectivity of these inspections while enhancing safety. This new system uniquely integrates UAV-based field inspection, automated damage/defect identification, and establishment of an element-wise As-Built Building Information Model (AB-BIM) for the damage documentation. The resulting AB-BIM has 3-D visualization of element-wise, quantitative damage information offering a transparent condition evaluation.

Project type: Research, Scholarship, and Entrepreneurship

252 - Collin Perry

Controlling Hydrogenase Orientation for Increased Hydrogen Production

2018 Fall - College of Natural Sciences

Energy production via fossil fuels accounts for over 80% of the US energy consumption; produce greenhouse gases that are predicted to greatly affect the global climate and water conditions in the coming decades. New materials and devices are required to create a more sustainable energy economy. Photocatalytic systems are engineered in order to utilize solar radiation to activate molecular catalysts which drive a myriad of chemical reactions. Here I will focus on the enzymatic production of hydrogen fuel when Fe-Fe hydrogenase (HydA) is paired with a silicon semiconductor electrode, and the interfaces effects on the competing electronic mechanisms.

Project type: Research, Scholarship, and Entrepreneurship

253 - Grace Peterson

Stress, Coping, and Emotional Distress of Medically Underserved Cancer Patients

2018 Fall - College of Natural Sciences

The intent of this study is to investigate how those who are medically underserved experience emotional distress when diagnosed with cancer. The participants in this study have been diagnosed with lung cancer (LC) and/or head-and-neck cancer (HNC). One aim of the study is to assess the impact of a stressful LC and/or HNC diagnosis on emotional distress. Furthermore, research indicates that the level of emotional distress a patient experiences is related to the way they cope. The second aim of this study is to assess how coping moderates the relation between stress of diagnosis and emotional distress.

Project type: Research, Scholarship, and Entrepreneurship

254 - Brooke Phipps

A Woman's Place is in the (Digital) Resistance

2018 Fall - College of Liberal Arts

Through a rhetorical examination of the distinct communication strategies Pantsuit Nation and the Pussyhat Project used in social protest, I argue that the emotional impact produced through Trump's election resulted in key U.S. women's groups locating themselves in social protest through a transition from rhetorical secrecy to rhetorical publicity. In present rhetorical scholarship, the impact of secrecy and publicity within the context of protest movements like the 2017 Women's March remains relatively unexplored. This project demonstrates how the direct interplay between digital communities and their strategic publicity plays understanding the embodied protests of our current, tumultuous political climate.

Project type: Research, Scholarship, and Entrepreneurship

255 - Dayton Pierce

The Phosphatase PTP-3 Regulates AMPAR Transport In Vivo

2018 Fall - University Interdisciplinary Programs

Normal cognition is dependent on AMPAR ( $\alpha$ -amino-3-hydroxy-5-methyl-4-isoxazolepropionic acid receptor) trafficking, which includes local synaptic trafficking and long-distance transport. Previous work has shown a critical role for the phosphatase leukocyte common antigen-related protein (LAR), in regulating the trafficking of AMPARs to synapses. However, despite this knowledge we do not know how LAR regulates AMPAR transport. This study aims to identify the function of LAR in long-distance AMPAR transport. Here we show that synaptic GLR-1 were decreased at proximal synapses but increased at distal synapses in LAR loss-of-function mutants. Next, we showed LAR mutants display decreased transport of single vesicles.

Project type: Research, Scholarship, and Entrepreneurship

256 - Elizabeth Pike

Coteaching During Student Teaching: Walking the Talk

2018 Fall - College of Health and Human Sciences

A three-year action research study investigates the implementation of the coteaching during student teaching (CTDST) model offered by CSU's Center for Educator Preparation (CEP). Transcripts from semi-structured, one-on-one interviews are analyzed for themes surrounding the experience of participants of CTDST placements. Changes have been made to the programs and procedures that support the CTDST experience based on the preliminary findings of the study. This research elucidates the challenges of

implementing a CTDST model and offers suggested avenues of strengthening the CTDST experience for pre-service teachers.

Project type: Research, Scholarship, and Entrepreneurship

257 - Elena Pires

Investigating the Role of RAD51AP1 in Homologous Recombination DNA Repair

2018 Fall - University Interdisciplinary Programs

Flawless DNA repair through homologous recombination (HR) is essential for correcting double-strand breaks, maintaining genome integrity, and preventing cancer. RAD51-Associated Protein 1 (RAD51AP1) is required for faithful HR and for enhancing RAD51, the fundamental player of HR. Our main objective is to define key attributes of RAD51AP1. Here, we have further characterized the DNA-binding properties of RAD51AP1 via biochemical assays. Based on our results, we propose a model of RAD51AP1 during late stages of HR. By understanding the biology of this important HR protein, we expect our studies may lead to the advancement of targeted cancer therapies.

Project type: Research, Scholarship, and Entrepreneurship

258 - Megan Posukonis

Fracture Characterization via Computed Tomography in Thoroughbred Racehorses

2018 Fall - College of Veterinary Medicine and Biomedical Sciences

Fractures of the third metacarpal/tarsal bone remain the most common injuries of the Thoroughbred athlete. There are currently no data exploring the trabecular bone mineral density relative to the propagating fracture line as a correlate to clinical outcome. This study aims to use computed tomography to map fracture lines and relative bone mineral density through de novo image analysis software that could be employed at the hospital level. We have statistically explored the relationship between the fracture/sclerotic map and case outcomes, and present possible diagnostic screening opportunities in computer-assisted radiographic image analysis for fractures in equine athletes.

Project type: Research, Scholarship, and Entrepreneurship

259 - Alex Preston

Nanoporous Stainless Steel with Structural Hierarchy

2018 Fall - College of Natural Sciences

Nanoporous stainless steels (NPSS) possess potential application as light weight structural components in the automotive and aerospace. Incorporation of additional hierarchy in structure can further improve the performance of the materials. NPSS, with a spatial gradient of pore and grain size gradients, were fabricated by spark plasma sintering of different feedstock powders that were strategically loaded in sequence in the die. The mechanical behavior of these porous stainless steels with structural hierarchy is investigated via dynamic compression testing, nanoindentation and scratch tests. Results show significant improvement in specific strength, impact toughness and wear resistance compared to traditional stainless steels.

Project type: Research, Scholarship, and Entrepreneurship

260 - Kevin Prokop

Treeline Investments

2018 Fall - College of Business

Colorado faces increasing risks of intense, damaging forest fires, due to small diameter and dead trees that are crowding the forests and providing fuel for them to grow. This problem continues to increase as our forests are underfunded at the federal level. The forest products industry is dilapidated and cannot

support the funding of forest management. Treeline Investments intends to create a loan fund to finance forest treatment and management. Participating borrowers will pay interest rates on the loans based on the success of the projects, and investors will receive returns that include, social, environmental and financial benefits.

Project type: Research, Scholarship, and Entrepreneurship

261 - Saloni Purandare

Development of Haute Couture Using Innovative Hand Woven Ilkal Fabric

2018 Fall - College of Health and Human Sciences

The purpose of this research which was conducted with Central Silk Board, Government of India organization is development of 6 haute couture pieces with innovative fabrics and ornamentation. Another motive was to preserve a traditional Indian silk fabric named “Ilkal” and the cultural practice of handloom. Unusual weft insertions namely Muga, Tussar, Eri, Mulberry Spun, Mulberry filature and Banana were done and fabrics were woven using pit loom. Textiles were ornamented through uniquely designed embroidery motifs. The fabrics were further tested for various aspects. Further consumer survey was conducted which yielded positive results. Garments are adorned at CSB Museum.

Project type: Research, Scholarship, and Entrepreneurship

262 - Emily Ramnarine

Global Climate Impacts of Microphysics Within Biomass Burning Smoke Plumes

2018 Fall - Walter Scott, Jr. College of Engineering

Wildfires and other biomass burning emit large quantities of particles into the atmosphere. These particles impact the climate by interacting with radiation from the sun and by affecting cloud properties. Particularly in fresh smoke plumes, particles collide and stick together in a process known as coagulation. This occurs at spatial scales too small to be resolved explicitly in global models. A previous study found that coagulation within an individual smoke plume can be approximated intuitively using fire properties, emitted particle properties, and local meteorology. By including this in a global model, we quantify the impacts of coagulation on global climate.

Project type: Research, Scholarship, and Entrepreneurship

263 - Ellen Ratajack

Right on Target: Perceptions/Prevalence of Stalking in Parental Alienation

2018 Fall - College of Natural Sciences

Stalking and parental alienation are detrimental independently, but together they can have truly devastating effects for those who are the targets of such behavior. Two studies will be presented to illustrate both stalking behaviors and general attitudes towards stalking in the context of parenting. Study 1 examines the interviews from self-identified parents who have experienced parental alienation; 51% of the parents interviewed reported that their former partner had engaged in stalking behaviors. Study 2 examines self-reported stalking behaviors and people's perceptions of those stalking behaviors. Further implications and findings will be presented.

Project type: Research, Scholarship, and Entrepreneurship

264 - Stephanie Rayburn

Becoming Fathers: Feasibility of a Community-Based Intervention

2018 Fall - College of Health and Human Sciences

The transition to parenthood brings significant changes for families. Fathers have few community resources to support them across this transition as they adjust to a new role, new stresses, and changing

relationship dynamics. The Becoming Fathers study seeks to determine initial feasibility and acceptance of a group community-based program. The program utilizes group discussion, implicit mindfulness practices, and skills education with the goal of helping expectant and new fathers make sense of their new role, manage stress, improve partner communication, and bond with their babies.

Project type: Research, Scholarship, and Entrepreneurship

265 - Julia Reedy

Dialysis and Transplantation on the Pine Ridge Indian Reservation

2018 Fall - College of Liberal Arts

The Oglala Lakota people of the Pine Ridge Indian Reservation have been plagued with poor kidney health due political economic factors such as poverty, discrimination, unemployment and limited food options. This poor kidney health, exemplified in high rates of End-stage renal disease has created a population of dialysis patients working to receive a kidney transplant. This research explores the barriers that dialysis patients face in managing their health and accessing healthcare specifically regarding kidney transplantation. With dialysis patients often overlooked, this research provides patients the opportunity to tell their stories and advocate for their right to health and dignity.

Project type: Research, Scholarship, and Entrepreneurship

266 - Brogan Resch

Impact of Music Cueing on Balance in Parkinson's Disease

2018 Fall - College of Liberal Arts

Standing balance requires the integration of multiple sensory systems including vestibular, proprioception, and vision (Vanderah et al., 2016). The impact of an external auditory stimulus during standing balance has not been established; however, music therapists report using music to assist in standing balance exercises (Merkel, 2014). Persons with Parkinson's disease demonstrate difficulties in movement coordination and balance (Calabresi, Picconi, Tozzi, Ghiglieri, & Di Filippo, 2014).

Improvements are thought to occur due to auditory-motor coupling that bypasses the impacted basal ganglia (Stegemoller, 2018). We tested if musical cueing improved sit-to-stand, balance, and variations of movement in individuals with Parkinson's disease.

Project type: Research, Scholarship, and Entrepreneurship

267 - Alec Richardson

Instrumented Microfluidic Organotypic Device (iMOD) to Analyze Intestinal Tissue Ex-Vivo

2018 Fall - Walter Scott, Jr. College of Engineering

Current in vitro gut models lack physiological relevance because they fail to recapitulate the cellular diversity and oxygen gradients seen in vivo. We have instrumented a microfluidic device that houses mouse and human full-thickness intestinal tissue to investigate the relationship between the intestines, the microbiome, and human health and disease. Differential flow of media across the luminal and serosal surfaces of the tissue allows us to tune the flow rate and oxygen concentration to physiological values. Integrated transepithelial electrical resistance (TEER) sensors provide real-time monitoring of tissue health, while sensors for oxygen, pH, and lactate are under development.

Project type: Research, Scholarship, and Entrepreneurship

268 - Mj Riches

Investigating Leaf-Level Plant Response to Abiotic Stressors

2018 Fall - College of Natural Sciences

In response to new environmental conditions, plants undergo changes in photosynthesis, thus affecting crop production and plant health. However, plants also change the amount and type of emissions differently, depending on the type of stress, which thus influences atmospheric chemistry. The magnitude of the effect of environmental changes on plant photosynthesis and emissions is of global intrigue, yet few studies seek to investigate the variability and implications of combined abiotic stressors. This study investigates those gaps in knowledge using a portable photosynthesis system and mass spectrometry to investigate photosynthesis and emission changes of stressed plants.

Project type: Research, Scholarship, and Entrepreneurship

269 - Sutton Richmond

Utilization of Time to Boundary for Objective mB.E.S.S Postural Evaluation

2018 Fall - College of Health and Human Sciences

Quantifying subtle differences in postural balance control can be difficult when utilizing subjective, clinical scales and poses a significant challenge when diagnosing/evaluating brain injuries. This study compared the modified Balance Error Scoring System (mBESS) and multiple objective measures of postural balance control in young adults. Our results indicate that the subjective scoring of the mBESS does not adequately capture postural control, whereas objective measures have the potential to provide athletic trainers and medical professionals with the ability to detect subtle performance differences. These results provide specific outcome measures to sensitively assess balance dysfunction and track recovery following injury.

Project type: Research, Scholarship, and Entrepreneurship

270 - Nada Rifai

Molt Induction Effects on Phosphodiesterase Expression in Decapod-Crustacean Molting Glands

2018 Fall - College of Natural Sciences

cAMP/cGMP signaling intermediates the repression of the crustacean molting gland (YO) by molt-inhibiting hormone (MIH). Phosphodiesterases (PDEs) hydrolyze the phosphodiester bond in cAMP and cGMP to AMP and GMP, respectively, thus modulate the YO response to be insensitive to MIH. Contigs encoding nine PDEs (1, 2,3, 4, 5, 7, 8, 9, &11) were identified in the *Gecarcinus lateralis* YO transcriptome. Molting can be induced by; Multiple limb autotomy (MLA) or Eye Stalk Ablation (ESA). qPCR results were consistent with RNA-Seq data showing similar trends of PDE expression in both MLA and ESA  $\pm$  rapamycin concluding that PDEs are regulated posttranscriptionally.

Project type: Research, Scholarship, and Entrepreneurship

271 – withdrawn

272 - Katie Rocci

Modification of Fertilizer and Soil Nitrogen by Plants and Biochar

2018 Fall - University Interdisciplinary Programs

Efficient use of nitrogen (N) in agroecosystems is crucial for economic use of resources, preventing deleterious N losses, and increasing crop yield. One potential way to increase N retention is by applying biochar as a soil amendment. We performed a greenhouse experiment growing lettuce with three biochar treatments with and without plants and used  $^{15}\text{N}$  isotopically labeled fertilizer to trace N. Data on N pools shows that biochar does affect N cycling but likely not in a way that is beneficial for plant growth or for reducing losses. These findings will better inform biochar use for environmental and agronomic benefit.

Project type: Research, Scholarship, and Entrepreneurship

273 - Mikaela Rodenbaugh

Does Immersive 360° Video Journalism Increase Empathy in News Audiences?

2018 Fall - College of Liberal Arts

Can immersive journalism foster empathy? Does immersive 360° video journalism impart greater empathy for the subject of a story in news audiences? Randomly assigned participants will be given the same news story in the different mediums of print with photos, traditional 180° video, and immersive 360° video and tested for their empathetic and sympathetic responses using aggregate measures for empathy, sympathy, immersion, and narrative persuasion pre- and post-exposure to the news story. The results could inform future journalists about using immersive virtual reality to engender greater empathy in consumers of the news as a force for social change.

Project type: Research, Scholarship, and Entrepreneurship

274 - Josue Rodriguez Ramos

Microbial Communities Support Methanogenesis in Oxygenated Wetland Soils

2018 Fall - College of Agricultural Sciences

Recent reports by our group and others have demonstrated that oxygenated wetland soils, previously denoted as non-methane producing zones in climate models, can account for up to 80% of methane emissions. Here, we coupled geochemical measurements with metatranscript analyses to define the community metabolic interactions that fuel the dominant acetoclastic methanogen (*Candidatus Methanotrix paradoxum*) in oxygenated soils. Weighted Gene Correlation Network Analysis define the active trophic interactions that provide the necessary redox and substrates to support methanogenesis. We hypothesize from these multi-omic and geochemical data, that methanogenesis in bulk oxygenated soils is mediated through the formation of anoxic microsites.

Project type: Research, Scholarship, and Entrepreneurship

275 - Marina Rodriguez

The Cost of Reproduction: Telomere Shortening in Nesting Tree Swallows

2018 Fall - Warner College of Natural Resources

Stress can have various effects on the health and longevity of organisms. One mechanism whereby stress exposure affects health and lifespan is telomere length, where high exposure to stressors is linked to telomere shortening and declines of individual fitness. To determine factors that affect telomere length in breeding Tree Swallows (*Tachycineta bicolor*), telomere length was measured in mothers and offspring throughout the breeding season, along with other variables such as nutrient availability, clutch size, and age of the mother. This study gives insight into the factors that cause long-term costs in breeding Tree Swallows that act via telomere shortening.

Project type: Research, Scholarship, and Entrepreneurship

276 - Chris Rom

Computationally Guided Synthesis of Novel Magnesium Nitride Ternary Materials

2018 Fall - College of Natural Sciences

Computational techniques can guide syntheses of new materials with useful properties. However, in silico formation of a new material does not easily translate to real world materials discovery. Magnesium nitride ternaries ( $MgMN_2$  where  $M = Sn, Ti, Zr, Hf$ ), which have been computationally predicted to form as structures with potential applications in circuit and battery materials, serve as an example. Although attempted syntheses have not yet produced the desired phases, the lessons learned can direct future efforts and accelerate the discovery of novel materials.



Project type: Research, Scholarship, and Entrepreneurship

277 -Xander Rorabaugh

Colorado Disparate Mortgage Lending Practices by Race/Ethnicity

2018 Fall - College of Liberal Arts

The Fort Collins City Government noted a large disparity by race/ethnicity in mortgage lending approvals within the City and wants to understand why this disparity exists and create policies to reduce it. This study surveys participants at the Colorado Mortgage Lenders Association conference, asking them to evaluate three randomized mortgage loan applications, with dependent variables: a primed name for Latinx and Caucasian identities, ethnicity, and race. This data and an analysis of policy initiatives taken by other cities to reduce discriminatory lending practices will guide the City of Fort Collins in enacting policies to mitigate this disparity.

Project type: Research, Scholarship, and Entrepreneurship

278 - Zoey Rosen

The Rhetorical Storm of Uncertainty in Severe Weather Communication

2018 Fall - College of Liberal Arts

Uncertainty is a concept that, while common to scientists, is often misunderstood by the public. Misunderstanding uncertainty in hazardous scenarios can become an issue of safety when individuals try to process complex information. In cases of severe weather, uncertainty is displayed in watches, warnings, and other risk messages. Through a quantitative content analysis of tweets collected around a string of tornadoes in March 2017, the use of hedges and qualifiers is examined to see how different sectors of weather personnel, ranging from government to media, use linguistic markers to display confidence and likelihood statements in risk communication messages.

Project type: Research, Scholarship, and Entrepreneurship

279 - Joanie Ryan

Fluorescent Tracking of Mycobacterial Extracellular Vesicles

2018 Fall - College of Veterinary Medicine and Biomedical Sciences

Mycobacterium tuberculosis (Mtb) is the causative agent of tuberculosis infection in humans. The role of extracellular vesicles (EVs) secreted during Mtb infection is unknown. We present a tool to track and characterize Mtb EVs which share lipids and proteins associated with the inner membrane of mycobacteria. We hypothesize that mCherry-fused to a transmembrane domain of mycobacteria will be targeted to the inner membrane, incorporated into EVs and released from the bacterium. We aim to use this system in Mtb, to visualize and compare the production and protein content of EVs during growth in liquid media and infection of cultured macrophages.

Project type: Research, Scholarship, and Entrepreneurship

280 - Shane Ryan

Does Dapagliflozin Influence Dietary Counseling Mediated Changes in Body Composition?

2018 Fall - College of Health and Human Sciences

The purpose of the current study was to determine the influence of Dapagliflozin on dietary counseling mediated changes in body composition. Thirty-five sedentary overweight/obese but otherwise healthy men and women were randomly assigned to one of two double-blind treatments comprising 12-weeks of dietary counseling for weight loss supplemented with daily ingestion of either placebo or Dapagliflozin (10 mg/day). Overall, these preliminary data suggest that 12-weeks of dietary counseling leads to similar favorable modification of body mass, body mass index, and fat mass, irrespective of pill

assignment. However, one treatment appears to attenuate the dietary counseling mediated loss in lean mass.

Project type: Research, Scholarship, and Entrepreneurship

281 - Natalia Sanchez

Comparative Pilot Study of T2D Prevention in Hispanic/Latinx Adolescents

2018 Fall - University Interdisciplinary Programs

This project addresses Type II Diabetes (T2D) prevention in Latinx adolescents in Northern Colorado through community engagement and through attention to both culturally-relevant social/psychological stressors and adolescent development. There were three main objectives: (1) To conduct focus groups with Latinx teens and their parents to inform design and considerations for T2D preventative intervention; (2) To adapt a lifestyle-based T2D intervention based upon community feedback; and (3) To pilot test the effectiveness of an adapted T2D preventative intervention in Latinx adolescents. Described in this project are recruitment methods, study flow through randomization and descriptive baseline characteristics of adolescent participants.

Project type: Research, Scholarship, and Entrepreneurship

282 - Jessica Sanow

Geometric vs. Anemometric Snow Surface Roughness ( $z_0$ ) Shallow Snowpack Calculations

2018 Fall - Warner College of Natural Resources

Aerodynamic roughness length ( $z_0$ ) when applied to a snow-covered surface, is typically considered as a static parameter within energy and atmospheric equations. However, observations of  $z_0$  have shown that it should be represented as a dynamic value and modeled within the equations as such. The objective of this study is to explore the two primary methods of calculating  $z_0$ : anemometric and geometric. Comparing these methods will help determine the cheapest and most accurate way to measure  $z_0$ , which will assist in creating a more accurate application of incorporating a dynamic  $z_0$  roughness at a variety of scales.

Project type: Research, Scholarship, and Entrepreneurship

283 - Juli Scamardo

Thinking Like Beavers: Geomorphic Channel Response to Beaver Dam Analogs

2018 Fall - Warner College of Natural Resources

Recently, beaver dam analogs (BDAs) have been installed in incised streams to regain vegetation, habitat, and ecosystem function. However, minimal science exists to guide expected outcomes of BDA restoration projects. We hypothesize that geomorphic and hydrologic response to BDAs in the Colorado Front Range will depend on physical basin characteristics. The response of two catchments to BDA installation in summer 2017 was studied throughout summer 2018 using groundwater wells, soil cores, repeat channel surveys, and repeat pool sediment surveys. Valley response was correlated to valley characteristics using statistical regressions in order to guide future implementation and management of BDAs.

Project type: Research, Scholarship, and Entrepreneurship

284 - Derek Schaeuble

Prefrontal Cortical Regulation of Stress-Induced Cardiovascular Susceptibility

2018 Fall - College of Veterinary Medicine and Biomedical Sciences

This study looks to determine a neuronal mechanism of stress-induced cardiovascular illness. Individuals who endure prolonged stress display imbalance over autonomic control of the heart resulting in

sympathetic predominance and increased activity of the heart. We have identified a stress-responsive region of the medial prefrontal cortex, infralimbic cortex, that may be responsible for producing an autonomic imbalance which may lead to cardiovascular disorders in individuals experiencing prolonged stress.

Project type: Research, Scholarship, and Entrepreneurship

285 - Bekah Schields

Archaeology Fairs: Measuring Informal Learning

2018 Fall - College of Liberal Arts

Archaeology Fairs are held across the country in honor of Archaeology Month and the International Day of Archaeology. Students and families learn about the many facets of archaeology, tools of the trade, the difference between archaeology and paleontology, and what to do when they find artifacts. Often, this learning takes place in an informal setting. So what are students actually learning at these Archaeology Fairs and how can we measure their understanding? From 2015-2017, we measured student's understanding of archaeological concepts. This poster discusses the results of this research and best practices for measuring informal learning.

Project type: Research, Scholarship, and Entrepreneurship

286 - Lisa Schlein

Investigating the Therapeutic Potential of Parthenolide to Treat Hematopoietic Neoplasms

2018 Fall - University Interdisciplinary Programs

The purpose of this research is to comprehensively explore the therapeutic potential of parthenolide (PTL) for a variety of common hematopoietic malignancies in dogs and to identify viable combination therapies with PTL. These studies will serve as the foundation to perform clinical trials in dogs with spontaneous tumors and provide a translational model to study rare and deadly human diseases—disseminated mastocytosis and histiocytic sarcoma (HS). PTL has been explored as a therapeutic for human leukemias and lymphomas, but to our knowledge, has not been studied as a therapeutic for equally deadly malignant mastocytosis nor HS in either humans or dogs.

Project type: Research, Scholarship, and Entrepreneurship

287 - Max Schulze

Carbon Nanotube Reinforced Batteries: Towards Larger Capacities and Longer Lifetimes

2018 Fall - College of Natural Sciences

Next generation rechargeable battery materials will need to exhibit improved energy storage capacities and cycle lifetimes to enable the electrification of transportation and the use of renewable power sources. While many materials exhibit larger energy storage capacities than commercialized Li-ion batteries, they still suffer from short lifetimes due to material instabilities. Here we demonstrate a strategy to improve the cycle lifetimes of Sb alloy anodes in Li-ion and Na-ion batteries by electrodepositing the anodes as Sb/carbon-nanotube composite films.

Project type: Research, Scholarship, and Entrepreneurship

288 - Joel Schwartzkopf

Creating an Administrative Fellowship at the CSU Health Network

2018 Fall - College of Business

The promotion of clinical leaders in the medical field has often been based on the merits of past performance in one's current role. Despite a lack of didactic training in management and administration, medical providers frequently ascend to those roles with little experience or preparation in budgeting,

human resources management, strategic planning, and operational or logistical decision making. To remedy this, the CSU Health Network sought to formalize a one-year administrative fellowship to provide this training to qualified employees in a real-time setting. This presentation summarizes the success and lessons learned from the first year of this fellowship.

Project type: Research, Scholarship, and Entrepreneurship

289 - Luke Schwerdtfeger

Bacteria on Drugs: A Party in the Human Intestine

2018 Fall - College of Veterinary Medicine and Biomedical Sciences

The intestines provide a barrier to the outside world that is susceptible to diseases that impact millions of people each year. There is a lack of models available for studying the intestines that recapitulate the guts native environment. Addressing this, a novel in vitro culture system for human colon was established. This system was used to show an antibiotic dependent increase in cellular proliferation in physiologic oxygen concentrations. These results demonstrate the importance of environmental conditions in regulating tissue physiology in vitro. This culture method provides a more physiologic system, available for use in investigating intestinal disorders in a dish.

Project type: Research, Scholarship, and Entrepreneurship

290 - Platon Selemenakis

Interplay Between RAD51AP1 and RAD54 During Late Stages of HR

2018 Fall - University Interdisciplinary Programs

Genomic instability is one hallmark of cancer and can arise by exposure to endogenous and exogenous factors. These factors lead to the generation DNA double-strand breaks (DSBs). DSBs are repaired by homologous recombination (HR), a pathway that is triggered if a homologous template DNA molecule is available. RAD51AP1 and RAD54L are two critical proteins in HR that function after RAD51 filament formation. Whether RAD51AP1 and RAD54L function independently or together in the HR reaction in cells is not understood. The aim of this project is to understand if RAD51AP1 is epistatic with RAD54L in genetic and cell-based assays.

Project type: Research, Scholarship, and Entrepreneurship

291 - Kimberly Selinske

Behind the Screens: Working Women of the Walt Disney Company

2018 Fall - College of Liberal Arts

Walt Disney Animation Studios has long been critiqued for its portrayals of women in animation, but little has been said about the women producing the films. From the women painting the ruby red lips of Snow White, to the first female animator of Disney Studios, the stories of these women are crucial to understanding the success of the Disney animation empire. Women have always played a major role in the creation of Disney animated movies and subsequently, the success of the company. These women faced the challenge of being offscreen laborers while their work portrayed onscreen women as damsels.

Project type: Research, Scholarship, and Entrepreneurship

292 - Nikki Seymour

The Relationship Between Magmatism and Deformation in Northern Chile

2018 Fall - Warner College of Natural Resources

Here we constrain the duration and cooling of the Chilean Coastal Cordillera arc and compare these data to the behavior of the Atacama Fault System (AFS) to understand how magmatism influenced deformation. Zircon ages record two pulses of magmatism: Jurassic and Early Cretaceous. Ductile

deformation along the AFS was restricted to the margins of Early Cretaceous plutons whereas Jurassic plutons lack ductile fabrics. Cooling ages are ~100 Ma, recording the end of magmatism. These data indicate Early Cretaceous plutons were necessary for ductile deformation along the AFS, and suggest cooling of the arc was coeval with abandonment of the AFS.

Project type: Research, Scholarship, and Entrepreneurship

293 - Chen Shen

Three-Dimensional CFD Simulation of NANO Hood with Human Body

2018 Fall - Walter Scott, Jr. College of Engineering

Nanomaterial research workers may be exposed to poisonous nanoparticles. Laboratory fume hood has been used to for activities involving nanoparticles. Some published researches have shown that the conventional fume hood may not constraint nanoparticles effectively. The recirculation zones present in the hood and the operator's arm motion may affect the performance. A three-dimensional computational fluid dynamics (CFD) simulation has been carried out to predict airflow patterns in the traditional fume hood and nano hood which has an improved geometric design with and without the human body. Particle tracking is performed to predict the nanoparticle leaking for various arm velocity.

Project type: Research, Scholarship, and Entrepreneurship

294 - Xoco Shinbrot

Unexpected Long-Term Impacts of REDD+ on Participants and Non-participants

2018 Fall - University Interdisciplinary Programs

The climate mitigation program REDD+, designed to reduce forest carbon emissions, increasingly promises poverty reduction. Research evaluating the socio-economic impacts of REDD+, however, have often been conducted without baseline data or experimental design built into the research methods. We conducted a quasi-experimental design of participants (n=15) and nonparticipants (n=15) in REDD+ before (2004), during (2009), and after (2018) REDD+ implementation in eastern Panama. Results show REDD+ has long term financial, physical, and natural impacts for participants. Results show non-participants benefit financially. Non-participants also increasingly reforested land, raising questions of whether REDD+ can incentivize conservation for non-participants.

Project type: Research, Scholarship, and Entrepreneurship

295 - Hossein Shirazi

"Kn0w Thy Doma1n Name": Unbiased Phishing Detection Using Domain Name

2018 Fall - College of Natural Sciences

Phishing websites remain a persistent security threat. Machine learning provides promising solution but uses a large number of features without providing justification. Large number of features impacts the scalability, the response time, and etc. The datasets often used are biased with respect to the website or its contents. Consequently, we argue that the domain name of phishing websites plays an important role and design features that model the relationships of the domain name to the key elements of a phishing website. This makes it hard for an attacker to tamper these features without raising the suspicion of the end-user.

Project type: Research, Scholarship, and Entrepreneurship

296 - Hazheen Shirnekhi

Characterizing the Role of BuGZ in Mitosis

2018 Fall - College of Natural Sciences

Cancer lethal screens are a method that cancer researchers use to discover target proteins that can be used to selectively destroy cancer cells while leaving healthy cells unharmed. Through this method, the mitotic protein BuGZ was discovered to be required in Glioblastoma brain cancer cells for survival, but dispensable in healthy neural stem cells. To determine if BuGZ can one day be used as a target for therapeutics, we must first ascertain what the protein's normal function is during cell division. Using cell biology and biochemistry, we are directly comparing defects between healthy and cancer cells depleted of BuGZ.

Project type: Research, Scholarship, and Entrepreneurship

297 - Fabiola Silva Angulo

Alternative Routes for BCG Vaccination in Murine Model

2018 Fall - College of Veterinary Medicine and Biomedical Sciences

Intradermal BCG vaccination provides highly variable protection against tuberculosis, therefore new approaches in vaccine delivery must be considered. This study compared four different routes of vaccination: subcutaneous(SC), intranasal(IN), intravenous(IV) and aerosol. Immuno-phenotyping for CD4/CD8 T cells, cytokine expression, post-infection cytokines, and CFU for lungs and spleens were analyzed at different time points. Vaccination resulted in decrease production of IFN- $\gamma$  and TNF- $\alpha$ , and bacterial load was significantly reduced, particularly in IN and aerosol vaccinated mice. A high recruitment of CD8 cells to lung of IN vaccine was observed at 60 day post infection.

Project type: Research, Scholarship, and Entrepreneurship

298 - Erin Slattery

Invisibility in Disability: Analysis of Multi-Disciplinary Research on Invisible Disability

2018 Fall - College of Liberal Arts

Not all disabilities are visible. More scholarship needs to be conducted on how people with invisible disabilities are regarded and communicate with others throughout the globe. The purpose of this multi-disciplinary literature review is to analyze what research exists on invisible illness as a disability in the field of disability studies, health communication, and cultural studies in order to extend thought and insights into future research. Thematic analysis was used a tool to examine the literature on invisible disability and culture as a whole. I identified the themes of culturally constructed identity, passing, and global understandings of disability.

Project type: Research, Scholarship, and Entrepreneurship

299 - Brittney Sly

Empowering Rwandan Women: Participatory Evaluation Methods for Sustainable Nutrition Education

2018 Fall - College of Health and Human Sciences

Malnutrition, food security, and low dietary diversity still plague rural Rwandan populations. Kitchen gardens have shown to be an effective solution for addressing these issues. We are implementing a training and education program for Rwandan women to start their own kitchen gardens and learn about the nutritional value of producing diverse small crops for household use. Training materials will be developed and refined through participatory evaluation. The initial group of women trained through this program will become peer-educators to train other women in their village. This will empower the community to improve nutrition and food security in their households.

Project type: Research, Scholarship, and Entrepreneurship

300 - Hillary Smith

Metabolomics of Dried Blood Spots from Malian Infants

### 2018 Fall - University Interdisciplinary Programs

Rice bran (RB), a byproduct of rice processing has functional food properties necessary for infant growth. This study investigated the effects of RB supplementation on the metabolite profiles of weaning infants in Mali, West Africa. Dried blood spots have advantages as shown by assessments for malnutrition and HIV status and were collected for studying metabolic response to RB feeding. Six month old, healthy infants were randomized to a control or RB supplementation group with increasing doses each month. RB fed infants showed changes in multiple metabolites of potential importance to growth outcomes through 12 months of age.

Project type: Research, Scholarship, and Entrepreneurship

### 301 - Sam Smith

#### Designing and Testing Evaluation Tools for a School-Based Cooking Series

#### 2018 Fall - College of Health and Human Sciences

Valid and reliable evaluation tools are needed to demonstrate nutrition program effectiveness. This project describes the development of self-report and observation-based tools to measure outcomes, feedback, and fidelity of a school-based cooking series to be implemented in classrooms currently receiving nutrition education from the Expanded Food and Nutrition Education Program (EFNEP). Design of these tools will be informed by a literature search and each tool will be tested for feasibility and face validity through cognitive interviewing and feedback from classroom teachers and EFNEP paraprofessionals. This testing is the first step in creating a robust evaluation methodology for this program.

Project type: Research, Scholarship, and Entrepreneurship

### 302 - Dana Sobel

#### Youth Engagement: Healthy Eating and Activity in Denver

#### 2018 Fall - University Interdisciplinary Programs

Obesity continues to be a prominent public health concern, particularly among low-income, minority youth. There is a need for intervention-based approaches for this audience. This project will work within the Elyria-Swansea and Globeville (GES) neighborhood in northeast Denver to identify and implement effective, community-based interventions to tackle the rising obesity epidemic through student driven initiatives. The goal is to engage youth to identify and help solve this issue through healthy food choices, physical activity, and community involvement in the hopes of lowering their risk of childhood obesity.

Project type: Research, Scholarship, and Entrepreneurship

### 303 - Elizabeth Sokolowski

#### Resource Utilization of LGBT University Resource Center and Prospective Barriers

#### 2018 Fall - College of Natural Sciences

LGBT students experience discrimination and harassment on college campuses at rates higher than their peers, which impacts their academic achievement and mental health. LGBT resource centers were created in response to these concerns, but they struggle with underuse of services. This study found that use of resources decreased over time and that awareness of resources acted as a barrier.

Additionally, the resource center's microclimate and name seem to have acted as meaningful barriers. Reducing the impact of these barriers results in LGBT students feeling more supported, which can aid in their academic achievement and well-being.

Project type: Research, Scholarship, and Entrepreneurship

304 - Claudia Solt

Mechanism of Adipose Distribution: The Role of the Estrogen Receptor

2018 Fall - College of Health and Human Sciences

Lipedema is a painful fat disorder that affects ~11% of the female population and is correlated with numerous deleterious health consequences. Characterized by symmetrical accumulation of subcutaneous adipose tissue in the limbs, onset is associated with major hormonal changes such as puberty, pregnancy and menopause. Clinical and animal studies have elucidated the effects of estrogen on energy balance and adipose distribution are mediated by estrogen receptor alpha (ER $\alpha$ ). We propose aberrant ER $\alpha$  signaling may be a potential mechanism of lipedema. Through viral knockdown in the inguinal subcutaneous depot we aim to develop a rodent model of the disease.

Project type: Research, Scholarship, and Entrepreneurship

305 - Youngseok Song

Robust High-Dimensional Multiple Regressions with Application to Biomarker Screening

2018 Fall - College of Natural Sciences

Identifying genetically related markers to a candidate pool based on sequencing data has been playing critical roles in genetic and genomics studies for treating cancer, controlling experiment quality, and learning evolutionary pathways. The complex dependency and leptokurtic nature of the sequencing data, however, make the conventional statistical approaches unreliable due to the loss of controlling the false discovery rate or compromising the empirical power.

Project type: Research, Scholarship, and Entrepreneurship

306 - Evan Sproul

The Changing Impacts of Greenhouse Gas Emissions

2018 Fall - Walter Scott, Jr. College of Engineering

Life cycle assessment (LCA) is a tool used to understand the sustainability of new products. One major limitation of current LCA methods is a lack of temporal resolution. As a result, LCA does not account for the dynamics of a changing future environment. This research presents two new methods for including the impacts of time in LCA. To demonstrate, both methods are used to evaluate the greenhouse gas emissions for a range of electricity generation technologies. Results show that including the impacts of time will increase perceived environmental impact relative to current conditions.

Project type: Research, Scholarship, and Entrepreneurship

307 - McKay Stoker

CFD Model for an Automobile Refueling System

2018 Fall - Walter Scott, Jr. College of Engineering

Government regulations and customer satisfaction direct the performance of an automobile refueling system. Each new design must be prototyped and tested to ensure these requirements are satisfied. To meet standards, multiple iterations are often needed. To conserve resources, a Computational Fluid Dynamics tool (CFD) tool is proposed to assist in design validation. Experiments are performed to characterize boundary conditions for CFD and to validate model results. Pressure data is gathered from simulation and experiment. Steady state pressures from each method trend the same and have similar magnitude at multiple fuel flow rates.

Project type: Research, Scholarship, and Entrepreneurship

308 - Gavin Stonehouse

Hemp's (*Cannabis Sativa* L.) Phytoremediation and Biofortification Potential for Selenium



2018 Fall - College of Natural Sciences

Hemp appears an optimal candidate for environmental cleanup (phytoremediation), considering its fast growth, high biomass, hardiness, and economic value. We tested hemp selenium (Se) tolerance, accumulation, Se speciation, and effects of Se on photosynthesis and cannabinoid levels. In a greenhouse study, hemp showed complete tolerance up to 40  $\mu$ M sodium selenate and accumulated up to 200 mg Se/kg dry weight. The Se found in seeds was seleno-aminoacids, known to have anticarcinogenic properties to consumers, at low levels. Cannabidiol (CBD) levels were not affected by Se. We conclude that hemp has good potential for Se phytoremediation while producing Se-biofortified dietary products.

Project type: Research, Scholarship, and Entrepreneurship

309 - Emily Stuchiner

15N-Labeled Substrate Additions Illustrate Differences in Microbial N<sub>2</sub>O Production Pathways

2018 Fall - University Interdisciplinary Programs

Ecosystems receiving excess nitrogen (N; hereafter N-polluted ecosystems) contribute to enhanced microbial emissions of nitrous oxide (N<sub>2</sub>O), a potent greenhouse gas. However, it is not clear which microbial processes are enhanced to drive these emissions. We evaluated how N<sub>2</sub>O production pathways vary with N loading and soil moisture by amending soils from N-polluted alpine and agricultural sites with 15N isotopically enriched substrates. We found strong isotopic differences in N<sub>2</sub>O-generating processes between ecosystems, illustrating that these systems respond differently to the same stressor (N pollution) and that management will need to be tailored to each ecosystem to mitigate microbial N<sub>2</sub>O emissions.

Project type: Research, Scholarship, and Entrepreneurship

310 - Ray Sumner

Roberts Ranch: Protecting 10,000-Years of Human History in Northern Colorado

2018 Fall - College of Liberal Arts

Roberts Ranch is a 17,000-acre ranch established in 1874 and contains over 10,000 years of human history. The goal of my research is the nomination and listing of the Roberts Ranch (Livermore, Larimer County, Colorado) as a Cultural Landscape to the National Register of Historic Places and the development of an interpretive and preservation plan to tell the ranch's story and protect the its structures. My research is interdisciplinary and incorporates archaeology, history, historic preservation, museum studies, botany, zoology, and environmental science into a unified understanding of the human use of the ranch and how it changed over time.

Project type: Research, Scholarship, and Entrepreneurship

311 - Brian Sumpter

Smart-Phone Based Assessment of Ballistic Lower Leg Movement

2018 Fall - College of Veterinary Medicine and Biomedical Sciences

For older adults, the inability to rapidly respond to perturbations in balance and gait often leads to injurious Fall - s and hospitalization. Measurement of the rapid leg movement required to catch oneself and prevent a Fall - typically requires expensive, lab-based instruments. We used a lab-based accelerometer and a common smart device (iPod Touch) to measure leg movement across a wide range of speeds (very slow to ballistic). The values were strongly correlated between the two devices. Portable smart devices may be used by minimally trained personnel to inexpensively yet precisely measure ballistic movements in remote clinical settings or research trials.

Project type: Research, Scholarship, and Entrepreneurship

312 - Jiefeng Sun

An Adaptive Walking Robot with Reconfigurable Mechanisms

2018 Fall - Walter Scott, Jr. College of Engineering

In nature, animals or insects can leverage the same body parts for different functions. We propose a novel strategy to enable reconfigurable robots by introducing into a mechanism with variable stiffness joints (VSJ). In this case, a mechanism can have different joint locations and link lengths to achieve multiple trajectories without altering the mechanical design. The fabricated mechanism shows smooth transitions between three example trajectories. We implement the mechanism in a walking robot to demonstrate different functions. The proposed strategy can enable adaptive robots that can change their sizes, shapes, or functionalities to fulfill multiple tasks in different environments.

Project type: Research, Scholarship, and Entrepreneurship

313 - Julianna Sun

Beta-Amyloid Induces Hyperexcitability via Disinhibition in Hippocampal Circuitry

2018 Fall - College of Veterinary Medicine and Biomedical Sciences

Beta-amyloid (AB) peptide accumulation has long been implicated in the pathogenesis of Alzheimer's disease (AD) but a well-defined mechanism detailing how AB causes AD pathogenesis has not been established. Using calcium imaging techniques, we show here that AB42 indirectly induces hyperexcitability in hippocampal pyramidal cells and also directly induces hypoexcitability in interneurons. We have also shown that selective inhibition of  $\alpha 7$  and  $\alpha 4\beta 2$  subunits nicotinic acetylcholine receptors (nAChRs) mimics AB42-induced hyperexcitability in pyramidal cells and AB42-induced hypoexcitability in interneurons. Knowledge of AB42's interaction with selective nAChRs on GABAergic interneurons could yield potential therapeutic targets for AD patients.

Project type: Research, Scholarship, and Entrepreneurship

314 - Dan Sutherland

Hemp Liquid Infused Porous Surface with Excellent Anti-Food, Anti-Icing Performance

2018 Fall - Walter Scott, Jr. College of Engineering

Perfluorocarbons usage is a large problem in the manufacture of super repellent surfaces. Many slippery liquid-infused porous surfaces (SLIPS) use perfluorosilanes or acids in order to lower the surface energy of the porous layer. These silanes and acids are highly toxic and can bioaccumulate in human. As of 2002 fluorocarbons can be found in the blood serum almost everyone in the US. Even in cases where researchers have eschewed fluorocarbons to manufacture SLIPS in favor of biodegradable materials, the synthesis has been labor intensive. Here we demonstrate an easily synthesized, all-natural, hemp-based SLIPS surface with excellent liquid repelling properties.

Project type: Research, Scholarship, and Entrepreneurship

315 - Josh Svendsen

Methylation Likely Links C. Elegans Primary and Secondary Small RNAs

2018 Fall - University Interdisciplinary Programs

RNA interference (RNAi) is a conserved process by which small RNAs and their Argonaute effectors regulate <sup>[1]</sup>diverse cellular processes. In C. elegans, primary small RNAs initiate both exogenous and endogenous RNAi by directing the association of target mRNAs with a secondary small RNA amplification complex to conduct genome surveillance. Two classes of primary small RNAs must be methylated in order to function. We demonstrate that, without methylation, these RNAs are truncated and the secondary small RNAs that depend on them are depleted. Additionally, we identify methylation-dependent miRNAs and show that exogenous primary small RNAs are methylated.

Project type: Research, Scholarship, and Entrepreneurship

316 - Clayton Swanson

The Associations of Age Between Turning and Cortical Inhibition

2018 Fall - College of Health and Human Sciences

Advancing age results in reduced mobility and decreased levels of cortical inhibition. Moreover, motor cortex inhibition is significantly associated with upper extremity bimanual control. However, it remains unclear whether this relationship exists for the lower extremities. Using transcranial magnetic stimulation to assess motor cortex inhibition and wireless inertial sensors to quantify turning characteristics we assessed if inhibition contributes to the control of turning in healthy, young and older adults. A variety of turning characteristics were significantly correlated to motor cortex inhibition indicating that inhibition may contribute to complex mobility, similar to its association with bimanual control.

Project type: Research, Scholarship, and Entrepreneurship

317 - Catherine Tait

Effects of Individual Variation in Cognition on Honeybee Fitness

2018 Fall - University Interdisciplinary Programs

Cognition is central to questions about functional explanations of behavior but the mechanisms through which interindividual variation in cognitive capacity translates to fitness differences is poorly understood. Honeybees are well known for their diverse array of cognitive abilities, but little is known regarding how individuals within a colony differ in their cognitive capacity and how such differences influence their foraging performance and contribution to the colony. Using a variety of behavioral assays, I examined the relationship between different cognitive parameters within individual bees and the influence of these parameters on their performance in various social tasks and survival.

Project type: Research, Scholarship, and Entrepreneurship

318 - Erica Tardiff

Nobilis Aqua

2018 Fall - College of Business

Nobilis Aqua brings environmental awareness to fish farming by offering a truly sustainable feed. Nobilis creates fishmeal from invasive Asian carp and combines them with locally sourced ingredients to make an affordable, nutritious, and sustainable fish feed option for aquaculture farmers.

Project type: Research, Scholarship, and Entrepreneurship

319 - Janee Terwoord

Novel Role of Acetylcholine in Blood Flow Regulation in Humans

2018 Fall - College of Health and Human Sciences

This research addresses how the molecule acetylcholine interacts with the sympathetic nervous system to regulate blood flow and oxygen delivery to working skeletal muscle in humans. We measured forearm blood flow and arterial pressure to assess vasoconstriction in response to local, intra-arterial infusion of an  $\alpha 1$ -adrenergic receptor agonist under control conditions and during local inhibition of muscarinic ACh receptors via atropine. We demonstrate, for the first time, a physiological role for endogenous ACh in blood flow regulation. To date, inhibition of several key pathways in this experimental model has had no impact on sympatholysis; thus, these findings are quite remarkable.

Project type: Research, Scholarship, and Entrepreneurship

320 - Selam Tewahade

Impact of Food-Environment Relative to Physical-Activity Environment on Adolescent Obesity

2018 Fall - University Interdisciplinary Programs

Often the environment has an effect on people's health. The purpose of this study is to better understand how the built environment, specifically the physical activity environment relative to the food environment impact the prevalence of obesity for adolescence 10th grade to 12th grade in the United States. Researchers used data from the Next Generation Health Study, this study gathered data from a nationally representative cohort (N = 2780). We hypothesize adolescence who live in unhealthy food environments, far from parks and recreation areas, and in high crime, neighborhoods are more likely to be obese or overweight.

Project type: Research, Scholarship, and Entrepreneurship

321 - Jonathan Thielman

Progress Towards the Total Synthesis of Baulamycins A and B

2018 Fall - College of Natural Sciences

The baulamycins are a class of broad-spectrum antibiotic natural products isolated from *Streptomyces tempestuensis*. Active against *Escherichia coli*, *Bacillus anthracis*, and at least one clinically-isolated strain of methicillin-resistant *Staphylococcus aureus* (MRSA), study of these naturally-occurring antibiotics has been limited by their extreme scarcity. We have designed a synthetic approach to access both the antibiotics and potential derivatives in order to better understand their biological mode of action. A novel synthesis of the full carbon backbone of baulamycins A and B has been achieved, and recent progress towards the complete synthesis of these valuable natural products is described.

Project type: Research, Scholarship, and Entrepreneurship

322 - Aanand Thiyagarajan

Effect of Oxide Buffers on CdTe Solar-Cells Using First Principles

2018 Fall - Walter Scott, Jr. College of Engineering

This is a study on oxide/CdTe interfaces in thin-film photovoltaic cells using ab-initio calculation methods, specifically Density Functional Theory, which is a first principles method to determine the electronic structure of a material. The oxides under investigation are Zinc Oxide (ZnO) and Magnesium Zinc Oxide (MZO). The goal of this effort is to determine how terminating elements and surface chemistry at the interface affect electronic properties such as band alignment. MZO is known to be beneficial for cell performance by creating a more favorable band alignment than ZnO, which is also studied.

Project type: Research, Scholarship, and Entrepreneurship

323 - Ariel Timkovich

Acupuncture Decreases Histologic Evidence of Osteoarthritis in a Rodent Model

2018 Fall - College of Veterinary Medicine and Biomedical Sciences

Osteoarthritis (OA) is a leading cause of physical disability worldwide. Acupuncture is a traditional Chinese practice involving the insertion of thin needles into the skin to alleviate pain, tension, and stress. Explanations for its mechanism of action are being researched but benefits remain inconclusive/contradictory. The objective of our study was to provide quantitative data on the effectiveness of acupuncture as a disease modifying therapy for OA. Our work demonstrated that OA-prone guinea pigs receiving manual acupuncture therapy had decreased histologic evidence of OA compared to control groups. Additional work is needed to elucidate molecular mechanism(s) responsible for this disease modification.

Project type: Research, Scholarship, and Entrepreneurship

324 - Olivia Todd

Developing Herbicide Tolerant Sorghum Bicolor Through Chemical Mutagenesis

2018 Fall - College of Agricultural Sciences

Sorghum bicolor is a cereal grain cultivated globally. Commonly grown for human consumption, animal feed or bioethanol production, sorghum grown in Kansas, Texas and Colorado accounted for 85% of the United States' total sorghum production (2017). As the market for human consumption increases, insects, pathogens and weeds still contribute significantly to sorghum yield loss. Only as recently as 1970 have genetic solutions been developed to combat these obstacles and herbicide resistant sorghum is a forthcoming consumer demand. Using chemical mutagenesis and conventional breeding methods, a stacked trait for resistance to two Acetyl CoA Carboxylase (ACCase) inhibitor herbicides is being developed.

Project type: Research, Scholarship, and Entrepreneurship

325 - Paul Todd

Kinetically-Controlled Assisted Metathesis of Metastable Yttrium Manganese Oxides

2018 Fall - College of Natural Sciences

The synthesis of complex oxides typically requires high temperatures in order to overcome barriers imparted by solid-state diffusion; as such, reactions typically yield only the most stable phase or polymorph for a given composition. To synthesize new or metastable complex oxides, new reactions with lower initial energy barriers must be devised in order to impart kinetic control over the reaction pathway and resulting products. This contribution details the synthesis of two metastable yttrium manganese oxides through a kinetically-controlled assisted metathesis reaction between  $\text{Mn}_2\text{O}_3$ ,  $\text{YCl}_3$ , and  $\text{A}_2\text{CO}_3$  under flowing oxygen; where A = Li, Na, K.

Project type: Research, Scholarship, and Entrepreneurship

326 - Ben Trabing

Understanding Rapid Intensity Changes in Official Hurricane Forecast Error Distributions

2018 Fall - Walter Scott, Jr. College of Engineering

The characteristics of National Hurricane Center intensity forecast errors are examined. Rapid intensification (RI) and rapid weakening (RW) represent the tails of the forecast error distributions. Statistically significant improvements to RI forecasts have been made in the East Pacific and to RW in the North Atlantic; however, no improvements have been made to RI in the North Atlantic and RW in the East Pacific. Forecast error distributions widen when tropical disturbances experience weak vertical wind shear and warm sea surface temperatures. Improvements to our observational capabilities, understanding, and prediction of inner-core processes is paramount to narrowing the forecast error distributions.

Project type: Research, Scholarship, and Entrepreneurship

327 -Jinn Tran

What Predicts Positive Mentorship Outcomes?

2018 Fall - College of Natural Sciences

Mentorship programs, in which an adolescent is matched with a caring adult, can have positive benefits for young people. Our study examines the extent to which a mentee's relationship skills (as reported by their parent prior to the start of the mentoring program) predict the development of relationships with other mentors and mentees, as well as the mentee's sense of belonging in the program. We found that

youths with higher relationship skills are more likely to feel like they belong and matter in the mentoring program, and that these effects are mediated by the relationships that they build with others.

Project type: Research, Scholarship, and Entrepreneurship

328 - Ashley Turnidge

Sex-Dependent Regulation of the Stress Response

2018 Fall - College of Veterinary Medicine and Biomedical Sciences

Stress-related diseases can result from a failure to properly limit the stress response and exhibit striking sex biased prevalence. Accordingly, far more women than men are affected, which may be related to sex differences in stress regulation at the level of the brain. Our investigations aim to identify such sex differences and their underlying cellular and molecular players. Using mouse models, we have discovered pronounced sex biases in the neural mechanisms that limit the stress response. Such findings may help explain why stress-related disorders are more prevalent in women and guide future studies of more effective, sex-specific treatments.

Project type: Research, Scholarship, and Entrepreneurship

329 – withdrawn

330 - Zack Valenti

Investigation of Proteostasis in Mice Following Treatment with a Nrf2-Activator

2018 Fall - College of Health and Human Sciences

The age-related increase in oxidative stress is a consequence of Reactive Oxygen Species (ROS) generation exceeding the capacity of antioxidant enzymes to eliminate ROS. Interestingly, normal concentrations of ROS are generated as by-products of metabolism. Yet, dysregulation between ROS generation and clearance causes oxidative damage to cellular components, predominately proteins. The transcription factor nuclear factor erythroid-derived 2-like 2 (Nrf2) induces gene expression of antioxidant enzymes, anti-inflammatory proteins, and the proteasome, effectively regulating mechanisms of cytoprotection and proteostasis. However, Nrf2 activity diminishes with aging; thus, investigating cytoprotective gene targets amenable to phytochemical activation is a promising strategy for healthspan extension.

Project type: Research, Scholarship, and Entrepreneurship

331 - Sravanthi Vallabhuneni

Superhydrophobic Coatings for Improved Performance of Electrical Insulators

2018 Fall - Walter Scott, Jr. College of Engineering

In this work by employing superhydrophobic coatings on the surface of polydimethylsiloxane (PDMS) sheets with different surface roughness, a systematical investigation was conducted to understand if the textured superhydrophobic surfaces can indeed improve the dielectric strength of the electrical insulators under wet conditions. Our results indicate that porous superhydrophobic coatings rather than rough monolithic superhydrophobic surfaces (e.g., abraded insulator surfaces) allow the retention of dielectric strength of insulators under wet conditions in spite of the surface roughness. We envision that the insights from our work will enable the design of electrical insulators with improved performance and increased longevity.

Project type: Research, Scholarship, and Entrepreneurship

332 - Cameron Van Cleave

Investigating Interactions of Short-Chain Menaquinones in Langmuir Monolayers

2018 Fall - College of Natural Sciences

Lipoquinones are essential to the electron transport chain and the survival of organisms. Menaquinone (MK) is a lipoquinone used in archaea, Mycobacteria, and humans. There is little literature on how MKs interact within the lipid bilayer. Literature on ubiquinone (UQ) suggests length of the isoprenoid chain affects the interaction of UQ within the lipid bilayer. Compression isotherm experiments of Langmuir monolayers containing both phospholipid and MKs of varying tail length were conducted to see if the same effects were observed. It was found that four isoprenoid tail units expands the monolayer while one isoprenoid unit does not have observable effects.

Project type: Research, Scholarship, and Entrepreneurship

333 - Laura van der Pol

Drivers and Indicators of Soil Health in Semi-Arid Agroecosystems

2018 Fall - University Interdisciplinary Programs

Cropping intensification and diversification can enhance nutrient retention and yield in dryland farms, though we do not yet know mechanisms of how intensification alters soil function. We endeavor to identify these mechanisms at multiple scales: within treatment in rhizosphere and bulk soils and among treatments at plot and field scales. Initial results have shown that the rhizosphere and bulk soils have distinct drivers for nutrient cycling. Currently, we are comparing field-scale differences in microbial activity and soil structure in dryland wheat systems. Using isotopically labelled litter, we will trace decomposition to identify mechanisms of C persistence and N-cycling in soil.

Project type: Research, Scholarship, and Entrepreneurship

334 - Tara Van Surksun

Fundamental Investigations of Two-Way Impact on Plasma/Catalyst for Plasma-Assisted Catalysis

2018 Fall - College of Natural Sciences

Plasma-assisted catalysis (PAC) has been investigated as a promising method for pollution control, specifically for conversion or removal of nitrogen oxides and volatile organic compounds. The utility of PAC is severely limited by an overall lack of understanding of fundamental plasma chemistry and the reactions occurring at the plasma-catalyst interface. The present work investigates the two-way impact that the catalyst and plasma have on each other in N<sub>2</sub> and CH<sub>4</sub> plasma systems. Ultimately, these studies aim to unravel the complex chemistry of PAC systems to achieve a viable method of pollution remediation.

Project type: Research, Scholarship, and Entrepreneurship

335 - Ana Velasquez Munoz

Mechanical Grooming Brush and Dairy Calf, Behavior and Health

2018 Fall - College of Agricultural Sciences

The objective of this study was to evaluate the effects of an automated brush on health, behavior, and performance of recently weaned and grouped Holstein heifers. To assess behavior, a 3-D accelerometer sensor was ear tagged to each calf. Presentation of diseases and performance were not affected by the presence of an automated brush. However, calves in automated brush pens spent less time per day “not-active” and spent more time “eating” (min/h) in comparison with control calves.

Project type: Research, Scholarship, and Entrepreneurship

336 - Zaria Vick

Computational Simulation Analysis of Metronidazole Pharmacokinetics and Potential Neurotoxicity Correlations

2018 Fall - College of Veterinary Medicine and Biomedical Sciences

Metronidazole is a well-known broad-spectrum antibiotic. However, in certain cases, it has caused neurotoxic effects in humans and other animals. While the mechanism of this unintended toxicity is largely unknown, a number of potential culprit processes have been identified. In order to (1) make mechanistic inferences and (2) quantify internal exposures with toxicological propensities, computational simulation techniques were employed. The resulting pharmacokinetic and pharmacodynamic datasets were able to mirror experimental pharmacokinetic data and quantitatively substantiate existing toxicological evidence. This study aids in our understanding of metronidazole and provides a new experimental tool for future toxicological investigations.

Project type: Research, Scholarship, and Entrepreneurship

337 - Leena Vilonen

Drought Legacy Effects on Carbon and Nitrogen Cycling

2018 Fall - University Interdisciplinary Programs

Global drivers, such as altered precipitation regimes due to climate change, are extensively altering different types of grassland communities (e.g., microbial, plant, herbivore, etc.), with implications for ecosystem functioning and services at regional to global scales. Climatic extreme events, such as drought, are predicted to become more intense and frequent in the future. Drought has been shown to have varied responses, making understanding these responses highly important. This study aimed to understand the legacy effects (e.g. repeated droughts; 1 vs. 2 vs. 3 previous droughts) on belowground carbon and nitrogen cycling.

Project type: Research, Scholarship, and Entrepreneurship

338 - Jessi Vlcek

Cellular Responses to Glycocalyx Mimetic Surfaces

2018 Fall - Walter Scott, Jr. College of Engineering

Cardiovascular disease is the leading cause of death worldwide. Most corrective treatments require the use of systemic anticoagulants because current materials used cause coagulation. The only blood compatible material known is the glycocalyx which is the inner lumen of blood vessels. To develop a blood compatible material, we have coated surfaces with nitric oxide releasing polyelectrolyte multilayers, and nanoparticles to mimic the glycocalyx. Platelet, leukocyte, and bacterial responses to our surfaces were evaluated to determine their potential use in blood contacting devices. We found that our surfaces were able to decrease adverse cellular responses and prevent microbial attachment.

Project type: Research, Scholarship, and Entrepreneurship

339 - Saddam Waheed

Stochastic Weather Generator Development and Vulnerability Assessment Under Climate Variability

2018 Fall - Walter Scott, Jr. College of Engineering

Hydro-climatic model's vulnerability are necessary to develop optimal dam operation schemes under future uncertainty. The main objective of this study is to quantify the dam operation schemes under future variability using a developed stochastic CLIGEN weather generator. Stochastic future scenarios have been generated according to the CMIP5 outcomes in the study area. Then, the dam operation response has been evaluated due to the synthetic climate scenarios by calculating the operation vulnerability. Results indicate that the current operation system is subject to risk in the next 25 years. However, adaptation strategies are needed to enhance the dam response.

Project type: Research, Scholarship, and Entrepreneurship



340 - Gemma Wallace

Addressing Methodological Limitations: Identifying Marijuana Use Predictors with Exploratory Analyses  
2018 Fall - College of Natural Sciences

Clinically meaningful research on substance use may be limited by confirmatory methodologies, in which few risk-factors can be simultaneously evaluated. Recursive partitioning (RP), an exploratory analysis, is not limited by statistical power. Here, RP identified predictors of marijuana use in college students, a population with elevated risk for negative use-related outcomes. We examined 193 predictors and their interactions, including constructs that have not been previously studied. Data were National College Health Assessment survey responses (N=4,052). Increased alcohol use and sexual behavior were the most salient predictors of marijuana use. Explicating the etiology of health-risk behaviors may inform marijuana harm-reduction approaches.

Project type: Research, Scholarship, and Entrepreneurship

341 - Maureen Walsh

Evaluating Age-Related Changes in Skeletal Muscle Using an Osteoarthritis Model  
2018 Fall - College of Health and Human Sciences

Maintenance of the musculoskeletal system is critical to prevent age-related Fall - s and loss of mobility. Sarcopenia, the age-related loss of muscle mass and function, affects 10% of those over 65 years and as much as 50% of people over 80 years of age. We compared skeletal muscle properties from 5 and 15-month-old Dunkin Hartley guinea pigs to determine if this model can serve to understand human skeletal muscle aging. Data collection is ongoing to identify if this guinea pig strain can model the age-related changes in fibrosis, inflammation, and fiber type characteristic of human skeletal muscle aging.

Project type: Research, Scholarship, and Entrepreneurship

342 - Heting Wang

Integrate User Emotion Analysis to Task-Driven Human Computer Interaction Dialogues  
2018 Fall - College of Natural Sciences

For a long time researchers have focused on exploring the impact of user actions and verbal instructions during task-driven human computer interaction, however, seldom do people analyze human emotions in this procedure. I'm collaborating with professor Bruce Draper and Ross Beveridge, integrating emotion analysis to our Diana Agent system with the help of the Affectiva SDK to better evaluate user satisfaction during task progress. The real-time video stream transmission from a dummy server to processing client has been finished, and frame-by-frame facial expressions and corresponding emotion judgement has been output to files for further research.

Project type: Research, Scholarship, and Entrepreneurship

343 - Zhenqiang Wang

Efficient Approach for Optimal Seismic Mitigation of Large-Scale Transportation Networks  
2018 Fall - Walter Scott, Jr. College of Engineering

Pre-event mitigation through retrofitting bridges is commonly an economical way to enhance the seismic performance of transportation networks. However, it is challenging to select the optimal group of bridges to retrofit using the traditional full-scan method in which tons of stochastic simulation are required due to the huge combinations of bridge for a large-scale network. Our proposed approach relies only on the simulation of one set of samples instead of exploring all the combinations to obtain the ranking of bridges to retrofit and its high efficiency is illustrated through the highway transportation network in Los Angeles and Orange counties.

Project type: Research, Scholarship, and Entrepreneurship

344 - Rekha Warriier

A Land-Sharing View of Tiger (*Panthera Tigris*) Conservation in India

2018 Fall - University Interdisciplinary Programs

A large proportion of the global population of tigers, an endangered large carnivore, occurs within densely human dominated landscapes in India. Community tolerance towards tigers and their prey species is a key determinant of the persistence these species in landscapes where human-wildlife conflicts are rampant. We explored the role of various socio-ecological factors in driving community tolerance towards tigers and their prey species in an important tiger conservation landscape (Terai Arc) in northern India. Our results highlight important disconnects between exposure to conflict risks, experienced conflicts, community beliefs about conservation and their tolerance for tigers and prey species.

Project type: Research, Scholarship, and Entrepreneurship

345 - Miles Whedbee

From Molecules Come Behavior: How Animals Adapt to Dynamic Environments

2018 Fall - College of Natural Sciences

Owing to their rapid adaptive capacity, guppies have become a popular system for evolutionary study. Gene expression analyses are common for investigating mechanisms by which environment influences behavior. However, gene expression analyses have not adequately explained behavioral differences between rearing conditions. RNA editing, like gene expression, is sensitive to environment. RNA editing differences were discovered between two guppy populations and rearing conditions, potentially filling the explanatory gap not previously met by gene expression analyses. This study opens the exciting possibility that commonalities in RNA editing across multiple guppy populations, may indicate an adaptive mechanism by which environment influences behavior.

Project type: Research, Scholarship, and Entrepreneurship

346 - Tyler Whittier

Virtual Time-To-Contact as a Measurement of Balance for Multiple Sclerosis

2018 Fall - College of Health and Human Sciences

Impaired balance is a significant health risk in people with multiple sclerosis (MS). Virtual time-to-contact (VTC) is a novel method of balance quantification, which may provide additional sensitivity in assessing balance impairment(s). Recent work has indicated that VTC is a neurally-monitored measurement that predicts future states of instability. The purpose of this study is to confirm this suggestion and see if it is consistent in people with MS. It is hypothesized that our results will indicate that people with MS are less able to predict future states of instability, which results in them being more unstable than non-neurologic populations.

Project type: Research, Scholarship, and Entrepreneurship

347 - Alissa Williams

Correlated Amino Acid Substitution Rate Accelerations in Flowering Plant Genomes

2018 Fall - University Interdisciplinary Programs

Eukaryotic cells contain multiple genomes, and cellular function is often an intricate collaboration between them. For instance, in plants, the plastid Clp complex core is composed of nine different subunits—one encoded by the plastid (ClpP1) and eight by the nucleus. We found that accelerations in ClpP1 substitution rate have occurred multiple times independently across angiosperms, and that these increased evolutionary rates are highly correlated with accelerations in nuclear-encoded Clp core

subunits. This result highlights the importance of coevolution between the plastid and nuclear genomes, particularly because we found that a highly divergent ClpP1 still assembles into the Clp core.

Project type: Research, Scholarship, and Entrepreneurship

348 - Robert Williams

Tissue-Specific Transcriptional Dynamics in the Developing *Caenorhabditis Elegans* Intestine

2018 Fall - College of Natural Sciences

The *Caenorhabditis elegans* intestine -- a clonally-derived, 20-cell organ -- is a powerful model of organogenesis owing to its relative simplicity. We seek to understand how key transcription factors that specify this organ work together with auxiliary transcription factors and chromatin to first initiate the differentiation of cells in the developing intestine and later organize its many functions once it is formed.

Project type: Research, Scholarship, and Entrepreneurship

349 - Stewart Williams

Structural Evolution of the Potosí Uplift, Sierra Madre Oriental, Mexico

2018 Fall - Warner College of Natural Resources

The Potosí uplift, one of the largest uplifts in the Mexican orogen, exhumed the Minas Viejas shear zone, a Late Cretaceous to Paleogene décollement in the Sierra Madre Oriental (SMO), Mexico. Detailed geologic mapping and structural analysis provided insight into the geometry and kinematics of the Potosí uplift. (U-Th)/He data record the timing of exhumation associated with the uplift and suggest thick-skinned uplift was a continuation of earlier SMO shortening as opposed to a distinct tectonic event and was achieved through the development of a sub-décollement anticlinorium as well as thrust faults and possible outer-arc extensional features.

Project type: Research, Scholarship, and Entrepreneurship

350 - Angela Wilson

Mobility Travel- Travel Site for Ambulatory (Mobility Related) Disability Needs

2018 Fall - College of Business

The 2016 Disability Statistics Annual Report states that 22.6% of individuals over the age of 65 have an ambulatory (mobility related) disability. This demographic requires a variety of mobility accommodation during travel, not just the use of a full-time wheelchair. Additionally, mobility issues face individuals with chronic illnesses, permanent and temporary injuries, and other movement restrictive concerns.

Unfortunately, current large travel and vacation sites either cater to fully functioning individuals or those restricted to wheelchairs full-time. Mobility Travel's mission is to open the world to mobility compromised travelers of all ambulatory disability types.

Project type: Research, Scholarship, and Entrepreneurship

351 - Robert Wimbish

How Cells Move their Chromosomes During Mitosis

2018 Fall - College of Natural Sciences

Dividing cells face the challenging task of moving their chromosomes over long distances, a feat which requires significant force generation by the chromosome-segregating machinery. Here, we investigate the molecular players that accomplish this task using a light microscopy-based combination of cell biological and biochemical assays. We find that the two main protein complexes involved in chromosome segregation, the Ska and Ndc80 complexes, contribute to the chromosome movement independently. However, the Ska complex exerts effects on the Ndc80 complex that could enhance

force generation required for chromosome movement. These data help to elucidate the molecular basis of force generation during division.

Project type: Research, Scholarship, and Entrepreneurship

352 - Lindsay Winkenbach

Functions of P Granules in the Early *C. Elegans* Embryo

2018 Fall - College of Natural Sciences

Germ lines in *Caenorhabditis elegans* are distinguished from somatic cells by the presence of cytoplasmic ribonucleoproteins called P granules. Despite extensive study, a clear picture of their functions remains elusive. The identities of many RNA Binding Proteins (RBPs) associated with P granules suggest they facilitate post-transcriptional regulation. Indeed, several mRNAs are known to reside in P granules coincident with their translational repression. My project will expand our understanding of P granule biology from individual mRNAs to larger sets of transcripts. Further, I aim to determine whether transcripts localize to P granules due to repression or for the purpose of repression.

Project type: Research, Scholarship, and Entrepreneurship

353 - Alyssa Winter

Investigating the Phase Behavior of Block Copolymers for Energy Applications

2018 Fall - College of Natural Sciences

Room temperature ionic liquids (RTILs) have been a major focal point in chemical and engineering research due to their favorable properties such as near-zero vapor pressure, negligible flammability, high ionic conductivity, stability, and selectivity for certain light gases. This makes them attractive for energy applications such as batteries and post-combustion gas separation membranes. RTILs can be integrated into the backbone of a phase-separating block copolymer (BCP) architecture to take advantage of the physical and mechanical properties of two or more unique polymers. Additionally, the BCP phase separation process produces nanostructures that have major implications for future applications of the material.

Project type: Research, Scholarship, and Entrepreneurship

354 - Yucong Xie

Cloning a Novel Gene Against Wheat Streak Mosaic Virus

2018 Fall - College of Agricultural Sciences

Wheat streak mosaic virus (WSMV), transmitted by wheat curl mite (WCM), is a major threat in the Great Plains region of the United States and causes serious yield loss to wheat. Host plants with genetic resistance to WSMV and WCM are an effective way to control this disease. The goal of this project is to find novel and durable genetic variations to WSMV in host plants. A new possible candidate gene has been identified by genetic, genomic, bioinformatics, and transcriptomic approaches. This study provides information for better management of WSMV to increase wheat yield.

Project type: Research, Scholarship, and Entrepreneurship

355 - Pamela Yapor

Antibacterial, Biodegradable Polyesters with Potential Applications in Tissue Engineering

2018 Fall - College of Natural Sciences

Biodegradable polyesters were prepared via bulk polycondensation with monomeric units including citric acid, maleic acid, thiomalic acid, and 1,8-octanediol. The materials were functionalized to deliver nitric oxide given its relevant role in physiological processes such as immune response, cell proliferation, and angiogenesis. Cell studies using human dermal fibroblasts confirmed the lack of toxic leachates in

the degradation products of the polymers. In addition, bacterial studies established broad-spectrum antibacterial activity. Tensile mechanical tests expanded the potential applications of the materials as their mechanical properties are akin to those of soft biological tissues such as meniscus, ligament and tendon.

Project type: Research, Scholarship, and Entrepreneurship

356 - KC Young

Advancing the Design of a Multi-Stage Anaerobic Digester

2018 Fall - Walter Scott, Jr. College of Engineering

Anaerobic digestion is an attractive technology for waste handling because it converts low value waste material into energy and other useful products. Conventional anaerobic digestion technology, however, encounters many economic challenges when being applied to high-solids substrate such as cattle manure. Our research group, led by Dr. Sybil Sharvelle, has developed an innovative multi-stage anaerobic digester (MSAD) technology capable of digesting high solids content waste with very low water addition. This development leads to the promising opportunity for valorization of a common waste product in Colorado to valuable byproducts including methane biogas, compost, and fertilizer.

Project type: Research, Scholarship, and Entrepreneurship

357 - Sarah Zentner

"The Grace of This Disheveled World": Flannery O'Connor's Literary Theology

2018 Fall - College of Liberal Arts

Though scholar Patrick York argues that "grace" in Catholic writer Flannery O'Connor's short stories leads to positive change, the writer's characters often stop just short of transforming for the better. Instead, the subjects of O'Connor's stories meet with uncomfortable realities that ostensibly lack redemptive resolution. This study of two of her works -- "A Good Man Is Hard To Find" and "The Life You Save May Be Your Own" -- links the Jesuit theology influencing her writing with Bruno Latour's object-oriented ontology, in an attempt to newly and accurately define how grace operates in O'Connor's literary world.

Project type: Research, Scholarship, and Entrepreneurship

358 - Haijie Zhang

Compliant Bistable Gripper for Aerial Perching and Grasping

2018 Fall - Walter Scott, Jr. College of Engineering

Small aerial robots usually face a common challenge that they can only fly for a short time due to their limited onboard energy supply. To tackle this issue, one promising solution is to endow flying robots with perching capability so that they can perch or land on walls, trees, or power lines to rest or recharge. We propose a 3D-printed compliant bistable gripper which is easy to close, stable to hold, and easy to adjust for a palm-size quadcopter to perch on horizontally placed slim objects.

Project type: Research, Scholarship, and Entrepreneurship

359 - Lydia Zhang

Food Metabolomics with Rice Bran for Improving Nutrition Quality

2018 Fall - College of Veterinary Medicine and Biomedical Sciences

Rice bran is a functional food that has been shown to control and prevent metabolic disturbances and inflammation involved in major chronic diseases, such as obesity, diabetes, cardiovascular disease and colorectal cancer. This study assessed metabolites and bioactive components in meals and snacks containing heat stabilized rice bran that were used in previous human clinical studies aimed to enhance

nutrition quality and health. There were 22 distinct metabolites detected from a series of meals/snacks made with rice bran compared to a control (no rice bran). Consumption of these food products may have potential to improve gut health across the lifespan.

Project type: Research, Scholarship, and Entrepreneurship