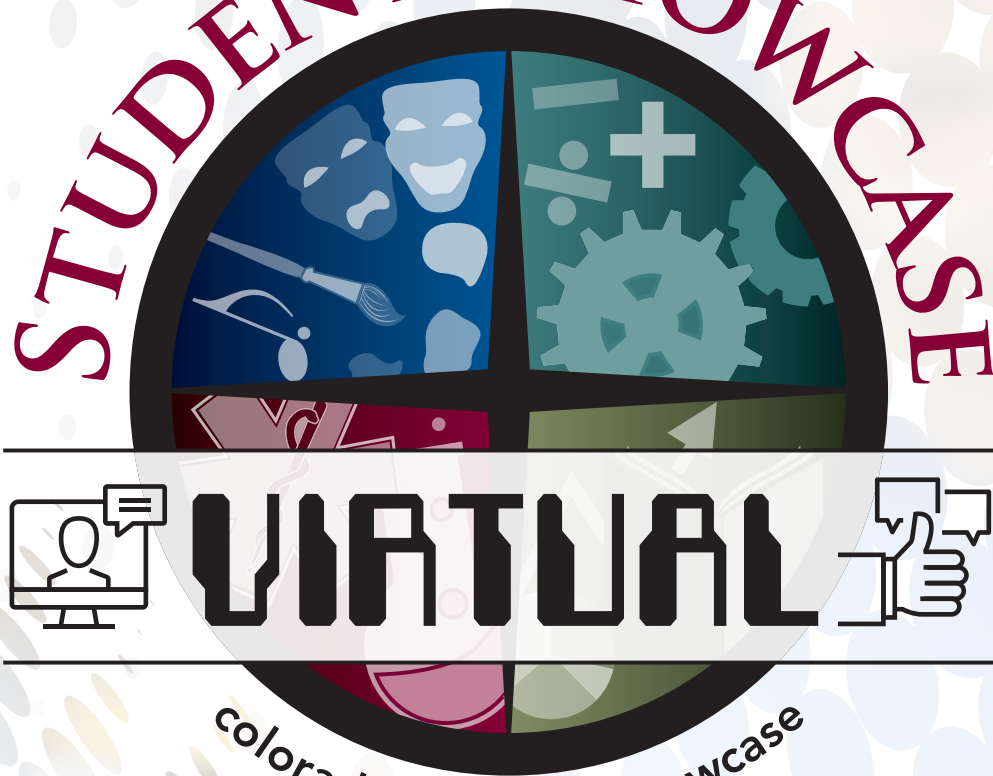


ELEVENTH ANNUAL
STUDENT SHOWCASE



coloradomesa.edu/showcase

2020

PROGRAM



⊕ PRESENTERS' NAMES AND TRACKS

Participant	Track	Participant	Track	Participant	Track
Elias Acevedo.....	11A, 11B	Elijah Chapa	3A	Chadd Gray.....	6A
Rosemary Adelgren.....	6A	Christian Cherry	2A	Lew Griffith	8A
Ciara Allen.....	12A	Zoey Cleveland	5A	Deserae Gruntorad.....	12B
Jeana Althea Altura	4D	Jacob Cline	4A	Fabiloa Gutierrez Barbosa	5A
Ian Anusencion	15	Meghan Cline.....	10D	Kirsten Haas	5A
Sean Apsey.....	4D	Justin Cobbley.....	6A	Lucan Haerle	3B
Brooke Arrieta.....	8A	Kevin Conley	10C	Brooke Hahn	5A
Jordan Ausman.....	11B	Juli Connolly.....	6A	Richard Hakes	4A
Kaylee Avila	12B	Amelia Conti	5A	David Hale.....	4B
Dalton Baker	10C	Kendall Crain	3A	Tara Hall.....	15
Jordan Ballard.....	3B	Natalya Dahlke.....	3C	Dylan Hallett.....	4B
Koya Barrette	15	Ethan Davis.....	4B	Erik Hamilton.....	15
Matthew Behnke.....	4D	Kassisi Day.....	4B	Nectarai Hanning.....	3B
Eric Berg	4C	Alain De la Bastide	4B	Amanda Hardy.....	5A
Rhiannon Bergman	7A	Maria De Los Angeles	7A	Braden Harrison	4A
Alexa Bester	5A	Anthony DeNardo	11B	Haley Hedges.....	12B
Mackenzie Bieker.....	5A	Soksereysophal Dep.....	3C	Cody Hedrick	4B
Tristan Bina	4B	Anabel Diaz.....	3A	Sydney Hellman.....	7A
Rylee Blacker.....	6A	Evangeline Diaz	15	Hayley Henderson	15
McKenzie Blackwell	5A	Vanessa Diaz.....	5A	Sydney Henke	3A
Genevieve Bleary.....	5A	Taylor Dodd.....	3A	Marquise Hill	15
Trevor Blume	3B	Lynzi Doke	5A	Ana Hinojosa.....	10D
Jaclyn Bodwin	5A	Jacob Doose	4B	Joshua Hodgson	3B
Guy Book.....	3A	Hunter Doyle.....	10C (2), 10D	Kaia Hofmeister	13B
Misty Bowen.....	10B	Josefine Dreier.....	6A	Emily Holder.....	5A
Nathan Bowen	3B (2)	Melissa Eagen	5A	Ana Holguin	3C
Jesse Boyce.....	15	Caleb Ealey	4B	Bryce Hopwood	2B
Taylor Bradshaw	4D	Nicole Edder.....	12C	Frederick Horn	11A
Emily Bricker.....	5A	Megan Edwards.....	5A	Alec Hostetler	3B, 3C
Kennedy Bright.....	12C	Joel Farewell	3B (2)	Parker Isakson	12B
Jayna Briscoe	15	Marc Farina.....	3C	Sarah Jackett.....	12A
Cole Brown.....	6A	Stephanie Fernandez	5A	Tammi Jacobs	3B
William Brown	4B	Emerson Flom.....	4D	Jariah Jaramillo.....	4D
Crystal Bucio Barrios	12C	Donald Flynn.....	3C, 11A	Maria De Los Angeles	
Jamie Buttermore.....	5A	Justine Forster	13C	Martinez Jaramillo	7A
Kendell Cain.....	3A	Deborah Foster.....	5A	Gary Johnson	10C
Luke Caires.....	4B	Matthew Frankmore	4A (2)	Yuvana Joshi.....	3B
Kersea Calhoun	7B, 7C	Carrie Garcia	5A	Miriam Kane	10D
Montgomery Carlo	4B	Emma Gardner.....	4C	Corey Keating	2A
Nicholas Carozza	9B	Miranda Garduno	5A	Zachary Kell.....	3B
Alan Carrasco	4B	John Goff.....	6A	Megan Kennedy	6A
Jaedon Carruth.....	3B	Gregory Gonzales.....	4B	Kyle Kennel.....	15
Brandon Castinado.....	5A	Victoria Goss	5A	Megan Kidd.....	12C
Madison Chaffee	6A	Aaron Gossage	4D	Brian Kilman	8A

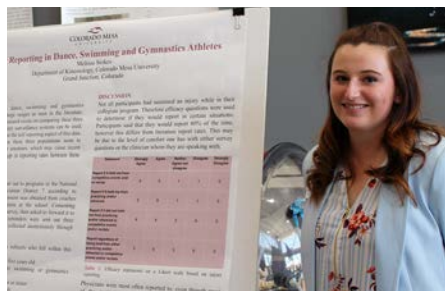
PRESENTERS' NAMES AND TRACKS

Participant	Track	Participant	Track	Participant	Track
Josey King	2A	Aaron Morrison	4C	Wyatt Roy	5A
Jared Kirts	15	Nyla Murphy	3B	Raquel Ruhme	5A
Ryan Kissinger	4A (2)	Caitlin Murray	5A	Ethan Ruiz	4A
Bailey Kleespies	3B	Christopher Nenne	3B	Matthew Rutkowski	10D
Heidi Kloser	2B	Sarah Nilsson	15	Alexys Sanchez	12A
Kaitlyn Knight	4B	Lael Nordstrom	3B	Camryn Sanchez	5A
Angelika Koukoulas	3C	Rebekah Nordstrom	5A	Mia Sanchez	15
Quintin Kurtz	3A	Trevor Novins	15	Caitlin Sander	6A
Sarah Lachelt	13A	John Noyes	10C	Lane Sanders	4B
Jordan LaGree	5A	Gregory Nuanes	5A	Dillon Sandrock	3A
Jacob Lambdin	4A	Sarah Nwagwu	5A	Dawn Schadegg	11B
Trey Lambrecht	4B	Derek Oakley	4B	Ian Schierland	3B
Lindsey Latchaw	5A	Tyler Oeltjenbruns	15	Natalie Schievelbein	13A
Rachel Lawrence	5A	Damien Ontiveros	3B	Joshua Schlag	10D
Kam Lee	13B	Daisy Ordonez	5A	Megan Schluckebier	6A
Kristin Legate	5A	Annie Osbourn	6A	Andrew Schmidt	10A
Elizabeth Lessard	5A	Mykalah Overholt	5A	Bryce Schulz	4A
Tyler Linza	15	Jacob Park	10D	Tyler Schwartz	10D
Chandler Livingston	15	Sophia Parker	12B	Charles Seever	7C
Bryn Loftness	4D (2)	Justin Pascual	3A	Jeremy Seeyava	4B
Rebecca Madigan	12B	Jessica Pastorello	13A	Shirin Shashova	5A
Rian Mahaffey	5A	Tessa Patton	12A	Jackson Shaw	4B
Jocelyn Malpica	3C	Casey Peed	10C	Omar Shawly	3A (2)
Brieanna Mangette	9A	Andrew Piechota	4D	Sydney Silverman	5A
Kenneth Markley	4A, 4D	Brittany Plateroti	5A	Jonah Simon	4A
Bryson Marks	10B	Richard Plock	10C	Heather Skufca	3A
BriAnne Marr	12A	Janina Pohorecki	4D	Ryan Smallwood	3C
Madison Marsh	12D	Alex Polito	12A	Hayley Smith	11B
Logan Mason	11A	William Pope	4A	Kimberly Smith	11B
Tanner Mast	4B	Courtney Powell	4B	Trevor Smith	10D
Marcel Mavangulu	3A	Jose Prada	15	Kilee Sofich	12A
Tabatha McCombe	4C	Sydney Prichard	12B	Sarah Solinger	12A
Gabriele McCombs	15	Angelina Puliafico	12B	William Somerville	4B
Paul McCourt	3B	Evelyn Quezada	12A	Dawson Springer	4A
Brei McQuivey	5A	Vy Quinn	11A	Madison Starbuck	5A
Matthew Meisinger	3B (2)	Jack Rahier	15	Marissa Stegora	12C
Seth Mewhinney	4B	Addison Reese	3A	Leah Stephens	12C
Megan Miller	12B	Kerry Ribbens	4C	Emily Stockton	2B
Thorsen Milton	4C	Kelsey Rickstrew	3B	Brandon Story	4D
Sierra Mitchell	10C	Andrew Ritter	3B	Alaina Stroble	13A
Zabriel Moffitt	4A	Natlaie Rivera Castro	5A	Kelsey Stroud	5A
Brieana Molinarik	4A	Sean Roberson	7A	Amy Sullivan	8A
Melanie Monroe	12B	Allie Robinson	12C	Anna Swelstad	5A
Diana Montes	4B	Gabriela Rodriguez	13C	Michael Tacker	4A
Hannah Moore	12C	Michaela Rollins	13C	Domonic Tafoya	4D
James Moore	6A	Zachary Romano	4D	Skyler Tait	5A
Montana Moore	11B	Candace Rosen	6A	Payton Tawater	3C

PRESENTERS' NAMES AND TRACKS

Participant **Track**

Christie Thammavong4D
 Paige Thaute12A
 Aaron Thompson3B
 Caitlin Torgerson4B
 William Tuck 15
 Selina Tucker2B
 Jacintha Turner 15
 Sydney Tuttle5A
 Cassie Twigs 15
 Sergio Vega3A
 Jose Velez14A
 Kendell Visser8A
 Rick Voss3A
 Marina Vucich3A
 Gregory Waldorf4B
 Lucas Walgren4D
 Rachel Wall4C
 Michael Wallendorff5A
 Dawson Walraven4A (2)
 Alexander Walt4A
 Macy Webb-Alexander3B (2)
 Jacob Welton-Kubeczko4C
 Christina Wihera 12B
 Savahanna Wilkinson10D
 Rose Willett12D
 Josiah Wilson4B
 Connor Wright3B
 Thale Yderstad13B
 Dakota Yourkowski4B
 Isaac Zepeda4B



STUDENT SHOWCASE PLANNING COMMITTEE

Dr. Aparna D.~N. Palmer,
Academic Affairs (Chair)

JoAnne Reis, Academic Affairs

Erin Rooks, Academic Affairs

Amy O'Campo, Academic Affairs

Aaron Osborne, Academic Affairs

Eli Hall, Art and Design

Denita Weeks, Biological Sciences

Shiang-Lih Chen-McCain, Business

Deb Parman, Business

Michael Philipp, Business

Ann Gillies, Center for
Teacher Education

Scott Bevill, Computer Science
and Engineering

Warren MacEvoy, Computer Science
and Engineering

Erin Donovan, Health Sciences

Brent Alumbaugh, Kinesiology

Kristen Hague, Languages,
Literature, and Mass Communication

Lisa Smith, Marketing

Cathy Bonan-Hamada, Math
and Statistics

Kristen Yun, Music

Cassandra Fenton,
Physical and Environmental Sciences

Justin Gollob,
Social and Behavioral Sciences

Scott Andrews, Theatre

Casey Dry, WCCC

Special thanks to Andrea Keck,
Marketing and Laura Bradley,
Marketing.

Thanks also to the staff in
Information Technology and
Institutional Research.

⊕ KICK-OFF EVENT

INTRODUCTION AND CONGRATULATIONS

Dr. Kurt Haas,
Vice President for Academic Affairs

INTRODUCTION TO KEYNOTE ADDRESS

Dr. Aparna D.~N. Palmer,
Assistant Vice President for Academic Affairs for
Student and Faculty Success (Chair)



KEYNOTE ADDRESS

RIVER RESTORATION: CONNECTING RESEARCH AND COMMUNITY

Guest speaker, Rica Fulton, Restoration Coordinator, RiversEdge West
Collaborator, Cara Kukuraitis, Outreach Coordinator, RiversEdge West

Rica Fulton, a restoration specialist, discusses the importance of research as it relates to healthy riparian areas and communities. Invasive riparian species, such as tamarisk, outcompete native species over thousands of acres along rivers in the West, leading to degraded riparian ecosystems. Restoring riverside habitat to increase biodiversity and resiliency takes research, collaboration, fundraising, and community involvement. Her organization and hundreds of partners are committed to restoring rivers by connecting researchers and practitioners, educating the public, and implementing on-the-ground restoration.

KICK-OFF EVENT SPONSORED BY THE ALPHA CHI HONOR SOCIETY

Student officers: Delaney Santoro, President and Shane Canitz, Vice President
Faculty sponsors: Dr. Morgan Bridge, Dr. Robin Calland and Dr. Tiffany Kinney

Alpha Chi is an national honor society that was established in 1922 to promote academic excellence and exemplary character among university students from all disciplines. The Gamma chapter of Alpha Chi serves to honor those students who demonstrate these qualities at CMU.



⊕ SESSIONS & ABSTRACTS

• Listed alphabetically by department then alphabetically by title within each department track.

ART & DESIGN

TRACK 1

Due to the precautions that had to be taken to slow the spread of COVID-19, there are no entries in this category.

BIOLOGY

TRACK 2A

Title: ELEVATIONAL PATTERNS OF STRESS IN AN ISOLATED POPULATION OF AMERICAN PIKAS (OCHOTONA PRINCEPS)
Presenter(s): Josey King
Type: Oral
Faculty Sponsor(s): Johanna Varner
Abstract: Climate change is an imminent threat to biodiversity, as evidenced by population declines in many climate-vulnerable species. In addition to long-term occupancy studies, an increasingly-popular monitoring method is non-invasively analyzing individual stress via fecal glucocorticoid metabolites (GCM). The American pika (*Ochotona princeps*) is a small lagomorph that is sensitive to rising temperatures and has experienced declines in parts of its range. However, a unique population exists in the La Sal Mountains of southern Utah; this population is predicted to be vulnerable because of its isolated nature and southern latitude. To determine relative stress levels among pikas in this unique population, we collected pika scat along elevational transects during summer 2019. We then used an information theoretic framework (AICc) to test competing hypotheses related to the effects of climate, biogeography, and habitat area on pika physiological condition (GCM) along elevational gradients. Elevation was the single strongest predictor of fecal GCM, with higher stress at higher elevation. Although seemingly counterintuitive, 2018-2019 saw abnormally high snowpack and avalanche activity, which reduced food availability in the spring and shortened the haying season at high elevation. These results advance the investigation of how climate-sensitive species respond to climate change and its unpredictable nature.

Title: INTERACTIONS OF NATURAL ISOLATES OF DICTYOSTELIDS WITH STREPTOMYCES
Presenter(s): Christian Cherry
Type: Oral
Faculty Sponsor(s): Kyle McQuade
Abstract: Members of the soil-dwelling bacterial genus *Streptomyces* are primarily known for their production of secondary metabolites. These filamentous, spore-producing bacteria are widely distributed in soil and cause various diseases in animals and plants. Dictyostelids are soil-dwelling amoebae that obtain energy and nutrients by consuming bacteria, but potential interactions with streptomycetes have not been extensively studied. We have isolated streptomycetes and dictyostelid strains from a variety of local soils and have begun to identify them. At least one dictyostelid grows when spores from the *Streptomyces* strains with which they were co-isolated are provided as the sole energy source, and we continue to assess potential interactions. These experiments are important for establishing a better



understanding of predator-prey interactions within the soil, for understanding biology of the amoebae, and perhaps for understanding virulence in *Streptomyces* strains that can cause disease.

Title: RNAi INVESTIGATION OF BLACK AND EBONY GENES IN PHOTURIS FIREFLIES
Presenter(s): Corey Keating
Type: Oral
Faculty Sponsor(s): Matthew Stansbury
Abstract: Photuris fireflies exhibit an evolutionarily novel photic organ for which the underlying genetic regulation remains unknown. The photic organ is a posterior-ventral structure that serves to catalyze and reflect luminescent reactions. An important feature of the photic organ is that it is overlain by a depigmented cuticle that facilitates luminescence transmission during courtship rituals. However, the genes responsible for the depigmentation remain unidentified. In *Drosophila melanogaster*, the genes black and ebony are known to repress cuticular pigmentation. We hypothesized that these functions are conserved in Photuris fireflies and that one or both genes have been recruited in the depigmentation of the photic organ's cuticle. We used RNA interference (RNAi) to intentionally inhibit expression of each target during pupal development. Microscopic examination of the adult RNAi individuals suggests that ebony is involved in the depigmentation of the cuticle surrounding the photic organ of female fireflies, while black is suspected to be involved in pigmentation patterning of the ventral thorax and appendages. These results suggest that photic organ pigment repression is complex and sex-specific in Photuris fireflies.

BIOLOGY

TRACK 2B

Title: DICTYOSTELIUM DISCOIDEUM CONSUMES SEVERAL STREPTOMYCES BACTERIA STRAINS
Presenter(s): Bryce Hopwood
Type: Poster
Faculty Sponsor(s): Kyle McQuade
Abstract: Dictyostelium discoideum is a soil dwelling amoeba that is commonly studied due to its unique life cycle in which starving amoeba aggregate to form multicellular reproductive structures, called fruiting bodies. Although the life cycle has been studied extensively in the laboratory, less is known about the biology of these amoebae in soil. I have assessed whether Dictyostelium amoebae consume Streptomyces bacteria to understand the role of these social amoeba in soil. Streptomyces are filamentous spore-producing bacteria, found in virtually all soils, that are known for their production of secondary metabolites. These metabolites have antibacterial and antifungal activities. My experiments show that Dictyostelium amoebae are capable of growing when spores from one of several Streptomyces species are supplied as the only food source. All strains tested support growth of the amoebae. These experiments suggest that Streptomyces spores may be a major food source of amoebae in soil and that the amoebae may be a good model to understand microbiological predator-prey relationships in soil.

Title: EFFECTS OF BACTERIAL VOLATILE ORGANIC COMPOUNDS ON A PATHOGENIC AMPHIBIAN FUNGUS
Presenter(s): Emily Stockton
Type: Poster
Faculty Sponsor(s): Denita Weeks
Abstract: There has been a global decline in amphibian populations and one major contributor is the fungus Batrachochytrium dendrobatidis (Bd), which causes the disease chytridiomycosis. This pathogen infects the skin of amphibians where it can inhibit electrolyte and gas exchange, ultimately leading to death. There are multiple methods of disease management including laboratory treatments and fungicide applications. However, many of these strategies are either ineffective or unsafe. Recent research has shown that the bacteria Bacillus thuringiensis, found in agricultural biopesticides, produces antifungal volatile organic compounds (VOCs). If Bd growth is inhibited by these VOCs, then there should be reduced Bd growth when B. thuringiensis and Bd are grown adjacently. Bd was plated alongside B. thuringiensis in a divided petri dish and incubated for 14 days. Photos of each plate were analyzed using Image J to assess percentage of Bd cover. Results indicated that B. thuringiensis VOCs significantly inhibited growth of Bd when compared to control plates. This suggests that a widely used biopesticide may be helpful in disease prevention for amphibians with overlapping habitat. This research is an important step towards developing effective disease management strategies for amphibians using common agricultural products.

Title: IDENTIFICATION OF FUNGI FOUND GROWING ON DECOMPOSING HUMAN REMAINS LOCATED IN A HIGH DESERT ENVIRONMENT

Presenter(s): Selina Tucker

Type: Poster

Faculty Sponsor(s): Margot Beckett

Abstract: According to the total body score system, decomposition of human remains can be broken up into four stages: fresh, early decomposition, advanced decomposition and skeletonization. The timing and characteristics of these stages vary in different environments (i.e. wet vs. arid environments). At Colorado Mesa University's Forensic Investigation Research Station (FIRS) the decomposition of human remains is observed with the goal of understanding how the process occurs in an arid, high desert environment. The aim of this study was to identify different fungi growing on human remains at FIRS. Tissue samples were taken from skin and bone and plated for continued growth in culture. Five different fungal species were identified based on morphological characteristics and grown in pure culture. DNA isolation, amplification and sequencing analyses were used to confirm the identity of each fungus based on their genetic sequences. Using the confirmed identity of each fungus, we hope to conduct further research into the role of fungi in the different stages of decomposition, as well as the differences in fungal growth in different environments. Understanding the role of fungi in decomposition can aid in forensic investigations and determination of the post mortem interval in different crime scene environments.

Title: MICROBIAL COMBAT AND THE RACE TO SAVE THE FROGS: THE EFFECTS OF BACILLUS THURINGIENSIS SECONDARY METABOLITES ON BATRACHOCHYTRIUM DENDROBATIDIS

Presenter(s): Heidi Kloser

Type: Poster

Faculty Sponsor(s): Denita Weeks

Abstract: Batrachochytrium dendrobatidis (Bd) is a fungal pathogen that has led to declines in amphibian populations worldwide. Some amphibians are protected from Bd infection by bacteria that they acquire from their environments. Bacillus thuringiensis (Bt) is a common soil bacteria that makes antifungal and antibacterial metabolites. We hypothesized that the presence of these metabolites in the liquid culture would inhibit the growth of Bd. Secondary metabolites were isolated from two Bt subspecies and tested against the Bd fungus in vitro. The secondary metabolites were extracted from broth cultures of Bt and used in a spectrophotometric growth assay against Bd for one week. It was found that when the metabolites were added to the liquid culture of Bd, the fungus grew better than the control group. The mechanisms by which the increased fungal growth is caused are unknown, but a possible explanation may lie in the signaling capabilities of Bd. Perhaps the fungus is capable of sensing the secondary metabolites and activating transcription factors thus, increasing cellular growth. This effect has been observed in other fungal studies utilizing secondary metabolites. Future studies may involve Bd signaling competency for both competition and growth factors.

BUSINESS

TRACK 3A

Title: FACTORS INFLUENCING CONSUMER SATISFACTION WITH SHARP IMAGE BARBERSHOP IN GRAND JUNCTION

Presenter(s): Anabel Diaz, Dillon Sandrock, Sergio Vega

Type: Oral

Faculty Sponsor: Shiang-Lih Chen McCain, Deb Parman

Abstract: There is no doubt that men visit barber shops consistently, according to Modern Salon, men visit their barbers about once a month stating, Stylists/barbers predict that the average time between haircuts for their male clients is 3.8 weeks, with the largest percentage (47%) getting their haircut every four weeks,(Soble, 2015, p. 7). Customers need a stylish haircut and create a bond with the barbers. In the city of Grand Junction, there are approximately 21 barbershop locations. Additionally, there has been an increase presence of locally independent- barbershops. Due to the increased competition, it, critical for local barbershops to be able to compete with the established chains like Supercuts and Sports Clips. Therefore, this study investigated how a barbershop, atmosphere, product quality, and service quality influenced consumers, overall satisfaction. The primary goal was to analyze and test the hypothesized, to research the relationship of technical and functional quality with customer satisfaction. In this study,

thirty reviews were analyzed on Sharp Image Barbershop. The results reported that technical and functional qualities both impacted customer satisfaction.

Title: THE MONUMENT RESORT

Presenter(s): Taylor Dodd, Sydney Henke, Addison Reese, Omar Shawly

Type: Oral

Faculty Sponsor(s): Britt Mathwich

Abstract: A group of four students majoring in hospitality, developed a resort concept that will be pitched to a group of investors. The project is a major component of Hospitality Resort and Recreation course, allowing for a full range of creativity and operating with an unlimited budget anywhere in the United States. The creation of the resort will include resort concepts, location, site plans, development plans, and competitive markets in the surrounding area. The main goal for the project is to connect what was learned in class and apply those concepts to a practical application on how every aspect of the development process ties together. Some of the departments that are included are management, financial, and operational departments. The project will be split into five phases: Resort Concepts, Resort Offerings, Space Design, Human Resource Management and Operations Management. The group will be developing a resort located at the base of the Colorado National Monument. The resort will be targeting vacationers who are looking for relaxation and adventure in the vast outdoors. The resort will incorporate the surrounding natural environment to blend with the resort, main concept.

Title: THE PARALLAX RESORT DEVELOPMENT AND CONCEPT

Presenter(s): Elijah Chapa, Kendell Crain, Rick Voss, Marinna Vucich

Type: Oral

Faculty Sponsor: Britt Mathwich

Abstract: A group of four students that come from different backgrounds and majors, have planned, organized and designed a resort including a comprehensive marketing plan. This project allowed groups to create a resort anywhere in the western United States, with an unlimited budget, to ensure the uniqueness and liveliness of this resort. The key focal points of this project are to highlight topics learned in class and the ability to apply to a full developed sales and marketing plan. The development of this resort, sales and marketing plan include full concepts, amenities, size, location, target market, and layout design. This fully concentrated project will be considered in the resort's organization operations and management section. Each of the six phases will be categorized as the following: resort concepts, resorts offerings, space design, Human Resource management, Operations Management, Sales and Marketing plan. The group has carefully considered all options and has decided to locate their new luxurious resort and spa on top of Vail mountain in Colorado. The resort will cater to families, couples, and business groups from all different income classes, to create fulfillment to enjoy this luxurious resort for memories to live on.

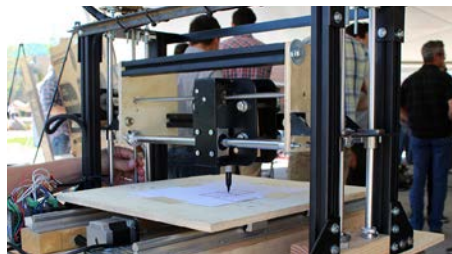
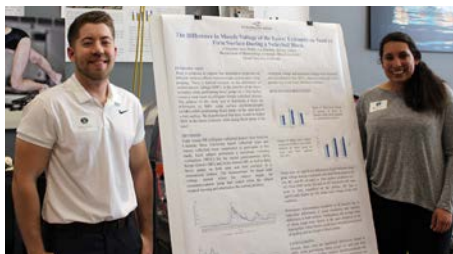
Title: WHAT'S THE POINT OF THE POINT?

Presenter(s): Marcel Mavangulu, Justin Pascual, Omar Shawly, Heather Skufca

Type: Oral

Faculty Sponsor(s): Georgann Jouflas

Abstract: What's the point of The Point?, The Point is a student-run pub on campus catering to students and faculty alike. The business is intertwined with the Experiential Management course which provides students with the opportunity to engage in an immersive working environment to give them the opportunity to gain the skills and knowledge necessary to run a successful business. This is a one of a kind course that combines experience and credit. The curriculum allows every individual to experience specific aspects of running a business. Bi-weekly rotation of work responsibilities include: product



movement, inventory, financials and human resources. Our primary goal this semester is to increase overall sales and gain a larger presence that appeals to the ever changing demographic of the campus. Over the course of the semester, our class has surveyed the CMU community. This data was analyzed and used to develop and implement projects in hopes of achieving our goals. We have coordinated events and entertainment marketing them in order to grow the influx of possible patrons as well as providing an improved atmosphere. Through successful implementation, we will continue to provide a safe place for students to come and enjoy some brews, food, and fun.

BUSINESS

TRACK 3B

- Title:** **CRIME IN COLORADO**
Presenter(s): Jordan Ballard, Yuvana Joshi, Andrew Ritter, Connor Wright
Type: Oral
Faculty Sponsor(s): John Snyder
Abstract: As members of the community, it is very important to be aware of crime in the community. The data that has been collected shows the type of crime including violent, property, and drug related crimes and is classified by counties and zip codes in Colorado. The data is used to show the relationship between crime and the different counties in Colorado, including whether crime is higher in large populated cities versus urban areas, whether there is a relationship between crime rates and total police officers employed in the area, and whether crime is higher in high income areas versus low income areas. The data will also be used to show the trend of crime rates by county to predict whether the crime rates will likely increase or decrease over time. The data and related analysis is intended to inform the Colorado community of the crime in their area to assist individuals in making better informed decisions like where to live, ensuring to lock their cars, and in general how to better protect themselves, their families, and their community.
- Title:** **COLORADO POPULATION ANALYSIS**
Presenter(s): Zachary Kell, Ian Schierland, Macy Webb-Alexander
Type: Oral
Faculty Sponsor(s): John Snyder
Abstract: Rent prices in Colorado have been increasing. Data from the Colorado Information Marketplace will be analyzed on a county level to determine if there are any correlations between population and rent prices. Trend analysis as well as graphical (geospatial) analysis will be presented to analyze the relationships between county population and rent prices. Forecasting rent prices will be attempted to predict future housing needs.
- Title:** **DATABASE DESIGN - LOCAL NON-PROFIT ORGANIZATION**
Presenter(s): Jaedon Carruth, Joel Farewill, Lucas Haerle, Joshua Hodgso, Alec Hostetler, Nyla Murphy, Paul McCourt, Macy Webb-Alexander
Type: Oral
Faculty Sponsor(s): John Snyder
Abstract: Non-profit organizations are firms that are dedicated to using their resources (funds, donations, relief aid) to further a particular social cause and assist in providing services to others. Whether the organization is considered a for-profit or non-profit firm, the requirements for gathering and storing essential information in a systematic way is important. As technology has improved tremendously in the last decade, it has become much less efficient to use paper-based methods to gather and store information. However, building databases has proven to be a challenging and costly affair for most firms, and lack of funds can sometimes put non-profit firms at a disadvantage. As seniors in Computer Information Systems, we were given the opportunity to build a functional database for a local non-profit organization. We focused on creating an easy-to-use interface that caters to different levels of computer literacy and seamlessly manages daily business processes. This offered our group the opportunity to gain experience in designing a database and provided the non-profit organization with a functioning database. This presentation will address the design process and the team, experience during the process.

Title: FORENSIC INVESTIGATION RESEARCH STATION DATABASE
Presenter(s): Nathan Bowen, Nectaria Hanning, Tammi Jacobs, Bailey Kleespies, Matthew Meisinger, Christopher Nenne, Damien Ontiveros, Aaron Thompson
Type: Oral
Faculty Sponsor(s): John Snyder
Abstract: The purpose of this project is to update and modify the CMU Forensic Investigation Research Station,Â’s (FIRS) database. This database enables tracking of FIRS activities from intake of donors to reports for grants and scholarship activities. Utilizing recommendations from employees that currently work on the system, the team is working to simplify the current database in order to produce a finalized version that focuses on ease of use, security, and relational integrity. Using the fundamentals and methodologies of the Systems Development Life Cycle (SDLC), we are taking an agile approach which allows us to make changes to the project throughout the process. Our student showcase will display the structure and relationships between tables used in Microsoft Access, forms and reports generated by the team, and illustrate the use of the database for operational activities. The team will redesign the forms and tables so that data entry and retrieval will be simplified for future employees and interns of FIRS.

Title: HEALTH INFRASTRUCTURE IN COLORADO
Presenter(s): Matthew Meisinger, Lael Nordstrom, Kelsey Rickstrew
Type: Oral
Faculty Sponsor(s): John Snyder
Abstract: The Colorado Information Marketplace includes sought after data that will be cleansed, mined, and visualized in order to provide insight into the state of Coloradans health future and health infrastructure. Based on a data set containing all health facilities registered with the Colorado Department of Public Health (CDPH) obtained from the Colorado Information Marketplace, data analysis on the infrastructure available to the public based on specific health concerns in the state will be performed. Specifically, one type of health facility will be selected and filtered to determine where facilities are needed. Colorado Information Marketplace also provides a data set containing population predictions per county that will be used to help predict infrastructure needs. This information is extremely important to the state of Colorado, which strives to provide the best healthcare to its citizens.

Title: TREE INVENTORY OF DENVER
Presenter(s): Nathan Bowen, Joel Farewell, Joshua Hodgson
Type: Oral
Faculty Sponsor(s): John Snyder
Abstract: With the increasing population in the Denver metro area, are we planting enough trees, at the correct locations, as well as the appropriate species of trees to ensure enough oxygen is converted to offset human carbon emissions? Denver has grown incredibly over the years with growth spurts as big as 50,000 new residents from July 2017 to July 2018. Using data from the Colorado Information Marketplace we set out to answer this question and follow up with another question. What trees need to be replaced or added in the following years to ensure the balance between human emissions and oxygen production? It,Â’s without a doubt a fact that Denver is going to continue to grow over the following years so it should be very heavily considered how we are going to maintain this balance.

Title: TREE TAX PROGRAM
Presenter(s): Trevor Blume
Type: Oral
Faculty Sponsor(s): David Ludlam
Abstract: This showcase project will remediate greenhouse gases emitted by natural gas production facilities. Implementing a tree tax, program, where operators are required to plant trees in accordance to how much carbon they emit, will ensure a carbon neutral production facility. The tree tax program will calculate the total amount of carbon emitted from a production facility on a yearly basis and equate that to the number of planted trees needed to absorb said carbon from the atmosphere. The program will be voluntarily adopted and will allow oil and gas companies to demonstrate that they are taking climate change seriously.

- Title:** **ENTREPRENEURIAL PROPENSITY AND INDIVIDUAL ENTREPRENEURIAL ORIENTATION AMONG BUSINESS STUDENTS**
- Presenter(s):** Angelika Koukoulas
- Type:** Poster
- Faculty Sponsor(s):** Carlos Baldo, Georgann Joufflas
- Abstract:** Previous research indicates a gap in the literature regarding entrepreneurial intentions among business students. The aim of this study is to compare entrepreneurial propensity and independent entrepreneurial orientation among students within different business concentrations. The study hopes to determine which business concentrations are more propense to become entrepreneurs. The study results from a questionnaire administered via. e-mail to the business students of Colorado Mesa University. The questionnaire also contains questions on demographic factors to determine trends in entrepreneurial intentions within business concentrations. Using the theory of reasoned action, we expect students studying mathematical and quantitative concentrations to be less propense for entrepreneurship compared to those studying person-oriented concentrations. The findings from our study can be applied to educators who wish to better identify, teach, and cultivate future entrepreneurs.
- Title:** **EXECUTIVE SEARCH FIRMS: A BIBLIOMETRIC ANALYSIS**
- Presenter(s):** Donald Flynn
- Type:** Poster
- Faculty Sponsor(s):** Carlos Baldo, Laureen Cantwell
- Abstract:** Executive search recruiters or 'headhunters' started in the 1960's when people started to realize their knowledge of employees and networking abilities valuable to others. The research in this topic followed shortly after and has been recently gaining more attention in the academic world. However, there has yet to be a study tracking the development of this topic over the years. This study aims to explore where academic research of the topic started, where it's gone, where it could possibly be going, the journals published with most, who the main authors have been, what countries and universities are involved, how many papers have been published each year, and what keywords have been used. 99 publications from a systematic literature review, were analyzed using the program 'R' and 'bibliometrix' package. The earliest publications were done by headhunters themselves, or periodical articles about them. The first academic paper coming out in 1965. A small group of researchers have been giving interest to this area however, the impact of this industry (executive search firms) make it an attractive field of research with ample future research opportunities.
- Title:** **NUCLEAR ENERGY: HOW COLORADO CAN BE THE LEADER TO TO A NEW FUTURE**
- Presenter(s):** Payton Tawater
- Type:** Poster
- Faculty Sponsor(s):** David Ludlam
- Abstract:** In Colorado there are those who believe we should be relying entirely on fossil fuels and those who believe renewable energy sources are the answer. Nuclear energy is the critical missing energy source in Colorado today. Nuclear energy has the ability to satisfy the renewable side by reducing emissions; while also appealing to the fossil fuel advocates because of the ability to produce reliable and affordable energy in Colorado. Colorado has the capability to extract large amounts of Uranium to produce nuclear energy. These Uranium deposits are plentiful and will provide the materials necessary for Colorado to start producing the nuclear energy. For Colorado to be the power behind this nuclear energy movement an infrastructure must be instilled to create this energy. The creation of nuclear powerplants are the necessary step to provide this overseen energy source. Growing up in Colorado has given me a unique perspective of the energy industry here in the state and this perspective has allowed me to show proof of why we need to invest our time and effort into nuclear energy.
- Title:** **THE POLITICAL INFLUENCE IN FEDERAL ENERGY DEVELOPMENT**
- Presenter(s):** Marc Farina
- Type:** Poster
- Faculty Sponsor(s):** David Ludlam
- Abstract:** Politics have a bigger impact on the development of federal lands than science. A careful assessment of energy development in the North Fork Valley will show how largely a political influence has delayed its progress. This thesis will show research consisting of local and federal government records, media reports, public comments, and local policy.

Title: THE RED LADY MINE AND RENEWABLE ENERGY
Presenter(s): Ryan Smallwood
Type: Poster
Faculty Sponsor(s): David Ludlam, Steven Soychak
Abstract: Numerous attempts have been made to re-permit and reopen the Red Lady mine in Crested Butte Colorado. The red Lady mine holds 132,448,972 metric tons of Molybdenum which makes it one of the largest reserve in the world. Activists successfully prohibited the reopening of the Red Lady mine and claimed it as an environmental victory. Molybdenum is a critical component of solar panels and batteries. This allows China the to create a Monopoly on Molybdenum production and distribution. The US is moving towards 100 renewable energy mandates which will in turn create a 100% reliance on a communist country. Reopening mines like the Red Lady will secure the electrical future for the USA.

Title: RELATIONSHIP BETWEEN EXECUTIVE SEARCH FOUNDERS AND MISSION STATEMENTS
Presenter(s): Ana Holguin
Type: Poster
Faculty Sponsor(s): Carlos Baldo
Abstract: Executive Search Firms or Head Hunters, are in part responsible for finding and placing high ranking and exceptional candidates for specialized positions around the United States as well as around the world. Although there is extensive literature on this service industry, this literature is mainly grounded on anecdotal evidence and practitioners, documents. Understanding how these firms operate and their strategies are essential to appreciate their contribution to business society. An approach to understanding this sector is analyzing these companies these companies, mission statements. Statements from 39 firms were analyzed using Voyant tools. The most common words in the statements were compared through a content analysis and through social network theory assumptions, to argue links between company founders. This research presents preliminary findings on communalities and differences between Executive Search Firm, mission statements and the founder, background.

Title: WATER IN COLORADO
Presenter(s): Soksereysofhal Dep, Alec Hostetler, Jocelyn Malpica
Type: Poster
Faculty Sponsor(s): John Snyder
Abstract: Colorado is both blessed and marred by extremes and water is no exception. The western slope has been described by George Bancroft as a world of water and a moonscape of land, whereas the front range is a world of land and a moonscape of water. This divide in environments hasn't changed through the years, but the needs of its population and economy have. With both sides vying for control of Colorado's water, often at each other's expense. This project aims to determine the relationship between where and how the water is used as Colorado has developed. With the goal of this information being used to better allocate and prepare for the future of both the land and people.

COMPUTER SCIENCE AND ENGINEERING

TRACK 4A

Title: 4H AUCTION DISPLAY
Presenter(s): Matthew Frankmore, Richard Hakes
Type: Oral
Faculty Sponsor(s): Warren MacEvoy
Abstract: The Auction display project brings together the best of productivity and ease of use to a stock show system. Every year the Mesa County Stock Show is held with records of sale being handwritten for each showing. This project allows volunteers and participants to easily record and track key information about the stock show. By having the current sale, previous sales, and upcoming participants displayed, the show can run more efficiently and effectively. This application provides an easy to use solution for the stock show that makes the yearly event much more enjoyable.

Title: COLORADO ADVENTURE TRAIL
Presenter(s): Aaron Gossage, Jariah Jaramillo, Brandon Story, Domonic Tafoya
Type: Oral
Faculty Sponsor(s): Warren MacEvoy
Abstract: The Western Slope of Colorado is home to many mountain bike trails. People who are new to the area may not know where to find these trails, or even general information about the nearby cities and towns. Is this trailhead near Fruita? Where is a good place to eat in Grand Junction? The Colorado Adventure Trail seeks to answer questions like these. This mobile application will feature information about the various mountain bike trails located near interesting towns and cities of western Colorado. Users can also view famous landmarks, popular restaurants, and other local attractions located within the towns themselves. Lastly, the app functions as a passport that users can stamp to verify that they have visited a location.

Title: FOODI
Presenter(s): Matthew Behnke, Emerson Flom, Bryn Loftness, Janina Pohorecki
Type: Oral
Faculty Sponsor(s): Warren MacEvoy
Abstract: A diverse selection of food can help enrich well-being and daily life; however, it has become increasingly overwhelming to select an option at a restaurant that is not the habitual choice. The Foodi mobile application aims to provide food recommendations tailored directly to the user's taste that are based on trends gathered from previous meals, experiences, and ingredients. With the Foodi app, users will have a better insight of their palette and feel comfortable expanding their dining options.

Title: GVVUA DIGITAL WATER REQUESTS
Presenter(s): Jacob Cline, Brieana Molinarik,
Type: Oral
Faculty Sponsor(s): Warren MacEvoy
Abstract: The Colorado River is undoubtedly one of the most vital resources for Mesa county and its surrounding areas. The Grand Valley Water Users Association helps regulate and protect this resource by distributing irrigation water in one of the 6 irrigation districts within the area. Currently, water users complete paper cards and return them to dropboxes in order to create a water request. Ditch riders, who relay these requests, collect the cards at these drop boxes. Our web application enhances this system by providing a digital interface that water users can access on their mobile device. From this interface they can submit their requests digitally, taking away the need to return to a dropbox location. The application aims to increase the amount and accuracy of these water requests.

Title: OMNIKEY CARD READER
Presenter(s): Jacob Lambdin, Ethan Ruiz, Jonah Simon, Michael Tacker
Type: Oral
Faculty Sponsor(s): Warren MacEvoy
Abstract: There are many different forms of key card locks for keeping buildings secure. One is known as Mifare Classic, a card commonly used in buildings. To read or write a card, a unique authentication key is required. In general, the only way to do this is to use expensive proprietary software. Our goal is to write an app in javascript and C++, that will allow users to read and write to cards that are compatible MiFare Classic. This app will read the cards with an Omnikey 5022 reader that connects to the USB port.



Title: ORCA APPLICATION
Presenter(s): Andrew Piechota
Type: Oral
Faculty Sponsor(s): Warren MacEvoy
Abstract: The objective of my project is to create a program called Orca that will bridge proprietary and open source geospatial data. I am working for and alongside a local geographic information system (GIS) company, Kaart. This will involve creating an extension of an open-source editor for OpenStreetMap called iD to allow entering and storing of proprietary data. The iD editor was chosen because it is an intuitive platform that is hosted on a browser to maximize usability and in effort to reach a wide audience. The project consists of two parts: design of a user interface for inputting GIS data, and the implementation of a database to securely host and manage the data. When complete, my program will enable companies to manage all of their geospatial data on a single platform.

COMPUTER SCIENCE AND ENGINEERING

TRACK 4B

Title: AUTOMATED DYE DISPENSING SYSTEM
Presenter(s): Kaitlyn Knight, Derek Oakley, William Somerville
Type: Engineering
Faculty Sponsor(s): Christopher Penick
Abstract: Innovative Textiles, a company located in Grand Junction, Colorado, produces PowerPro, a premium quality braided fishing line. During production, PowerPro fishing line goes through a manual coloration process that is labor-intensive and produces significant color variation in the finished product. A team of senior mechanical engineering students designed and fabricated an automated dye dispensing machine capable of handling five liquid components to reliably produce the company's Moss Green color. The machine is capable of automatically dispensing and mixing four colors and acetone with an error of less than 0.1 pounds per constituent.

Title: BICYCLE RIM BAKING RACKS
Presenter(s): Luke Caires, Alain De la Bastide, Gregory Gonzales
Type: Engineering
Faculty Sponsor(s): Christopher Penick
Abstract: DT Swiss is a bicycle wheel manufacturer with manufacturing facilities in Europe, Asia, and the United States. The Grand Junction facility produces high-end bicycle wheels and distributes them throughout the United States and South America. In the wheel building production line, decals with the company's logo are applied to each wheel rim. After the decals have been applied to the rims, they are then baked at 150°C. Currently, the rack used for this process holds 60 rims. A team of senior mechanical engineering students designed a new rack to hold 80 rims of various sizes to increase the rate of wheel manufacturing.

Title: ENGINEERED APPLICATOR DEVICE (EAD) FOR BIODEGRADABLE STARCH SOLUTION USED IN GRAFFITI REMEDIATION
Presenter(s): Ethan Davis, Kassisi Day, David Hale, Dylan Hallett
Type: Engineering
Faculty Sponsor(s): Christopher Penick
Abstract: The United States has over 400 beautiful, culturally important, and inspiring sites within its National Parks. However, vandalism threatens these protected lands, and one of the most destructive types is spray-painted graffiti. Current graffiti remediation methods can leave a site permanently scarred. A proprietary starch solution was developed by a team of Colorado Mesa University (CMU) chemistry students that is 90% effective at removing paint from rock surfaces. The product is biodegradable, environmentally friendly, and effective within a few hours of application. A team of undergraduate senior engineering students has teamed up with the chemistry team to design and develop an Engineered Applicator Device (EAD) that can mix, transport, and apply the starch solution to vandalized areas. The EAD is self-contained, lightweight, and portable so it can be easily carried by park rangers to remote locations. The benefit of this project to the broader engineering technology community is to encourage engineers to apply their knowledge to the well-being and preservation of nature and pursue developing products that encourage sustainability.

Title: FHE SENIOR DESIGN PROJECT
Presenter(s): Cody Hedrick, Jeremy Seeyava, Jackson Shaw
Type: Engineering
Faculty Sponsor(s): Christopher Penick, Nathan McNeill
Abstract: FHE is a company in Fruita, Colorado, that specializes in pressure control systems for the oil and gas industry. FracLock is the most recent innovation that connects surface equipment to wellheads via remote control. A FracLock unit takes several technicians' multiple days to assemble. With components in the assembly weighing up to 1800 lb, it is necessary to use devices like the overhead crane that spans the length and width of FHE facility. Other departments also use the overhead crane for their lifting needs, leading to delays in the FracLock assembly process while waiting for overhead crane availability. FHE asked the design team to eliminate dependency on the overhead crane during the FracLock assembly process to improve assembly time. The team also identified a second opportunity to optimize assembly time. A 2-in-1 piston assembly build/test stand that allows technicians to build and test FracLock piston subassemblies in a method that prevents part damage currently occurring during assembly. These optimizations improve the efficacy of the FracLock assembly process while keeping quality of the product and the safety of the workers a priority.

Title: MET DESIGN PROJECT 2
Presenter(s): Diana Montes, Caitlin Torgerson, Gregory Waldorf, Dakota Yourkowski
Type: Engineering
Faculty Sponsor(s): Christopher Penick, Nathan McNeill
Abstract: Waterwheels have been used for thousands of years for different tasks such as crushing grain and powering farms. Like many inventions, waterwheels have been improved over time to increase efficiency. The purpose of this project was to provide a new addition to the water exhibit in Eureka! McConnell Science Museum. The two designs selected for this new exhibit to demonstrate efficiency are an undershot wheel and an overshot wheel. Power output and relative efficiency of these wheels are represented by LED light strips on each wheel. Water flow to each wheel will be easily manipulated by museum visitors using current components of the exhibit to increase or decrease the flow of water to each wheel. The LED light strips will indicate the power produced by each wheel. It is important to the designers that the exhibit is educational and easy to understand for all ages.

Title: RESIZABLE 3-D PRINTER ENCLOSURE TO CONTAIN AEROSOL EMISSIONS THAT ARE HARMFUL FOR THE HUMAN BODY (CU BOULDER - VANCE LABS)
Presenter(s): Alan Carrasco, Trey Lambrecht, Lane Sanders
Type: Engineering
Faculty Sponsor(s): Christopher Penick, Nathan McNeill
Abstract: The purpose of this project was to design and manufacture a re-sizable 3-D printer enclosure. The design targets 3-D printers that employ the Fused Deposition Modeling (FDM) technique, which produces significant amounts of harmful aerosol emissions that lead to the degradation of indoor air quality. There are enclosures on the market which capture harmful emissions, but the majority of enclosures only accommodate specific printer models. The implementation of nested aluminum tubing allows the enclosure designed by our team to resize into a minimum and maximum volume of 8 ft 3 and 27 ft 3 , respectively. Acrylic panels attach to the aluminum frame and slide along each other when the enclosure size is changed. The enclosure includes a filtration system that houses an activated carbon and HEPA filter that captures 90% of the number concentration of aerosol emissions within the enclosure. The enclosure accommodates 95% of common tabletop 3-D printers.

Title: SEMI-AQUATIC CONTINUOUSLY ROVING UTILITY BOT (S.C.R.U.B.)
Presenter(s): Jacob Doose, Seth Mewhinney, Josiah Wilson, Isaac Zepeda,
Type: Poster
Faculty Sponsor(s): Christopher Penick
Abstract: Ute Water Conservancy District is a water utility company that delivers water across the Grand Valley. With a mission statement of providing only the highest quality water to their clients, this project was created to uphold that promise. Currently, the company faces a problem with its inclined plate settler assemblies accruing sediment and algae. These assemblies assist in the sedimentation phase at the treatment plant. The company must partially shut down a settling pond to clean each assembly, which is both labor intensive and costly. The purpose of this project was to design and fabricate an automated device that removes this buildup without shutting down a settling pond. To avoid the partial shutdown the project meets the following criteria: autonomous, lightweight, and waterproof. A team of senior mechanical engineering students designed and built a robotic device to remove buildup from plate

settler assemblies. The Semi-Aquatic Continuously Roving Utility Bot (S.C.R.U.B.) utilizes a combination of both brushes and UVC LED lights to remove sediment and algae from each plate assembly.

Title: **SHOCK-ABSORBING DYNAMOMETER FOR THE M320 GRENADE LAUNCHER**
Presenter(s): Montgomery Carlo, Tanner Mast, Courtney Powell
Type: Engineering
Faculty Sponsor(s): Christopher Penick
Abstract: Capco is a company in Grand Junction, Colorado that manufactures the M320 grenade launcher for the U.S. Armed Forces. When this firearm is fired, the recoil force is significant enough that an operator is limited to 25 rounds a day. To increase the number of rounds a soldier can fire in a day, Capco is prototyping new buttstock designs that decrease the maximum recoil force experienced by an operator when firing the launcher. The purpose of this project is to design and fabricate a test stand to measure recoil force and displacement as a function of time when the launcher is fired with prototype buttstocks and the currently issued buttstock. The damping coefficients of each buttstock will be calculated from the collected data to determine which buttstock transmits the smallest force when the launcher is fired. The dynamometer will be used by Capco to make design improvements for future buttstock prototypes.

Title: **WALKER PRODUCTS MASS-AIR-FLOW SENSOR FLEX/CONTINUITY TEST APPARATUS**
Presenter(s): Tristan Bina, William Brown, Caleb Ealey
Type: Engineering
Faculty Sponsor(s): Christopher Penick, Nathan McNeill
Abstract: This project encapsulates the design and fabrication of a mass-air-flow sensor flex/continuity test apparatus for Walker Products. Walker Products has been in business since 1946 designing and manufacturing OEM (Original Equipment Manufacturer) and aftermarket fuel system components and engine management sensors. Some of the many parts manufactured by Walker Products in their Grand Junction facility are mass-air-flow sensors that departments also use the overhead crane for their lifting needs, leading to delays in the FracLock assembly process while waiting for overhead crane availability. FHE asked the design team to eliminate dependency on the overhead crane during the FracLock assembly process to improve assembly time. The team also identified a second opportunity to optimize assembly time. A 2-in-1 piston assembly build/test stand that allows technicians to build and test FracLock piston subassemblies in a method that prevents part damage currently occurring during assembly. These optimizations improve the efficacy of the FracLock assembly process while keeping quality of the product and the safety of the workers a priority.

COMPUTER SCIENCE AND ENGINEERING

TRACK 4C

Title: **MONUMENT ROAD BICYCLE TRAIL PHASE II**
Presenter(s): Eric Berg, Emma Gardner, Thorsen Milton, Jacob Welton-Kubeczko
Type: Engineering
Faculty Sponsor(s): Joel Sholtes
Abstract: The City of Grand Junction plans to extend the recently constructed Monument Road Bike Trail to connect the Lunch Loop trail-head with an existing bike trail on South Camp road. When this section is complete the trail will form a loop that provides miles of biking trails. The City wants to encourage riders on the trail thus the social impacts of design are a significant consideration. This design project presents the design of the proposed trail alignment, as well as an engineering cost estimate. An alternatives analysis considered different alignments and crossings with respect to safety to trail users, cost of construction, maintenance concerns, ease of use, flood hazards, and property owners. These criteria were used to select an alignment, as well as water conveyance structures. The project deliverable includes preliminary design drawings and calculations. The final deliverable to the City will include details of stream crossings, a cost estimate, grading plans, alignment plan and profiles, and cross sections of trail.

Title: **CULVERT REPLACEMENT**
Presenter(s): Tabatha McCombe, Aaron Morrison, Kerry Ribbens, Rachel Wall
Type: Engineering
Faculty Sponsor(s): Joel Sholtes
Abstract: The purpose of this project is to redesign a culvert on Highway 340 near Fruita, Colorado. Culverts are designed to decrease future flooding problems near transportation infrastructure while still allowing the passage of water and animals. This allows for a natural flow path to be maintained within a controlled

environment. This project is in partnership with the Colorado Department of Transportation (CDOT) and aims to improve an existing culvert for maintenance, transportation safety, sustainable infrastructure, and animal passage. To accomplish this, hydrologic flow analyses, alternative design options, and a cost analysis for the chosen design have been conducted. Alternative designs included complete replacement, slip-lining, direct repair, and cured-in-place designs. This project includes permitting, regulatory research, environmental, sustainability, right-of-way, utility, and transportation factors that will contribute to the project construction timeline and cost. A 30% project design will be completed for CDOT by May 2020. This will include hydrologic analyses, transportation research, utility investigations, cost estimate, and chosen alternative design.

COMPUTER SCIENCE AND ENGINEERING

TRACK 4D

- Title:** CONSTRUCTING AN ACCESSIBLE LOW-BUDGET STRESS DETECTION BIOSENSOR
Presenter(s): Bryn Loftness
Type: Oral
Faculty Sponsor(s): Michelle Mellenthin, Karl Castleton
Abstract: Currently, biosensor research identifying stress through physiological responses is completed with state-of-the-art sensors comprised of high-quality and high-price materials. These projects are generating substantial results and noteworthy findings. However, replication and production of low-budget versions of these high-grade stress detection tools for use of the general public is lacking. This project aims to explore this gap through the development of a proof-of-concept device comprised of three economical, accessible sensors: a galvanic skin response (GSR) sensor for measuring electric resistance, an electromyography (EMG) sensor for measuring muscle stimulation, and a photoplethysmography (PPG) pulse sensor. Using this prototype device, pilot data of physical responses was collected and analyzed during exercise, which is a fundamental form of stress on the body.
- Title:** PYGOAT - A WEBAPP HACKING EDUCATION FRAMEWORK
Presenter(s): Sean Apsey, Taylor Bradshaw, Lucas Walgren
Type: Oral
Faculty Sponsor(s): Warren MacEvoy
Abstract: Both developers and students alike could benefit from learning web application security. However, it can be difficult for the average person to get their hands on a full blown web application that they can test for vulnerabilities. Web application security tools exist, but the most popular ones (WebGoat, NodeGoat, etc.) are based in more enterprise-friendly languages like NodeJS and Java. This makes writing lessons about additional vulnerabilities quite the challenge. Python is one of the most commonly used languages among security professionals and, to the best of our knowledge, no Python-based web app education frameworks have been created yet. We intend to fill this void with PyGoat - a collection of web app vulnerabilities that has a focus on Python security flaws. We also want to make writing more lessons about new and upcoming vulnerabilities as painless as possible with simple config files. The end result will be an easily accessible, deliberately insecure web application that anyone can learn from.
- Title:** SNOWBALL SWEEPSTAKES WEBSITE FOR THE ROTARY CLUB OF GRAND JUNCTION
Presenter(s): Jeana Althea Altura, Zachary Romano, Christie Thammavong
Type: Oral
Faculty Sponsor(s): Warren MacEvoy
Abstract: Grand Junction's Rotary Club is a non-profit organization consisting of members of the community dedicated to give back to others. The Rotary Club conducts a Snowball Sweepstakes every year. This sweepstakes allows other local organizations to fund raise by selling tickets to the community. All tickets sold will be entered into a raffle in which snowballs are rolled down the mountain to create winning number combinations. Due to the global increase of web purchases the club wishes to modernize this event by moving from paper ticket sales to online sales. We created a new website for the club that allows administrators to add and delete database information while also allowing organizations to lead their customers to purchase tickets online. Those who are not tech savvy are still able to purchase physical tickets and not be left out of the fun. The website also provides basic information about the club and their event. The creation of this website makes it convenient for customers organizations and the club due to its automation of previously manual tasks.

- Title:** **ANTIDEPRESSANT USE IN PREGNANCY RELATED TO ADHD IN CHILDREN**
Presenter(s): Brandon Castinado, Zoey Cleveland, Caitlin Murray, Anna Swelstad
Type: Poster
Faculty Sponsor(s): Lucy Graham
Abstract: The purpose of this evidence-based project (EBP) is to understand how nurses can better educate pregnant women on the relationship between certain medications and the development of ADHD in children. The PICO question that guided this project is: In pregnant women, how does the use of antidepressants and anxiolytics, compared to no use, affect a child's likelihood of developing ADHD before adolescence (age 12)? The topic was selected because maternal antidepressant and anxiolytic use and the long-term effects on children is an issue that has received limited attention. Four students formed a group based on a shared interest to complete the EBP as a part of our Nursing Research course. We will use the Iowa model to guide our project. The project's goal is to analyze evidence-based studies to answer the PICO question and determine best practices for nurses regarding education for pregnant and child-bearing-aged women. Based on our findings, we will recommend strategies for educational programs and an evaluation plan to assess efficacy of the intervention. Implications for nursing practice will be shared through the professional showcase at Colorado Mesa University.
- Title:** **ANXIETY AND DEPRESSION AMONG UNDERGRADUATE NURSING STUDENTS: AN EVIDENCE-BASED PROJECT**
Presenter(s): Gregory Nuanes, Brittany Plateroti, Skyler Tait, Sydney Tuttle,
Type: Poster
Faculty Sponsor(s): Lucy Graham
Abstract: The purpose of this evidence-based project is to investigate levels of anxiety and depression in undergraduate nursing students compared to students in other academic programs. We will make recommendations for nursing students and nursing programs based on our findings. The PICO question that guided this project is: Do nursing students have an increase in anxiety and depression due to their academic stress compared to the general university student population? The group project topic was selected because each member of our group has experienced an increase in anxiety and depression since starting the nursing program. This project is completed as part of our Nursing Research course. The Iowa model will guide this project. The goal of the literature review will be to identify 10 articles from scholarly sources while addressing limitations and levels of evidence for each article. Retrieved articles and results will be synthesized to relate this topic to nursing practice and education and determine implementation strategies related to our PICO question. Implications for how nursing practice will be affected or improved will be shared at the Student Showcase using a poster presentation.
- Title:** **ARE POSTPARTUM WOMEN RECEIVING ENOUGH PATIENT EDUCATION AND FOLLOW UP CARE?**
Presenter(s): Jamie Buttermore, Melissa Eagen, Emily Holder, Lindsey Latchaw
Type: Poster
Faculty Sponsor(s): Erin Donovan
Abstract: A lack of research related to fertility issues, hormone therapy, and prolonged postpartum effects became evident, as did the lack of basic postpartum education provided to women regarding their own health and well-being. This gap in postpartum education shifted our focus and purpose. The purpose of this project was to investigate the amount of patient education prenatal, at discharge, and postpartum, with regards to postpartum symptoms, to determine their educational needs in order to make recommendations for healthcare practice. The Iowa Model of Evidence-Based Practice to Promote Quality Care was used. Literature obtained through the CINAHL, Cochrane, Google Scholar, and Medline databases resulted in 13 articles being utilized. The studies included three systematic reviews, two meta-analysis, four quantitative studies, two qualitative studies, and two peer reviews. Information from the literature showed that postpartum women were not always sure what was considered abnormal symptoms. It was recommended to individualize postpartum care plans, provide multiple assessment methods, and pre-schedule follow-up visits. Changes in insurance coverage and legislation may be required. Postpartum concerns demonstrate a need for increases in patient education and services. Research needs to continue with larger sample sizes, hormone therapy and postpartum effects, and more information on post delivery expectations.

Title: **BARRIERS TO BREASTFEEDING AND NURSING INTERVENTIONS**
Presenter(s): Lynzi Doke, Kirsten Haas, Amanda Hardy, Fabiolo Gutierrez Barbosa
Type: Poster
Faculty Sponsor(s): Lucy Graham
Abstract: The purpose of this evidence-based project is to identify barriers women encounter that prevent them from breastfeeding for 6 months or longer and to make recommendations for nursing practice. The PICO question guiding this project is: In postpartum women who did not breastfeed for 6 months or longer, what were the barriers they encountered versus women who did breastfeed for 6 months or longer? The project topic was selected because research shows that breastfeeding is the most beneficial mode of nutrition for newborns, but there are still many women who do not breastfeed for the suggested 6 months. Four nursing students chose the topic due to shared interest in maternal/child health and are completing this project in partial fulfillment of the Nursing Research course. The Iowa model will guide this project. The goal of the literature review will be to identify high-quality evidence related to our PICO question to help inform an intervention that may reduce barriers to breastfeeding. Results will be synthesized to determine what allowed women to be successful in breastfeeding and what barriers were identified. Recommendations and implications for nurses will be discussed when the project is shared through a poster presentation.

Title: **DECREASING MATERNAL MORTALITY RATES AMONG RURAL WOMEN OF COLOR IN THE U.S.: WHAT NURSES CAN DO**
Presenter(s): Genevieve Bleary, Megan Edwards, Deborah Foster, Brei McQuivey
Type: Poster
Faculty Sponsor(s): Lucy Graham
Abstract: The purpose of this evidence-based project is to learn about what nurses can do to help decrease the maternal mortality rates for women of color in the U.S. Through this research, we will make recommendations for improvements in nursing practice. The PICO question that guided this project is: Is the maternal death rate for rural women of color decreased for those receiving enhanced education on prenatal care and preventative services compared to those who are not receiving those services? The group project topic was selected because a high maternal mortality rate is a nationwide problem and maternal mortality rates are rising in women of color in the U.S. Four students chose to work together because of a mutual interest in the topic. We will use the Iowa Model to guide our project as part of our Baccalaureate Nursing Research course. The goal of the literature review will be to find 10 scholarly articles that relate to our PICO question. Retrieved articles and results will be synthesized to help inform holistic recommendations for nursing practice. Based on the recommendations, an intervention will be suggested to help local nurses decrease maternal mortality rates for rural women of color.

Title: **EFFECTS OF SOCIAL MEDIA ON CHILDHOOD/ADOLESCENT OBESITY**
Presenter(s): Miranda Garduno, Wyatt Roy, Kelsey Stroud
Type: Poster
Faculty Sponsor(s): Erin Donovan
Abstract: The purpose of this evidence-based project is to determine which teaching platform is the most influential in helping treat children and adolescents who are obese and to make recommendations for implementation into nursing practice. The PICO question that guided this project is: In children and young adolescents who are obese, how does the teaching platform affect the treatment of their obesity? The group project topic was selected because childhood and adolescent obesity is a growing concern in our society. Various platforms can have beneficial or consequential influences on these individuals who are obese. The Iowa Model of Evidence-Based Practice to Promote Quality Care will guide this project. The goal of the literature review will be to find evidence on the importance and best strategies for the treatment of childhood and adolescent obesity. Retrieved articles will be used to compare and contrast various teaching platforms to identify best strategies. Results will be synthesized to determine



which teaching platform is the most beneficial in the treatment of childhood and adolescent obesity. Implications for the recommendation and how nursing practice will be affected or improved will be displayed.

Title: HUMAN TRAFFICKING IN NURSING

Presenter(s): Alexa Bester, Elizabeth Lessard, Rebekah Nordstrom, Sydney Silverman

Type: Poster

Faculty Sponsor(s): Erin Donovan

Abstract: The purpose of this evidence-based project is to identify in the nursing population how education of human trafficking can affect the nurse ability to identify a victim of human trafficking and to make recommendations for implementation into nursing practice. The PICO question that guided this project is: In the nursing population, how does education on human trafficking affect successful identification of human trafficking victims? The group project topic was selected because each member of the group agreed that human trafficking is prevalent in today's society and we want to incorporate it in clinical nursing practice. The Iowa Model of Evidence Based Practice will guide this project. The goal of the literature review is to evaluate articles using statistical and clinical evidence to formulate future interventions. Retrieved articles will guide this project in potential nursing practice methods to include in human trafficking education. Results will be synthesized from the available literature to determine ways that education on human trafficking can be included in courses for nurses, both entering the field and those already a part of it. Implications for the recommendation and how nursing practice will be affected or improved will be presented.

Title: INFLUENCE OF SOCIOECONOMIC STATUS ON PREGNANCY OUTCOMES

Presenter(s): Emily Bricker, Natalie Rivera Castro, Vanessa Diaz, Victoria Goss

Type: Poster

Faculty Sponsor(s): Erin Donovan

Abstract: The purpose of this evidence-based project is to increase awareness of health disparities among pregnant women of different socioeconomic statuses, and to make recommendations for implementation into nursing practice. The PICO question that guided this project is: Are women of lower socioeconomic status, compared with those of higher socioeconomic status at higher or lower risk for complications during pregnancy? This topic was selected because there are obvious health disparities between socioeconomic statuses. We are interested in learning how socioeconomic status influences one's risk of developing complications during pregnancy. The Iowa Model of Evidence-Based Practice to Promote Quality Care will guide this project. The goal of the literature review will be to use scholarly sources that provide evidence-based information to make recommendations for nursing practice. Articles will be used to formulate interventions to minimize possible disparities among pregnant women. Results will be synthesized from the literature to determine if there are significant risks to those of lower socioeconomic statuses. Health care professionals may need to be educated on the issue and implement new strategies for educating and caring for this population. Implications for the recommendation and how nursing practice will be affected or improved will be shared.

Title: INFLUENZA VACCINE IN SCHOOL-AGED CHILDREN

Presenter(s): Stephanie Fernandez, Daisy Ordonez, Mykalah Overholt, Shirin Shashova

Type: Poster

Faculty Sponsor(s): Erin Donovan

Abstract: The purpose of this evidence-based project is to determine what the influencing factors are for parents when deciding to vaccinate their children for influenza. This information will be used in order to provide guidance and recommendations for implementation into nursing practice. The PICO question that guides this project is: In parents of school-aged children, what are the influencing factors for vaccinating their children against influenza or not? Many people contract influenza each year and the death toll continues, even with the influenza vaccination. This evidence-based practice project is aimed at discovering and making suggestions for practice regarding this topic. The Iowa Model of Evidence-Based Practice to Promote Quality Care guided this project. The goal of the literature review will be to assess influencing factors behind vaccinating children or not and the role of the nurse in providing education. Recommendations will be developed based off of the literature. Implications for the recommendation and how nursing will be affected or improved will be shared.

Title: IT'S MORE THAN JUST CONDOMS AND BANANAS: HOW NURSES CAN IMPROVE REPRODUCTIVE HEALTH IN ADOLESCENT POPULATIONS
Presenter(s): Kristin Legate, Rian Mahaffey, Madison Starbuck, Michael Wallendorff
Type: Poster
Faculty Sponsor(s): Lucy Graham
Abstract: The purpose of this evidence-based project (EBP) is to evaluate current literature specific to nurse-led education about sexual health and the impact on adolescents. The PICO question that guides this project is: In adolescents between the ages of 10 and 16 years, does nurse-led education about sexual health lead to better health outcomes, such as lower rates of STIs and unintended pregnancies, compared to other types of education about sexual health? The topic was selected because of the group's combined interest in sexual reproductive health in adolescents as an important way to improve overall public health. The project is being completed as part of our Nursing Research course. The Iowa model will guide this project. The goal of the literature review will be to search the literature for a variety of credible articles related to our topic. Retrieved articles will be used to summarize recommendations and findings to inform an intervention that could address our PICO question. An evaluation plan and relevance to nursing practice will be discussed as a part of the EBP poster presentation.

Title: POSTPARTUM DEPRESSION AND MODE OF DELIVERY
Presenter(s): Mackenzie Bieker, Amelia Conti, Julia Davenport, Jordan LaGree
Type: Poster
Faculty Sponsor(s): Erin Donovan
Abstract: The purpose of our evidence-based project about postpartum depression and mode of delivery is to review literature and to make recommendations for implementation into nursing practice. The PICO question that guided this project is: Are mothers (P) who deliver their babies via cesarean section (I) more likely to develop postpartum depression (O) than mothers who deliver via vaginal birth (C)? The group project topic was selected because many women experience postpartum depression and as nurses it is important to know any risk factors and recommendations for practice. The Iowa Model of Evidence-Based Practice to Promote Quality Care guided this project. The goal of the literature review will be to investigate previous literature on the topic and look for similarities and differences between studies. Retrieved articles will be used to make recommendations for nursing practice and/or identify risk factors for the development of postpartum depression. Results will be synthesized from the available literature to determine if the mode of delivery impacts the risk of postpartum depression. Implications of the recommendations and how nursing practice will be affected or improved will be shared.

Title: STOP: PATIENT SAFETY AT RISK AHEAD
Presenter(s): McKenzie Blackwell, Brooke Hahn, Raquel Ruhme, Camryn Sanchez
Type: Poster
Faculty Sponsor(s): Lucy Graham
Abstract: The purpose of this evidence-based project is to identify how certain understaffed nursing units have been able to maintain patient safety while others have not and to make recommendations for implementation into nursing practice. The PICO question that guided this project is: How do understaffed nursing units with poor patient safety outcomes compare to understaffed units with adequate patient safety outcomes in acute care settings? The topic was selected because understaffing is a prevalent nursing issue that can affect patient safety. This project will be completed as part of our Nursing Research course. The Iowa model will guide this project. The goal of the literature review will be to identify 10 scholarly articles that assess acute care settings, understaffed nursing units, and differing patient safety outcomes. Retrieved articles will be used to answer the PICO question and guide recommendations and possible interventions. Results will be synthesized from the available literature to determine best practices that will increase patient safety outcomes in understaffed acute care settings. Implementation and evaluation methods will be discussed in the final project. Implications for how nursing practice will be affected or improved will be shared in a poster presentation.

Title: SUICIDE PREVENTION TRAINING IN SCHOOL-AGED CHILDREN
Presenter(s): Jaclyn Bodwin, Carrie Garcia, Rachel Lawrence, Sarah Nwagwu
Type: Poster
Faculty Sponsor(s): Erin Donovan
Abstract: The purpose of this evidence-based project is to determine the efficacy of suicide prevention programs in school aged children grades 6-12 and to make recommendations for implementation into nursing practice. The PICO question that will guide this project is: In school aged children grades 6-12 how does suicide prevention training compared to no training affect suicide rates. The group project topic

was selected because suicide is prevalent in the community and one of the leading causes of death. The Iowa Model of Evidence-Based Practice to Promote Quality Care will guide this project. The goal of the literature review will be to determine what is the best evidence-based practice for suicide interventions in school aged children. Results will be synthesized from the available literature to determine if suicide prevention training lowers suicide rates. Implications for the recommendation and how nursing practice will be affected or improved will be shared.

Title: ALCOHOL & ATHLETICS: EXAMINING THE EXPANSION OF ALCOHOL SALES AT COLORADO MESA UNIVERSITY
Presenter(s): James Moore
Type: Oral
Faculty Sponsor(s): Sean Phelps, Sloane Milstein
Abstract: Nationwide, athletic departments forced to cut programs due to a lack of funding. In efforts to prevent this, students may notice new student fees and an increased cost of tuition (Joyce, 2019). The purpose of this project is to determine if selling alcohol to adult spectators during home athletic contests would be a valuable source of income for the Colorado Mesa University (CMU) athletic department. This is an exploratory study for current CMU administrators. In addition to the possible increased income produced from the alcohol sales themselves, the promoting of the general public now being able to purchase alcohol at games could also lead to increased attendance, resulting in additional ticket and concession sales. This project will also compare and contrast data from other universities to see if selling alcohol to the general public during sporting events limits binge drinking and the positive or negative consequences that result from it. Questionnaires will be sent to athletic administrators who are employed at institutions affiliated with the Rocky Mountain Athletic Conference (RMAC). Preliminary results will be available for the showcase, pending the responses to these surveys.

Title: ASSESSMENT OF MITOCHONDRIAL FUNCTION VIA BLOOD LACTATE RESPONSE TO EXERCISE
Presenter(s): Annie Osbourn
Type: Poster
Faculty Sponsor(s): Carmine Grieco
Abstract: Mitochondria, which are responsible for energy creation via aerobic respiration play an important role in human health and physical performance. Aerobically fit individuals have a higher mitochondrial mass than unfit populations. Similarly, those who are aerobically fit have lower lactate response during submaximal exercise than those who have lower levels of aerobic fitness. Lactate is a by-product of exercise and can be measured via whole blood by a device similar to a blood glucose meter. It has recently been demonstrated that blood lactate response to exercise is a marker of mitochondrial function. The original study establishing the proxy relationship between lactate response to exercise and mitochondrial function used a graduated exercise testing protocol designed for very fit populations. The purpose of this study is to compare a modified (i.e. shorter) protocol to the original (i.e. longer) protocol. The modified protocol involves 5 minute stages and resistance increments that are normalized to fat free mass. We hypothesize that our modified protocol will yield the same lactate response to exercise as the original protocol. Results of the present study may provide an alternative method to assess blood lactate response to exercise that is more appropriate for less aerobically trained populations.

Title: A COMPARISON OF RIGID-CORE FOAM ROLLING AND NON-FOAM ROLLING IN REGARDS TO THEIR EFFECT ON LOWER EXTREMITY FLEXIBILITY AND POWER
Presenter(s): Juli Connolly, Megan Schluckebier
Type: Poster
Faculty Sponsor(s): Brent Alumbaugh, Michael Reeder
Abstract: Foam rolling has been shown to increase joint flexibility. There is debate on whether increased joint flexibility will improve characteristics related to vertical jump performance, specifically momentum. Purpose: To determine the effect that pre-activity glute, hip, and lower limb rigid-core foam rolling has on hip and knee flexibility and vertical jump performance, specifically related to momentum during a vertical jump launch in Division II male and female collegiate athletes. Methods: Twenty Colorado Mesa University's student athletes will be recruited. Subjects will be randomly divided into groups of foam rolling (A) and non-foam rolling (B). Both groups will follow a warm up video. After warm up,

group A will perform the foam rolling intervention with subsequent ROM measurements while group B will immediately be measured for ROM of hip and knee. Both groups will then perform a vertical jump on the force plates. Hypothesis: We hypothesize that foam rolling will increase ROM and improve momentum during a vertical jump test.

Title: **CONCUSSION AND RETURN TO LEARN ACCOMMODATIONS**
Presenter(s): Megan Kennedy
Type: Poster
Faculty Sponsor(s): Jeremy Hawkins
Abstract: Scenario: An individual suffering from a concussion will often have trouble returning to the classroom environment during recovery because of the symptoms experienced with a concussion and the time that it takes for the brain to heal. Academic accommodations can be given to support these individuals during this transition. Question: Do academic accommodations increase a person's readiness to return to class while recovering from a concussion? Key findings: Those who are diagnosed with a concussion experience greater academic dysfunction at one-week and one-month post diagnosis. Of those diagnosed, only 45% were receiving accommodations at one-week post injury and 31% were using accommodations at the one-month mark. For those that did seek accommodations different levels of support can be provided. To give a student all the necessary tools to succeed they must work in collaboration with educators, administrators, and health care providers to establish an individual plan. The individual plan to return to previous academic level cannot be time based. Bottom line: By providing students suffering from a concussion with academic accommodations to match their individual needs they are more prepared for the eventual return to the classroom.

Title: **EFFECT OF ABDOMINAL TENSIONING ON MAXIMAL GRIP STRENGTH**
Presenter(s): Chadd Gray
Type: Poster
Faculty Sponsor(s): Michael Reeder, Brent Alumbaugh
Abstract: Abdominal tensioning is a strengthening technique frequently applied during rehabilitation exercises. Drawing in (DI) is a common abdominal tensioning technique that utilizes breathing to help activate the abdominal muscles and more specifically, the transverse abdominis (TA) to a greater extent as the TA assists in breathing. The DI technique has been shown to improve abdominal activation and coordinated muscular support of the trunk (Kim & Lee, 2017) (Boyle, Olinick & Lewis, 2010). The purpose of our study was to determine if abdominal tensioning would have an effect on a distal area by observing the effects on maximal grip strength (MGS). We hypothesized that performing a grip strength test while activating the abdominals with the DI technique would increase MGS through increased motor unit recruitment. Eleven participants completed the study. Each subject performed two control (CON) and two experimental trials. Participants performed the CON and experimental trials twice with breaks between each trial for both dominant and nondominant hands. Results demonstrated no significant difference in MGS between the CON and experimental trials, with a p-value of 0.60. In conclusion, our results indicate that using the DI technique while performing a grip strength test does not increase MGS.

Title: **THE EFFECT OF ANKLE BRACES ON EMG AND VERTICAL JUMP DURING A VOLLEYBALL APPROACH JUMP**
Presenter(s): Caitlin Sander
Type: Poster
Faculty Sponsor(s): Brent Alumbaugh, Gannon White
Abstract: PURPOSE: To determine whether there is a difference in surface electromyography (EMG) during the landing phase of a volleyball approach jump in addition to if vertical jump is affected with and without the T2 active ankle brace in division II volleyball players. METHODS: Muscle activation was assessed using surface EMG for the tibialis anterior, soleus, lateral gastrocnemius, and medial gastrocnemius between two conditions: no ankle brace and the T2 brace. The subjects completed maximum vertical jumps in both conditions and EMG data were normalized using maximum voluntary contraction for each muscle. RESULTS: Ankle braces did not have significant differences on surface EMG in the soleus, lateral gastrocnemius, and medial gastrocnemius ($P > 0.05$), but did have a significant increase in activation for the tibialis anterior ($P = 0.016$) when compared to no ankle brace. No significant differences were observed in vertical jump height between the conditions. CONCLUSION: The T2 brace only significantly altered the surface EMG of the tibialis anterior. Additionally, there were no changes in vertical jump height suggesting ankle braces do not negatively affect vertical jump height performance. Therefore, athletes who choose to wear ankle braces as a prophylactic measure shouldn't be concerned with jumping performance when wearing them.

Title: THE EFFECTS OF A TARGETED GLUTE AND HAMSTRING WARM-UP ON EMG SURFACE VOLTAGE DURING BACK SQUATS IN FEMALE COLLEGIATE SWIMMERS
Presenter(s): Josefine Dreier, Candace Rosen
Type: Poster
Faculty Sponsor(s): Michael Reeder, Brent Alumbaugh
Abstract: BACKGROUND: Several studies (Sotiropoulos et al., 2010; Crow et al., 2012) showed the effects of a gluteal and hamstring targeted warm-up on performance and surface voltage, however, the studies assessed jump performance rather than EMG activity. Furthermore, there is limited research about the effects of using resistance bands during a targeted warm-up. PURPOSE: The purpose of this project is to identify whether a gluteal and hamstring targeted warm-up with resistance bands will have an effect on surface voltage during a moderate load back squat. METHODS: Single leg surface voltage EMG of the vastus medialis, vastus lateralis, gluteus maximus and biceps femoris will be taken from six NCAA female collegiate swimmers. Subjects will perform a set of five tempo controlled (3-1-3-2) moderate load (60% of body weight) back squats after a general warm-up. The intervention performed after control set consists of five resistance band exercises targeting the hamstring and gluteal muscle groups. Participants will then perform another set of five back squats under the same conditions as the control set. HYPOTHESIS: We hypothesize that a targeted warm up with resistance bands will increase the mean surface voltage of the gluteus maximus and biceps femoris after the intervention compared to the control.

Title: THE EFFECTS OF A WEIGHTED VEST ON CENTER OF MASS, POSTURAL SWAY AND GAIT
Presenter(s): Madison Chaffee
Type: Poster
Faculty Sponsor(s): Brent Alumbaugh, Michael Reeder
Abstract: Research has suggested that weighted blankets, vests and compressive vests may have positive outcomes related to proprioceptive input for spectrum disorders as well as cerebral palsy. Purpose: The purpose of this study is to evaluate healthy college age subjects and examine the effects that a weighted vest has on center of mass (COM), center of postural sway (COP) and gait. Methods: Fifteen healthy college students will be asked to perform the unipedal balance test and the gait cycle evaluation both with and without a weighted vest. Participants will first be examined without weight for COM, COP and gait. Subjects will then be asked to wear a 9.8 kg weighted vest for 45 minutes and then be reassessed in a similar fashion to the control condition. Hypothesis: We hypothesize that the weighted vest will decrease postural sway and there will be an improvement to gait cycle. Conclusion: Positive results in a healthy population could be investigated with other populations such as spectrum and CP.

Title: EMG ACTIVITY DURING BARBELL VS DUMBBELL BENCH PRESS
Presenter(s): Cole Brown, Justin Cobbly, John Goff
Type: Poster
Faculty Sponsor(s): Michael Reeder, Brent Alumbaugh
Abstract: Electromyography is a technique for evaluating and recording the electrical activity produced by skeletal muscles. The EMG technology can be used to compare muscle activity during different resistance training exercises. Purpose: The purpose of this study is to compare EMG activity of the pectoralis major, anterior deltoid, and lateral triceps brachii during a set of flat barbell bench press and flat dumbbell bench press. Methods: This study is using division 2 college football linemen lifting a weight that is 40% of their barbell bench press one rep max. EMG leads will be placed on the pectoralis major, anterior deltoid, and lateral triceps brachii. After performing their typical warm-up routine, the subjects will perform one set of six reps on barbell bench press, briefly rest, then one set of six reps on dumbbell bench press. Hypothesis: We hypothesize that we will see more EMG activity during the dumbbell bench press than in barbell bench press in all muscles observed.

Title: A STUDY OF PHYSICIAN AND ADVANCED PRACTICE PROVIDER BURNOUT IN WESTERN COLORADO
Presenter(s): Rosemary Adelgren
Type: Poster
Faculty Sponsor(s): Amy Bronson
Abstract: Physician and advanced practice provider (APP) burnout is a growing concern in the field of medicine. High-stress levels and low work-life balance contributes to physicians and APPs being more likely to experience burnout than any other career. The Mini Z Burnout Survey was sent out to physicians and APP providers in Western Colorado. The Mini Z Burnout Survey is a validated tool to measure burnout in physicians and APPs. The surveys will be scored, and statistical analysis will be performed to determine a

baseline level of the current burnout reported by providers in Western Colorado. This study is important because no previous research has been published on physician and APP burnout in Western Colorado.

LANGUAGES, LITERATURE AND MASS COMMUNICATION

TRACK 7A

Title: ALONE
Presenter(s): Sean Roberson
Type: Performance
Faculty Sponsor(s): Randy Phillis
Abstract: "Alone" is a post-apocalyptic horror fiction piece that I am working on. It is a novella with the hopes of becoming a full-length story in the future. It is currently in progress. The story focuses on a young man named Isaac and his struggle surviving in a fallen Earth. He must endure several conflicts and challenges that the new world has left for him when all of his friends and family have left him. The extinction of humans has caused nature to take back what it is in new horrifying ways. Isaac will have to make tough choices deciding what is worth fighting for when he is all alone.

Title: LIVING IN LANGUAGE
Presenter(s): Maria De Los Angeles Martinez Jaramillo
Type: Performance
Faculty Sponsor(s): Rhonda Claridge
Abstract: The poems in this original reading present two dimensions: one being the literal experimentation of language, and the other being the social impact of language in everyday life. In a literal sense, I choreograph diction, syntax, and the physical structure of the poems. To express the influence of language, I use the literary devices of voice, personification, and juxtaposition. With these elements, I am exploring relationships between the abstraction of words and the physicality of human life as a code through my experiences. "Living in Language" represents the hold that language has on me, and this concept that language comes from experiences with others as well as inner thoughts, and has a hold on us all.

Title: UNBELIEVABLE
Presenter(s): Sydnie Hellman
Type: Performance
Faculty Sponsor(s): Randy Phillis
Abstract: This fictional piece is a short story that follows the childhood of a young girl with a vivid imagination suppressed and scrutinized by biased perceptions of adult figures in her life. Drawing from instances within the author's own life, this piece showcases an issue felt by many children of unsupportive parents but takes it a step further to show how one's talent can be misunderstood and manipulated. This piece employs thematic patterning to help amplify the main character's recurring attempts to individualize herself. For the presentation, the author will give a brief introduction of the story to address its purpose and meaning, followed by a reading of the full text as it is only 1500 words.

Title: THE WEAVING OF BREATH
Presenter(s): Rhiannon Bergman
Type: Performance
Faculty Sponsor(s): Randy Phillis
Abstract: There's only one planet earth. So, it is not too far of a stretch to believe that every living being, every human, every fish, mammal, lizard, and willow tree carries and expels energy that can affect the world in unimaginable ways. We are all connected, and therefore one person's life may alter or reflect off another's without even knowing. I have always been fascinated with this idea that the choices I make in life are affecting the world around me in ways I will never know in my lifetime- as if the world is one giant lake and we are all tossing our pebbles in at the same time, our ripples expanding and blending together to the point where untangling them seems impossible. This excerpt I will be reading for Student Showcase is from a collection of short stories that I have been working on all spring. Each story follows one individual and is completely whole on its own but the connections between stories within the collection add another layer. They reflect and refract off of each other to produce a new meaning: how all of our breaths are weaved together.

Title: **The Potter's Daughter**
Presenter(s): Kersea Calhoun
Type: Performance
Faculty Sponsor(s): Randy Phillis
Abstract: The piece I will be reading is an excerpt from my larger senior writing project; however, it is, in and of itself, self-contained. "Throwing Pottery" portrays an adult version of myself having a flashback to my child self witnessing the destruction of my father's sacred pottery barn.

Title: **DROUGHT, VIOLENCE, AND THE KACHINAS: EXAMINING THE ANCESTRAL PUEBLOAN EXODUS OF THE FOUR CORNERS REGION**
Presenter(s): Charles Seevers
Type: Oral
Faculty Sponsor(s): Rhonda Claridge
Abstract: For more than seven centuries the Ancestral Puebloan people, or Anasazi, flourished in the desert climate of the Four Corners Region. They built grand pueblo complexes at Chaco Canyon, Mesa Verde, Cedar Mesa, and numerous other locations. However, only a few decades after achieving the pinnacle of their most significant accomplishments, they abandoned their long-time homes. For a century, archaeologists, anthropologists and researchers have argued the causes for this departure, yet much remains in contention. This oral research presentation examines various theories, from the establishment to the outliers, aimed at explaining the exodus of an elaborate agriculture society from their long-occupied homeland.

Title: **LIMINAL SPACE BETWEEN FEMALE SOCIAL CONSTRUCTS IN SHAKESPEARE'S OTHELLO**
Presenter(s): Kersea Calhoun
Type: Oral
Faculty Sponsor(s): Randy Phillis
Abstract: This piece focuses on the roles of Emilia and Desdemona in Shakespeare's play, Othello. In a society where women were governed by the goddess/ whore dichotomy Emilia and Desdemona recognized the social constructs placed on them and in order to break free both sought a path to empowerment through her sexuality and attempting to occupy a liminal space between the two extremes.

Title: **Cognitive Science and the Education Mathematics**
Presenter(s): Amy Sullivan
Type: Poster
Faculty Sponsor(s): Edward Bonan-Hamada
Abstract: Addition is regarded as a fundamental part of mathematical practice. Yet, we do not understand how students construct their understanding of this operation. This project will look at three methods of addition and then discuss the underlying logical systems that give rise to these methods. We will then consider the cognitive neuroscience and the human reasoning in mathematics behind one of these methods. Finally, we will consider some teaching methods and strategies that align with a supposed model of student learning.

Title: **Exploring Survival Analysis Assuming Stochastic Order**
Presenter(s): Kendell Visser
Type: Poster
Faculty Sponsor(s): Richard Ott
Abstract: The Kaplan Meier Estimator is the most well-known survival curve estimator in the branch of biostatistics. However, when the Kaplan Meier estimator is found for two datasets assuming a certain condition

known as stochastic order, the estimator can violate the assumption, which presents some issues of bias and mean squared error. For example, we would expect a Degree 1 Carcinoma Cancer patient to have higher survival probabilities and an increased likelihood of living longer than a Degree 2 Carcinoma Cancer patient because of their slightly healthier condition. However, the survival functions we derived from Carcinoma Cancer datasets (survival package in R studio, Stanford University, 1977) cross over each other with respect to survival probability and time, which is a violation of stochastic ordering. In this project, we will consider an estimator proposed by Rojo (2004) to force stochastic ordering as we evaluate the Carcinoma Cancer data in the two-sample case as well as look into a theoretical three-sample case using exponential data created using R studio.

Title: Incorporating Movement into Mathematics Instruction
Presenter(s): Brooke Arrieta
Type: Poster
Faculty Sponsor(s): Catherine Bonan-Hamada
Abstract: In this project we investigate the benefits of incorporating movement into the mathematics classroom. We also look at methods for implementing movement into a secondary mathematics lesson with a focus on pedagogical techniques that include active and tactile learning.

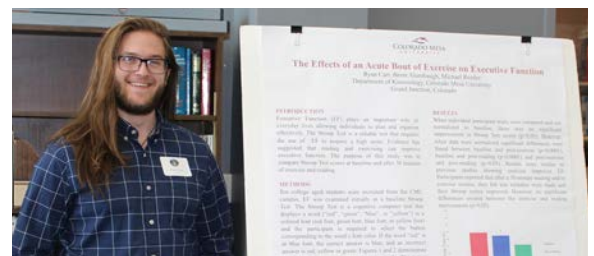
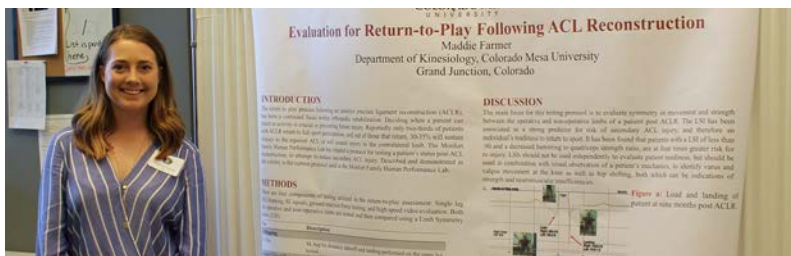
Title: Modeling Hunting Energy Expenditure
Presenter(s): Lew Griffith
Type: Poster
Faculty Sponsor(s): Philip Gustafson
Abstract: Having the energy and supplies to get to their destination and back is important to hikers and hunters alike. There are times where hunters are successful in their efforts, and they are far from their base camp. How far can they hike so that they can still not only get back, but also bring back their harvested animal? In this project, we will seek to find the answer in order to help hunters and hikers know their limits while they enjoy the beautiful scenery.

Title: Spatial Relationships Among Colorado Counties
Presenter(s): Brian Kilman
Type: Poster
Faculty Sponsor(s): James King
Abstract: In this project, we consider spatial relationships between a variety of variables at the county level in Colorado based on data collected from the United States Congress Joint Economic Committee. These spatial relationships are considered for both raw data and residuals of linear models. Analysis of the linear model residuals can be used to determine whether a spatial term belongs in each model.

MUSIC

TRACK 9A

Title: A Thought Experiment: The Mind-Brain Distinction
Presenter(s): Brianna Mangette
Type: Performance
Faculty Sponsor(s): Darin Kamstra
Abstract: My brother thinks of a lot of interesting things, but he has a bad habit of keeping it all to himself. I asked him to write an essay on one of his ideas for us to explore today. In the essay, he toys with the idea of



the mind and the brain being two separate entities using ideas such as how we see color. While he takes this opportunity to experiment with new ideas, I take the same chance to do something different with my composing. I attempt to visualize the separation between the abstract mind and the concrete brain in the movements of my mallets. The Mind-Brain Distinction is one section of a three part series called "The Thought Process" exploring this idea.

MUSIC

TRACK 9B

Title: **Designing a Film Score**
Presenter(s): Nicholas Carozza
Type: Oral Presentation
Faculty Sponsor(s): William Aikens, Darin Kamstra
Abstract: Movie soundtrack music can make the difference between a box office success and a film that leaves a lukewarm taste in your mouth. In my project, I will describe the process and inspiration for my original film score composed for *The Vaxx*, a film by Taylor Mahoney, a student of the WCCC Digital Filmmaking program. The influences for my soundtrack are various movie scores, including the synthesizer scores of John Carpenter, various 80s and 90s horror scores, and specifically, the score for *Friday the 13th Part VI: Jason Lives*, which was recorded by an orchestra joined by the CMU professor Tim Emmons. By synthesizing my music and studying knowledge of communication, I used facial cues of actors for musical inspiration and created a score for the film. My presentation will show the music for the film as it is related to each character and scenario, along with a description of the digital instruments used within Ableton Live to create the score. I will also describe the math involved in timing of BPM with scenes, and the collaboration process between composer and director.

PHYSICAL AND ENVIRONMENTAL SCIENCES — GEOLOGY

TRACK 10A

Title: **MAPPING PLUTO SURFACE AGE BY IMPACT CRATER ANALYSIS**
Presenter(s): Andrew Schmidt
Type: Oral
Faculty Sponsor(s): Verner Johnson, Richard Livaccari
Abstract: ArcMap flexibly models geographical data not just for Earth but other ellipsoids. Pluto is the latest solar system body to undergo recent study of its geology and geography. Many internet images exist upon which ArcMap can perform basic georeferencing, projection, editing, and numerical analysis. This study uses ArcMap, and power law relations governing crater size distributions, to date the various subregions of Pluto that were imaged in sufficient resolution to perform editing. Pluto appears orders of magnitude younger than 4.5 billion years because its rifted, smooth surface is not impact-saturated; however, absolute ages derived from inner solar system models are suspect because temperatures, impactor populations, and orbital velocities are lower in the outer solar system. This study plots relative ages for homogenous geomorphic regions. Normalized by surface area, results indicate that areas adjacent to Sputnik Planum (an early impact basin, now a frozen nitrogen, most actively exhibit greatest small-diameter crater removal via glaciation, cryo-volcanism or volatile deposition, while areas near the poles undergo passive crater removal processes via relaxation and frost infill. Mid-latitude areas retain the oldest impact record, with the exception of Cthulhu Regio, which appears younger because a coating of tholins obscures its mostly unaltered crater history.

PHYSICAL AND ENVIRONMENTAL SCIENCES — GEOLOGY

TRACK 10B

Title: **40AR/39AR DATING OF DETRITAL SANIDINE IN THE GOODENOUGH UNIT, GRAND MESA, COLORADO**
Presenter(s): Joshua Schlag
Type: Poster
Faculty Sponsor(s): Andres Aslan
Abstract: Radiometric dating involving $^{40}\text{Ar}/^{39}\text{Ar}$ isotopes in detrital sanidine (DS) is a relatively new and emerging method for dating non-volcanic sedimentary deposits. The technique assumes that detrital

sediments contain a small percentage of volcanic air fall that is reworked into the sediment at the time of deposition. This method is being applied to the Goodenough unit, which lies stratigraphically under the Grand Mesa lava flows and above the Uinta or Green River formations. The Goodenough unit chiefly consists of unconsolidated or friable fluvial sand and floodplain or lacustrine mud facies. The age of the unit is poorly constrained. However, detrital sanidine data may provide the first absolute age for the Goodenough. There are currently two hypotheses for the age of the Goodenough unit: 1) Late Miocene, which suggests a major unconformity separates the Goodenough from the underlying Eocene Uinta Formation, or 2) Oligocene, which suggests a major unconformity separates the Goodenough from overlying Grand Mesa basalt flows. The primary goal of this study is to use $^{40}\text{Ar}/^{39}\text{Ar}$ dating of sanidine to construct an accurate depositional history of when the Goodenough unit accumulated.

Title: AN ANALYSIS OF JURASSIC THEROPOD TOOTH SERRATIONS USING GIS

Presenter(s): Miriam Kane

Type: Poster

Faculty Sponsor(s): Andres Aslan, Julia McHugh

Abstract: Theropods are carnivorous dinosaurs that have serrations on their teeth, like a steak knife. A serration is a row of sharp tooth-like projections. In the case of theropod dinosaurs, these serrations are found on the edges of their teeth. There have been two main theories surrounding the origin and purpose of serrations on theropod teeth. In the first theory, serrations help to maintain the strength and integrity of the tooth along the curve of the tooth. The second, and more widely accepted theory, is that denticles evolved to aid in the killing of prey, which helped theropods become the apex predators of their time. Many attempts have been made to morphometrically analyze theropod teeth as an aid in their identification, including measurements of serration density and the microanatomy of the serrations. However, none of these techniques have been able to successfully identify theropod genera from isolated teeth and teeth fragments. The purpose of this study is to use GIS mapping of tooth serrations of known theropod teeth acquired from museum collections, to establish criteria for identifying genera using theropod tooth serrations.

Title: CLAY MINERALOGY OF THE MOLINA MEMBER OF THE WASATCH FORMATION: RECOGNITION OF THE PETM

Presenter(s): Misty Bowen

Type: Oral

Faculty Sponsor(s): Andres Aslan, William Hood

Abstract: A global warming event occurred near the Paleocene-Eocene boundary known as the Paleocene Eocene Thermal Maximum (PETM). The purpose of this study is to determine if clay mineralogy can be used to recognize the PETM in the Piceance Basin. Specifically, clay minerals of the Atwell Gulch and Molina Members of the Eocene Wasatch Formation will be examined. The study area is located between DeBeque and Molina, Colorado in an area called Atwell Gulch. Samples were processed and analyzed for their clay mineralogy using an X-ray diffractometer. When looking for the change in the clays we should have seen chlorite once the samples were heated and the kaolinite was removed. However, chlorite was absent and instead, we found minerals that have yet to be identified. The minerals show that something dramatic occurred. The chlorite must have been present at some time, but other minerals developed and the chlorite peaks bonded with the smectite peaks, which complicates the identification of these minerals. Clay mineralogy might help us determine what future environments might look like if similar warming events occur in the future.

Title: DETERMINING APPLICABILITY OF GIS AND REMOTE SENSING TO IDENTIFY BEETLE KILL IN THE CNM

Presenter(s): Hunter Doyle

Type: Poster

Faculty Sponsor(s): Verner Johnson

Abstract: The Colorado National Monument is a protected public land located in western Colorado, known for its unique geology, beautiful sites, and pinyon-juniper woodland. An issue with these woodlands is beetle infestations that target the pinyon pine in the area. In areas such as National Parks and Monuments, there are a variety of restrictions to keep visitors on the trails and limit accessibility to areas for preservation purposes. Due to this, large areas go untouched and unobserved, making it difficult to identify areas with infestation problems. We are attempting to utilize aerial photographs and satellite imagery to identify areas of beetle kill as well as map out current beetle infestations and determine if there are any spatial factors such as elevation, slope, and aspect that correlate to higher beetle mortality. With ArcGIS and remote sensing software, we can determine beetle damaged trees by looking

at spectral wave reflectance relating to moisture stress and color of the needles as well as utilizing this software to determine if there is any correlation between beetle kill and spatial factors such as elevation, slope, and aspect.

PHYSICAL AND ENVIRONMENTAL SCIENCES— PHYSICS

TRACK 10C

Title: ASSEMBLY, ALIGNMENT, AND CALIBRATION OF A SPECTROMETER
Presenter(s): Bryson Marks
Type: Poster
Faculty Sponsor(s): Brian Hosterman
Abstract: Spectroscopy investigates the interaction between light and matter by observing an emitted spectrum, typically with instrumentation such as a spectrometer. A model 82-000 Jarrel-Ash spectrograph and QHY CCD camera was donated to CMU for this project and a mercury emission bulb was used as a calibration source. I assembled and optimized a spectrometer from the spectrograph and CCD camera. This process required adjustments to mechanical features such as the drive motor and gear assembly, as well as optical adjustments to the mirror and entrance optics. I wrote software to analyze the image acquired by the CCD and create an intensity versus wavelength spectrum. Using the known spectrum of mercury, I calibrated the grating position to known wavelengths.

PHYSICAL AND ENVIRONMENTAL SCIENCES — ENVIRONMENTAL SCIENCES

TRACK 10D

Title: BACKGROUND LEVELS AND SOURCES OF SELENIUM AND E. COLI IN ADOBE AND LEACH CREEKS
Presenter(s): Kevin Conley, Hunter Doyle, John Noyes, Casey Peed
Type: Poster
Faculty Sponsor(s): Freddy Witarsa
Abstract: Selenium (Se) is posing a problem to the aquatic life and recreation of many local rivers and watersheds in western Colorado. In the Grand Valley, this is posing a serious problem as there are two local streams that were listed under the 303(d) provisions of the Clean Water Act as impaired for Se and E. coli. Natural background sources were not measured in the undeveloped area north of the highline canal, hampering the establishment of total maximum daily loading (TMDL) limits on these creeks. The objective of this research is to locate the sources of the Se and E. coli that is causing the impairment to Adobe and Leach Creeks and to help establish TMDLs for both creeks. Sampling and analysis of the two creeks north and south of the Highline Canal will be conducted. The results of these analyses will be presented later as sampling and analysis is currently being conducted. The results of this study will lend themselves to the determination of a TMDL limit that is required for these two creeks and that they have a source that can be regulated through TMDL applications.

Title: DETERMINING APPLICABILITY OF AN ALGAL TURF SCRUBBER (ATS) TO REMOVE SELENIUM FROM WATER
Presenter(s): Hunter Doyle, Sierra Mitchell
Type: Poster
Faculty Sponsor(s): Freddy Witarsa
Abstract: The algal turf scrubbers (ATS) is a water treatment system that utilizes the natural properties of algae to scrub contaminated water of unwanted pollutants. These systems were used in the treatment of agricultural wastewater containing high amounts of nutrients (nitrogen and phosphorus). Some studies have found these systems to remove some iron, magnesium, calcium, and other metals. In the western part of Colorado, high levels of the metalloid selenium (Se) have been observed in the water, posing a risk to predatory fish and waterfowl. While the use of ATS is common for removing nutrients, the ability to remove Se from water is largely unstudied. This study serves to address this research gap by determining the effectiveness of Se removal from irrigation ditches that are effluents to agricultural sites. Our system was installed in a local irrigation return flow that was found to have elevated levels of Se (25 µg/L), which was higher than the Colorado state standard of 4.6 µg/L. Successful implementation and removal of selenium by this system that relies on solar energy and algae would provide a cost-effective and efficient method for selenium treatment in the region.

Title: DEVELOPING A RECLAMATION PLAN FOR THE ABANDONED 'TELLURIDE 18' URANIUM MINE (NEAR MOAB, UT)
Presenter(s): Meghan Cline, Tyler Schwartz, Savahanna, Wilkinson
Type: Poster
Faculty Sponsor(s): Deborah Kennard, Steven Renner
Abstract: Abandoned uranium mines are scattered across the landscape of the western United States. The Telluride 18 mine outside of Moab, Utah is one such mine. With open mine entries (adits, shafts), unreclaimed waste rock piles, and close proximity to 4x4 trails, the mine site poses unique hazards to human health and the environment. Our goal for this project is to create a comprehensive reclamation plan for the Telluride 18 mine that addresses site stability, enhances the biologic and hydrologic functions of the site, and increases public safety and awareness with regards to abandoned mine lands. Our group will use measures of soil and water quality in conjunction with geomorphic characteristics of the site (e.g., slope, distance, erosion rates) and vegetation data to determine planned reclamation actions. The final reclamation plan will be submitted to staff working under the Defense-Related Uranium Mines program at Navarro Research and Engineering, Inc., a contractor to the U.S. Department of Energy.

Title: INVENTORY OF ABANDONED GRAVEL MINES AND THEIR POTENTIAL TO IMPROVE WATERFOWL AND NATIVE FISH HABITAT ALONG THE COLORADO RIVER CORRIDOR IN MESA COUNTY
Presenter(s): Dalton Baker, Gary Johnson, Richard Plock
Type: Poster
Faculty Sponsor(s): Deborah Kennard
Abstract: There were 82 active gravel mines and 350-400 abandoned gravel mines along the floodplain of the Colorado River in Mesa County in 2000. Gravel mining operations replace riparian vegetation and shallow backwaters with deep-water ponds non-conducive to waterfowl or native fish. The goal of this study is to inventory the abandoned mines and assess their potential to be reallocated into suitable habitat for migratory waterfowl as well as threatened and endangered native fish species. Aerial photography will be used to identify which sites will be assessed physically. Physical observation and water sampling will be used to categorize them as candidates for rehabilitation. ArcMap will be used to produce maps to visually present the information gathered including rankings of suitability for rehabilitation from best to worst, and vegetation currently present onsite. The findings of this study will be shared with interested agencies and organizations including the Bureau of Land Management, Rivers Edge West, Colorado West Land Trust, and Ducks Unlimited, among others.

Title: USING OYSTER MUSHROOMS (PLEUROTUS OSTREATUS) TO MYCOREMEDIATE PHENOL FROM MESA COUNTY LANDFILL LEACHATE
Presenter(s): Ana Hinojosa, Jacob Park, Matthew Rutkowski, Trevor Smith
Type: Poster
Faculty Sponsor(s): Freddy Witorsa
Abstract: Mycoremediation, the use of fungi to remove pollutants, is a technique practiced in many applications, including the decontamination of industrial waste. While the use of *Pleurotus ostreatus* in their mycelium stage has been studied for the remediation of many hazardous chemicals, including phenyl compounds, heavy metals, and PAHs, using them for remediation of leachate needs more research. Leachate, the result of water percolating through solid waste, is often characterized by high concentrations of the previously-mentioned chemicals. Typically, landfill leachate is not accepted at wastewater treatment facilities because of the high phenol concentrations. Our study aims to determine if the mycelium of *Pleurotus ostreatus* is suitable for removing phenol from landfill leachate. We will collect leachate from the Mesa County landfill and test it in a laboratory setting with the addition of different concentrations of phenol to determine the overall tolerance and ability of *Pleurotus ostreatus* to remove phenol from leachate. We will interpret results and compare them to our hypothesis that phenol concentrations will be lower in the treated samples than their initial concentrations. Our study would suggest if mycelium is a cheap and viable option to remediate landfill leachate, or other field applications, that has high phenol concentrations.

Title: **IMPACT OF BODY MASS INDEX (BMI) ON MOIST DECOMPOSITION IN HUMAN REMAINS**
Presenter(s): Logan Mason
Type: Poster
Faculty Sponsor(s): Melissa Connor
Abstract: The purpose of this research was to determine whether there is a correlation between a decedent's body mass index (BMI) and the moist stage of human decomposition. Previous research demonstrated no significant correlation between BMI and the complete trajectory of human decomposition, but no research evaluates whether BMI effects specific stages of decomposition. Twenty-two male cadavers and seventeen female cadavers ranging in BMI from 14.4 to 49.5, were used. These were donated to the Forensic Investigation Research Station (FIRS) between January 2014 and August 2018. The FIRS defines moist decomposition as the desiccation of tissues while retaining significant moisture. The total body score (TBS) method scores the head and neck, the trunk, and the limbs as three individual anatomical regions and combines these scores to give values to each stage of decomposition. A total body score of 20-22 was used as the standard score range for remains in moist decomposition. Temperature was normalized using accumulated degree-days, calculated using temperature in Celsius with a threshold of zero and then plotted in relation the BMI. A two tailed T-test ($t=2.125$), significant at $p=0.02$, indicates that BMI has a statistically significant effect on the moist decomposition stage of human decomposition.

Title: **MYSTICAL EXPERIENCES: IDENTIFYING VARIABLES ASSOCIATED WITH HAVING HAD A MYSTICAL EXPERIENCE**
Presenter(s): Elias Acevedo, Donald Flynn, Frederick Horn, Vy Quinn
Type: Poster
Faculty Sponsor(s): Jeremy Tost, Chelsie Hess
Abstract: Mystical experiences have existed alongside many philosophies throughout history. These experiences have been characterized along the lines of unity (internal and external), transcendence of time and space, noetic quality, sacredness, positive mood, and ineffability/paradoxicality. Such experiences have been synonymous with feelings of awe, mindfulness, love, and other peak experiences. The benefits of mystical experiences have been speculated for some time, though the interest in the long-term effects of mystical experiences has been renewed. Previous research suggests outcomes of a mystical experience that include increased subjective well-being and a decreased us-against-them mentality. The current study examines the prevalence of having had a mystical experience and the relationship between having had a mystical experience and an array of variables including personality, spirituality/religiousness, and moral foundations. Findings from this study will provide the foundation for future experimental work.

Title: **THE COLORFUL HISTORY OF ROSS BUSINESS COLLEGE**
Presenter(s): Montana Moore
Type: Oral
Faculty Sponsor(s): Sarah Swedberg
Abstract: The history of a checkwriter found in Special Collections at the Tomlinson Library led to uncovering a historical connection between Colorado Mesa University and the Ross Business College. Ross Business College was founded in 1905 and moved to Grand Junction in 1907. Ross Business College advertised itself as a place to get the necessary business skills needed in the workforce. World War II left the Ross Business College without men to fill their classes, so they accepted a proposal from Mesa College to purchase Ross and its inventory. An inventory list with serial numbers verified that not only the check writer but other items in the Tomlinson special collections were in fact owned and transferred from Ross to Mesa in the 1943 sale. But even more intriguing was the fact that the founders, administration, and faculty of the Ross Business college are directly related to the history of not only Colorado Mesa University, but of Grand Junction itself. This colorful history is the foundation of the names of our campus buildings and sports facilities which may lead us to rethink what those names represent and whether we should consider renaming them.

Title: CRITICAL THINKING AND PERSONALITY: INDIVIDUAL DIFFERENCES IN A CONCERN FOR TRUTH
Presenter(s): Elias Acevedo
Type: Oral
Faculty Sponsor(s): Chelsie Hess
Abstract: Critical Thinking (CT) is an empowering factor in all facets of one's life, given it provides the basis for what is reasonable for an individual to believe and do. CT consists of skills and dispositions. CT dispositions are a network of attitudes, intellectual virtues, and habits of mind. CT dispositions influence the way individuals approach a thinking task and motivate the appropriate application of CT skills. In other words, CT dispositions characterize the willingness to think critically. Although factors of CT disposition are described in similar terms to personality traits, very little research has looked at the relationship between factors of CT disposition and personality. Truth-seeking, one of seven factors that comprise CT disposition, is described as eagerly seeking knowledge, courageously asking questions, and honestly pursuing evidence. Unfortunately, several studies have shown students are generally not inclined toward truth-seeking. The present study examines the prevalence of a concern for truth and its relationship with the big five factors of personality in students at Colorado Mesa University. Religious and political ideology, field of study, class rank, and other demographic information are also considered.

Title: HOMELESSNESS IN MESA COUNTY: A POINT IN TIME
Presenter(s): Dawn Schadegg, Hayley Smith, Kimberly Smith
Type: Oral
Faculty Sponsor(s): Jina Lewallen
Abstract: This presentation will display the data collected from the Point in Time count conducted in January, 2020, for Mesa County's homeless population. This data reflects sheltered as well as unsheltered individuals and is further broken down by age, race, gender, length, and frequency of the individual's homelessness. This homeless count is crucial for the accurate representation of the homeless population in Mesa County. The count helps establish the amount of funding allocated to homeless resources that are made available in the community. The data collected from Mesa County were then added to the national report, which allows for a more representative picture of the homeless population for the nation. It is essential for the community to be aware of the implications of local homelessness because the lack of sufficient funding would hinder the quality of life within the community and put significant strain on current public safety capital. Resources for the homeless are available in the community and heavily depend on surveys such as these for future funding.

Title: THE MORAL CASE FOR NUCLEAR ENERGY
Presenter(s): Anthony DeNardo
Type: Oral
Faculty Sponsor(s): Terence Casey
Abstract: There are few issues as polarizing in the modern environmental movement as nuclear energy. There are those who feel we should not be investing in nuclear energy because of a perceived history of danger. I will seek to address some of these concerns as well as explore the social, economic, and environmental benefits nuclear energy can provide, if we choose to look past an intimidating facade and see the wonder within.

Title: REINTEGRATING/TRANSITIONING BACK INTO SOCIETY
Presenter(s): Jordan Ausman
Type: Oral
Faculty Sponsor(s): Michael Delaney
Abstract: Reintegrating back into society for ex-offenders is not an easy process. Communities do not always prepare ex-offenders for the hardships that are to come with their newfound freedom. Through reentry programs that help prepare offenders while in prison, programs that help with immediate resources after being released from prison, and programs that offer long term support, ex-offenders would have a better chance at succeeding in life and lower the recidivism rate. There are many factors that influence the success of an ex-offender's journey when integrating back into society. What is considered daily life behavior for most, can be foreign to ex-offenders. Not every offender knows of the resources that the prisons provide for reintegration. However, if society helped with the process rather than turning a blind eye, the ex-offenders could have more of an opportunity to flourish in becoming a citizen of the community without the extra stress. This presentation will address the reintegration concerns from both the inmate and non-offender perspectives.

Title: CHILDREN AND TRAUMA**Presenter(s):** Evelyn Quezada, Alexys Sanchez, Sarah Solinger**Type:** Oral**Faculty Sponsor(s):** Ann Gillies

Abstract: As teachers, the presenters have worked with children with various backgrounds and history within their classrooms. The children include ones who have experienced trauma. Working with children who have experienced trauma can be tricky, so it is important for teachers to understand exactly how trauma affects children and any struggles they may face. Teachers need to have an understanding about what exactly trauma is and how it is caused. After that baseline of knowledge is set, teachers need to explore strategies that can help. Every child is different, therefore teachers need to recognize the differences in cognitive development and brain structure surrounding children who have been affected. What struggles are they going to face with their social/emotional development and how will their physical and mental health be impacted from their experiences? Having this understanding will help teachers move forward in providing children with helpful strategies and resources.

Title: THE EFFECTS OF HANDWRITING ON LITERACY**Presenter(s):** Sarah Jackett**Type:** Oral**Faculty Sponsor(s):** Ann Gillies

Abstract: This presentation will explore the different effects that the physical act of writing has on students and their overall literacy level. The presenter will speak about the time she spent with a selected student and this student's experiences as well as struggles with handwriting. The presenter will also explain how these handwriting struggles have impacted the student's overall growth in literacy and outlook on literacy as a whole. During this presentation the presenter will have the audience complete an activity that helps them visualize how difficulties with the physical act of writing are directly related to a child's literacy level. The presenter will then give the audience practical ways to differentiate lessons in order to attend to students who struggle with literacy due to issues with the physical act of writing.

Title: LITERACY AND MILESTONE DEVELOPMENT**Presenter(s):** Alex Polito**Type:** Oral**Faculty Sponsor(s):** Ann Gillies

Abstract: The purpose for this presentation is to discuss emerging literacy skills in children ages birth-6. The presenter will share ways parents can help enhance their child's literacy skills. Finally, several books will be available to view that are appropriate for each of these developmental levels. The motivation to pursue this project is to highlight the importance of emergent literacy skills, particularly to parents, and how parents and educators can encourage these early skills. This presentation will also discuss the idea that all children are distinct in their development of literacy skills by using information the presenter has gathered from his Emergent Literacy class. Much of the background information that will be covered will be information about milestones of language and literacy, how to talk with children about literacy, appropriate books for each stage of development, skills that reinforce children's learning, and how to identify delays in emergent skills.

Title: SUPPORTING YOUNG CHILDREN WHO HAVE BEEN IMPACTED BY TRAUMA**Presenter(s):** BriAnne Marr**Type:** Oral**Faculty Sponsor(s):** Ann Gillies

Abstract: This presentation will focus on Emotional and Behavioral Disorders caused by trauma. The presenter will reflect on the causes of different types of childhood trauma. The presentation will also provide tips to support teachers, faculty, and anyone who has interactions with children who have experienced trauma. The presentation will also include an interactive activity which will allow audience members to practice Trauma Informed Care before using the new skills with children. In our society today, countless children deal with different types of trauma. This presentation will help ensure that we are supporting young students in every way possible.

Title: **SENSORY TOOLS IN THE CLASSROOM**
Presenter(s): Kilee Sofich
Type: Oral
Faculty Sponsor(s): Ann Gillies
Abstract: This presentation will educate the audience on the effectiveness and uses of sensory tools in the classroom. The presenter will review what sensory tools are, some different forms they come in, and diverse needs they each meet. The presenter will share what was observed during a 2-hour period of time in a classroom with a student with ADHD, and what types of other students can benefit from these tools. Ultimately, the audience will learn how important it is to keep sensory tools in the classroom for students who have special needs, have a learning disability, and those who just need a little extra support during the school day.

Title: **WORKING WITH STUDENTS WITH HEARING IMPAIRMENTS**
Presenter(s): Paige Thaute
Type: Oral
Faculty Sponsor(s): Ann Gillies
Abstract: This presentation will discuss students who have a hearing impairment, and important issues teachers need to consider. The presenter will discuss what kinds of things that students go through on a daily basis, what accommodations or modifications they may need, and what teachers and peers can do to make learning as successful as possible. The main concept of this presentation is to understand the hearing impairment disability and to know how to accommodate students in a classroom setting.

Title: **WORKING WITH STUDENTS WHO ARE TWICE EXCEPTIONAL**
Presenter(s): Tessa Patton
Type: Oral
Faculty Sponsor(s): Ann Gillies
Abstract: This presentation will explore students who are diagnosed as Twice Exceptional. The presenter will share a variety of different aspects regarding students with this label. This presentation will include explaining what it means to be Twice Exceptional, as well as strengths and difficulties students may experience. The presenter will be discussing the many ways that a student can be considered Twice Exceptional, but the main focus will be on gifted students who have autism. In this presentation, experiences working with a gifted student who has an autism diagnosis will be discussed. The presentation will include an activity that helps stimulate discussion around the topic. Finally, the presenter will give strategies that will help educators work with students who are Twice Exceptional.

TEACHER EDUCATION

TRACK 12B

Title: **ADHD**
Presenter(s): Megan Miller
Type: Oral
Faculty Sponsor(s): Ann Gillies
Abstract: This presentation is about what Attention Deficit Hyperactive Disorder is, and the difference between ADD and ADHD. This presentation will also share strategies a teacher can use to help students with the disorder learn in the best way possible. The motivation to present this topic is that all students learn differently, and it is essential to use different teaching techniques to help all students learn. This presentation will give the audience a further understanding of what ADHD is and how teachers can best teach students with this label. During the presentation, there will be an activity helping the audience understand the difference between Attention Deficit Disorder and Attention Deficit Hyperactive Disorder.

Title: **CHALLENGING BEHAVIORS**
Presenter(s): Sydney Prichard
Type: Oral
Faculty Sponsor(s): Ann Gillies
Abstract: This presentation will educate the audience on the relevance of challenging behaviors and the way these behaviors can manifest themselves in the classroom. The presenter will discuss risk factors that can contribute to challenging behaviors, as well as strategies that educators can implement in the

classroom to prevent and respond to these behaviors. The presentation will include a small activity for the audience to partake in. They will be asked, through a made-up scenario, to evaluate a student who is exhibiting certain challenging behaviors and decide on a course of action, using strategies introduced in the presentation. With this presentation, the presenter hopes that the audience is encouraged to approach students who exhibit challenging behaviors with understanding, grace, and kindness.

Title: IMPORTANCE OF PHYSICAL ACTIVITY IN EARLY CHILDHOOD EDUCATION

Presenter(s): Kaylee Avila, Parker Isakson, Christina Wihera

Type: Oral

Faculty Sponsor(s): Vail Shoultz-McCole

Abstract: In early childhood education, children are often told to ,quit moving around, and to ,sit still, after being in the classroom all day long, which can take a dramatic toll on their physical and emotional health. Children in childcare in the US only spend about 27 minutes doing moderate to vigorous physical activity each day, which is nearly five times less than the recommended 120 minutes according to the US National Health Standards. Children who experience physical activity are at lower risk of anxiety, depression, and sleeping problems, and their social and emotional skills are positively influenced. Through this action research, we will explore the benefits of additional physical activity every day. We will compare current behavior with limited physical activity to behavior after increased activity over a couple of weeks.

Title: LEARNING DISABILITY: DYSGRAPHIA

Presenter(s): Sophia Parker

Type: Oral

Faculty Sponsor(s): Ann Gillies

Abstract: In the presentation Dysgraphia, this learning disability will be addressed. What is dysgraphia and how will it look to a student or a teacher? These questions will be answered through an investigation in current research. Something that is important for any teacher to know is how this learning disability can affect a student learning everyday in the classroom. To help students with dysgraphia there are steps and activities to create less stress on a student. From a special pencil grip to computer skills so the student can still get the same amount of knowledge as other students in the classroom; many effective supports will be discussed. An activity will also be part of this presentation that will illustrate how dysgraphia feels to a student and characteristics to look out for. The activity will give knowledge to those who wonder what dysgraphia really is, and the feeling students get when having dysgraphia.

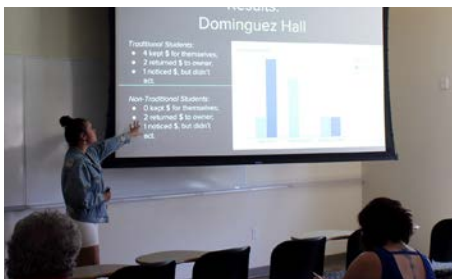
Title: A LOOK AT TRAUMA INFORMED PRACTICES: WAYS EDUCATORS CAN HELP RECOVERY.

Presenter(s): Angelina Puliafico

Type: Oral

Faculty Sponsor(s): Vail Shoultz-McCole

Abstract: Many people have heard of traumatic events happening to children via different media sources, but when looking at the statistics involving childhood trauma it happens more than one might think. According to The Substance Abuse and Mental Health Administration ,More than two thirds of children reported at least 1 traumatic event by age 16. When people think about this topic the major focus is on the way, trauma can affect children and their behavior. There is not much information on how to help these kids as they are recovering. Childcare providers need effective and appropriate strategies to help these students in the classroom. This presentation will identify some signs of trauma and abuse observed in students through documentation of their behaviors. The presentation will then follow 3 young children who have experience some kind of trauma, along with what strategies their team uses to assist them. Included will be a firsthand interview with an early childhood professional about what teachers, and caregivers can do to help these children have happy and successful lives.



Title: ONLINE LEARNING IN EDUCATION
Presenter(s): Deserae Gruntorad, Rebecca Madigan
Type: Oral
Faculty Sponsor(s): Ann Gillies
Abstract: As Early Childhood Special Education majors, the presenters have gained knowledge about effective teaching strategies to implement during an era that is expanding the use of technology. The presenters want to share this information with others so they can incorporate technology into their classrooms in a beneficial way. The presenters plan to take the audience through the foundation of technology in education (International Society for Technology in Education), using and implementing learning management systems, give a background on cyber bullying, and share some tools that can build engagement and enhance online learning. The hope is to have the audience leave with an expansion on their knowledge of the use of technology in classrooms and open a door to the many different ways online education can amplify learning.

Title: RACIAL DISPROPORTIONALITY IN ADHD
Presenter(s): Melanie Monroe
Type: Presentation
Faculty Sponsor(s): Ann Gillies
Abstract: In this presentation the audience will be informed on racial disproportionality in students with ADHD. This presentation will go into how learning disabilities such as ADHD might be overlooked in many students from particular races due to a various number of reasons. Sometimes it might be difficult for some people to identify what learning disabilities look like in children because of the education they have been given and also the resources they have around them to help the children with learning disabilities. This presentation will also go into depth about how to seek out those students with ADHD and give them the support and resources they need to be able to work with their learning disability. There will also be an interactive activity that will put the audience in the shoes of a student with ADHD and not being given the support and resources they need to succeed. This interactive activity is to give the audience a better inside look of a day in the life of a student in this situation

Title: TEACHING CHILDREN WITH DYSLEXIA
Presenter(s): Haley Hedges
Type: Oral
Faculty Sponsor(s): Ann Gillies
Abstract: This presentation will explore students who have been diagnosed with dyslexia. The presenter will teach a variety of different concepts about children with dyslexia. The presentation will include what dyslexia is and common signs that develop in children. The main focus of this presentation will be addressing teaching strategies for children with dyslexia in the classroom. The presentation will conclude with an opportunity for the audience to have hands-on experience practicing, identifying, and brainstorming the best strategies to help support children with dyslexia.

TEACHER EDUCATION

TRACK 12C

Title: ACHIEVING GOALS IN PRIMARY
Presenter(s): Crystal Bucio Barrios
Type: Poster
Faculty Sponsor(s): Lisa Friel-Redifer
Abstract: Being an educator means being a life-long learner with a curious soul: when was the last time you remember being taught how to set goals? As adults, there is a constant race against the clock, for students it is the same. Every learner is different, and it is common for some students to struggle with the speed teachers are expected to go resulting in a learning gap. Students may feel overwhelmed by the classroom's academic expectations. A way that teachers can minimize this feeling for students is to allow them to become familiar with individual goal-setting so they feel accomplished with every step they take in school. Use of goal setting for primary students is encouraged but not always practiced. The aim of this project is to find the best process to help primary students set goals to improve learning. This project will address student work with the intention to set goals to see the impact goal setting has on their work. Allowing students to take ownership of their learning through goal setting will not only show their success and growth as learners, but they will also be practicing a skill that will follow them through life.

Title: ANALYSIS OF SPELLING ASSESSMENTS

Presenter(s): Allie Robinson

Type: Poster

Faculty Sponsor(s): Lisa Friel-Redifer

Abstract: Research shows that it is important that teachers document and analyze the work of their students to gain better knowledge and insight about what students understand about what they are learning. Throughout history, spelling assessments and tests have been a hot topic in education. Many people believe many different things on how and if spelling should be taught and assessed within the classroom. Spelling can give teachers a lot of information on how students are reading and writing and what concepts they are and are not understanding. What spelling assessment will give teachers the most knowledge and information about their students' literacy skills? Throughout a project, a series of assessments that the presenters will be giving to students will be compiled and analyzed to see what formative and informative assessments tell teachers the most about their students' knowledge of spelling. The presenters will be giving the students several different assessments ranging from traditional spelling tests, spelling analysis, spelling inventories, and the students' weekly word work activities. Throughout the project, the data will show the presenters what spelling assessment or series of spelling assessments are the best and give the most information about students' knowledge and conceptual understanding of spelling.

Title: ASSESSMENT IN ACTION

Presenter(s): Marissa Stegora

Type: Poster

Faculty Sponsor(s): Lisa Friel-Redifer

Abstract: As a teacher, providing students with appropriate feedback is a vital aspect of effective teaching. With the variety of diverse learners that teachers will encounter in their classrooms, they must be prepared to decide which type of feedback will be the most helpful for each individual student. All students learn differently and respond to feedback differently, so being properly equipped with ways to relay information to students is a necessity. Research has shown that providing students with immediate, positive, structured feedback gives students their best chance at making meaningful connections between what they have worked on and the feedback to improve their work. In this project, the presenter will try to determine which form of feedback will be the most effective on the majority of students' writing. The growth of student writing after feedback has been given will determine which method is most effective. Students want to excel and feel proud of the work they have accomplished. A teacher's feedback is the tool to make that happen.

Title: ASSESSMENT IN ACTION-FEEDBACK

Presenter(s): Leah Stephens

Type: Poster

Faculty Sponsor(s): Lisa Friel-Redifer

Abstract: Teacher observations will be made to determine if oral or written feedback would be more beneficial for student growth in their writing while observing fourth grade students. Feedback will be given to the students through one-on-one conferencing and having the students determine what they need to work on for future work. When conferencing with the students, the first three weeks will only be oral feedback. The last three weeks of conferencing, the teacher will be giving written feedback of what the students think they need to work on for the next week. The teacher is then going to assess if students are applying the feedback, and if so, was the verbal or written feedback more beneficial for improvement in their writing. In the feedback, the student will decide on one of the four concepts: capitalization, appearance, punctuation, or spelling (CAPS), to focus on in future work. Research shows that oral feedback is more beneficial when students struggle with reading. In the end, the presenter will evaluate her hypothesis that written feedback will show more growth in their writing instead of oral feedback only because the students have something to refer back to instead of having to memorize the feedback.

Title: AUTISM SPECTRUM DISORDER: INTERVENTION TECHNIQUES

Presenter(s): Nicole Edder

Type: Poster

Faculty Sponsor(s): Ann Gillies

Abstract: This presentation will discuss Autism Spectrum Disorder, also known as ASD. The inspiration for this project comes from working as a behavioral technician in applied behavioral analysis for children with ASD. The presenter believes more people need to learn about ASD and the various forms of therapy

and help centered around it. This presentation will both touch on characteristics of ASD, and applied behavior analysis as an effective intervention strategy.

Title: **GIVING FEEDBACK TO ELEMENTARY STUDENTS: WRITTEN VS ORAL**
Presenter(s): Hannah Moore
Type: Poster
Faculty Sponsor(s): Lisa Friel-Redifer
Abstract: Giving and receiving feedback is important in elementary classrooms when students' minds are like sponges and absorb information and grow rapidly. Feedback needs to be given when it comes to student writing so that they know what they are doing well and what they need to improve on. This project will be focusing on the question: Is written or oral feedback more beneficial for student writing growth? This question will be answered through research and through a case study in a fourth-grade classroom. The teacher will look at three students' writing samples and give feedback focusing on capitals, appearance, punctuation, and spelling (CAPS). The teacher will look at a different writing sample every week and see if the students have made any improvements. This will be done over a six-week period. The first three weeks, written feedback will be given and the last three weeks, oral feedback will be given. At the end of the six-week period, the writing samples will be looked at and compared. The students will also be given a survey of whether they preferred written or oral feedback and whether or not they feel like they have improved in their writing.

Title: **PLANNING FOR INSTRUCTION**
Presenter(s): Megan Kidd
Type: Poster
Faculty Sponsor(s): Lisa Friel-Redifer
Abstract: Assessments are a huge part of what teachers do in the classroom; teachers normally give assessments throughout every school day. Assessments are not always just giving tests at the end of a unit to see what students have learned. They allow teachers to discover students' strengths, developmental needs, and see what they need to change to meet students' needs. For this project, the focus is on the portion of assessment that happens specifically at the beginning of the year. The purpose of this project is to discover how pre-assessments are used to plan for instruction in the classroom. The question that is trying to be answered is: How do pre-assessments help teachers determine students' background knowledge, especially reading ability, and affect beginning of the year planning/instruction? As part of a class assignment, random sampling of 10 to 12 students will be pulled from a second-grade class, and they will be given a running record as a pre-assessment. Then, based on the results, students will be put into small groups. The second part of the project is looking at areas that need to be focused on with small groups. This project is trying to simulate what assessments are like at the beginning of the year.

Title: **TEACHING STUDENTS WHO HAVE AUTISM**
Presenter(s): Kennedy Bright
Type: Poster
Faculty Sponsor(s): Ann Gillies
Abstract: Having a disability is something that not only affects a person's life and well-being but also affects his/her education, especially a child. Every disability is going to be different and affect everyone in a different way. Even if two students have the same disability label, they are going to learn in a different way and have different needs. The presenter will first introduce the disability autism, including what it is and the characteristics of someone who has autism. The presenter will discuss how autism affects a child's learning abilities as well as his/her social skills. Knowing a child has autism and knowing his/her needs are key when planning how to teach students who have autism. This presentation will offer strategies and techniques teachers can use to teach students who have autism as well as how teachers can recognize the characteristics of a student who has autism. Whether a student has a disability or not, everyone learns differently and has different needs. It is a teacher's job to know the needs of her/his students and provide them with the resources they need in order to help them learn to the best of each student's ability.

Title: **LEARNING CENTERS**
Presenter(s): Madison Marsh
Type: Oral
Faculty Sponsor(s): Ann Gillies
Abstract: Teachers want to provide the best learning environment for their students. The question is how does a teacher construct that learning environment in the context of a classroom that serves students with Severe Needs Autism (SNA)? Teachers strive to provide opportunities for their students to be successful and active learners. The use of Learning Centers have been found as an effective way to contribute to that desired learning environment teachers strive for every day. Learning Centers allow students with autism to participate in educational activities with 1 on 1 assistance. The activities that are set up at each center are tailored to the students' skill levels and will meet the needs of the students' Individualized Education Plans. Educating students with autism through the use of Learning Centers allows students the opportunity of being a continuous learner in an environment that is best suited to their strengths.

Title: **THE ECONOMIC IMPACT OF ATTENDING COLLEGE WITH AN UNIDENTIFIED BRAIN PROCESSING ISSUE**
Presenter(s): Rose Willett
Type: Oral
Faculty Sponsor(s): Ann Gillies
Abstract: Students who attend college with the added challenges of undiagnosed brain processing issues can experience an unexpected financial impact. Having a tremendous work ethic, grit, and perseverance is oftentimes not enough to overcome the learning challenges these students face. Failing classes not only results in extra time to complete a degree, but extra expenses to re-take classes. A specific type of brain processing issue, Scotopic Sensitivity Syndrome or Irlen Syndrome, is so common that research shows it impacts between 10-15% of the general population. Irlen Syndrome causes visual perceptual processing difficulties and the impact increases to approximately 46% for students who have been previously identified with reading or academic challenges. This disorder can be inexpensively identified and accommodations can be implemented to minimize the impact on student academic performance. This presentation addresses the following questions: What are the visual perceptual processing issues caused by Irlen Syndrome? What is the projected economic impact on university students with Irlen Syndrome when this disorder is not identified? Case study historical data will provide information as to how this disorder affects student learning and the direct financial impact to students with undiagnosed Irlen Syndrome.

THEATRE ARTS

TRACK 13A

Title: **ADAPTIVE DESIGN**
Presenter(s): Sarah Lachelt
Type: Oral
Faculty Sponsor(s): Michael Legate
Abstract: This oral presentation will be discussing how I adapted the original lighting design of "#metoo," choreographed by Amanda Benzin, to fit into the limited ten lighting cues called for by ACDA. This discussion will include thoughts on how a lighting designer helps support and communicate the intent of a dance per the vision of the choreographer. I will also explain and express the conversation and process of the original design to contrast it with the adapted design for ACDA.

Title: **BEASTS**
Presenter(s): Alaina Stroble
Type: performance
Faculty Sponsor(s): Amanda Benzin
Abstract: This piece explores the raw side of what it means to have a passion for performance. It features a contemporary dance piece set to a recording of an original spoken word poem revealing the sacrifices, pain, joy, and love experienced by those who give their all to the art they believe can change the world. It will involve two voices and one to two dancers, and will last about 2-3 minutes.

Title: BRIDGING GAPS
Presenter(s): Jessica Pastorello
Type: Oral
Faculty Sponsor(s): Amanda Benzin
Abstract: This presentation explores the crossover of studio dance culture and academic dance culture by comparing my previous experience in choreography processes in studios alongside the multiple choreographic processes taught and used in academia. Using choreographic elements from each dance world creates a dance piece that not only exemplifies well rounded dancers, but also can be used in both a studio competition setting and a collegiate concert setting. By using these elements, I will provide a product that can help communicate the importance of a mixed choreographic process. Educating others on understanding the similarities and differences between the two dance cultures and how the processes and practices from each dance culture relate is crucial for developing dancers that are adaptable, versatile, and embody a bridge between these two dance worlds.

Title: THE OPIOID CRISIS
Presenter(s): Kam Lee
Type: Oral
Faculty Sponsor(s): Scott Andrews
Abstract: The CDC reported in 2017 that on average, forty-six people die everyday due to opioid overdose. The International Anesthesia Research Society reported in 2017 that the US spent more than eighty million dollars treating opioid addiction. This is the opioid crisis. The speaker currently works as a pharmacy technician, and in August, she'll be attending CU Denver to get her PharmD. As someone who fills medications for a living, the amount of narcotics going out of the door each shift raises incredible concerns. Something has to change about the way we educate patients and their families on what opioids are and how they function, why the people we love could be at risk, and how we can make a difference in the lives of people who have been affected by these medications and those who could be. This presentation aims to give listeners this information and the drive to take action with it.

THEATRE ARTS

TRACK 13B

Title: THE ART AND SCIENCE OF RHETORIC
Presenter(s): Michaela Rollins
Type: Oral
Faculty Sponsor(s): Scott Andrews
Abstract: Rhetoric is a concept that has been around for over 2,500 years. It is the backbone of communication and persuasion and has been studied by many famous and noteworthy scholars. However, despite this, no one has been able to define rhetoric and its theory in a way that is universally accepted. With this in mind, the class "Theories of Persuasion" asked its students not only to learn the history and evolution of rhetoric within persuasion, but it also laid the groundwork for students to define their own personal theory. From out of this project, the speaker developed a theory of rhetoric as "an ability to show rather than tell" the ideas an individual is attempting to portray, something commonly found within the art and science of storytelling. During this presentation, we will explore the theory and its historical roots (based on the rhetorical theories of Aristotle, Gorgias, Cicero, Plato, and Burke) and show its effect within everyday communication and persuasion.

Title: THE POOREST COMMUNITY IN AMERICA
Presenter(s): Kaia Hofmeister
Type: Oral
Faculty Sponsor(s): Scott Andrews
Abstract: I will be presenting an oral presentation about the poorest community in America, the Pine Ridge Indian Reservation located in the southwest corner of South Dakota. I grew up in South Dakota and participated in mission trips during the summers throughout high school to the Reservation, experiences that allowed me to get to know the Lakota people on a personal level and enabled me to learn more about their culture. In this presentation, I will share the many factors that contribute to poverty in the area, including (but not limited to) their housing, their unemployment rate, their lack of education, their poor healthcare, and the issue of alcoholism. When people think of poverty, they think of bad luck or personal failure, but the Lakota people have been living with these conditions for over a hundred years, and it's become an unfortunate trend that they can't seem to fight their way out of.

Title: PROVIDING EDUCATION AND ACCESS FOR DANCE TEAMS
Presenter(s): Natalie Schievelbein
Type: Oral
Faculty Sponsor(s): Amanda Benzin
Abstract: Dance Team offers an affordable option for lower income families to provide a dance activity for their children. However, the resources available to high school students and coaches in rural America who would like to participate in dance are limited. Current guidebooks for dance team programs offer paperwork for parent student contracts, tryout/competition guidelines, and information on advanced tricks. There is a gap in educational resources for teaching and practicing basic dance technique. This limited information can result in a high rate of injury due to lack of foundational knowledge. The research I have done in the realm of Dance Pedagogy has brought to light the need for a written and visual resource on basic Pom technique. In this oral presentation I will address a foundational dance team program I have created and implemented here in the Western Slope. I will provide a written explanation along with a corresponding step by step video that breaks down some essential dance techniques including proper pom arm positions, pirouettes, and toe touches.

Title: THE TRUTH ABOUT MISLEADING INFORMATION AGAINST VACCINATIONS
Presenter(s): Thale Yderstad
Type: Oral
Faculty Sponsor(s): Scott Andrews
Abstract: There are many people all around the world today who are choosing against vaccination. In this presentation, the speaker will educate people on why this position needs to be stopped. There are approximately 1.5 million people who will die all around the world due to vaccine-preventable diseases, and these numbers are far too high for something with such a simple solution. People who don't vaccinate are just simply confusing causation and correlation--something everyone does--without even realizing it. If we don't start to educate people on the mistakes that they are making by choosing to not vaccinate, these diseases will spread faster than ever. Using different sources of evidence, in this speech, I will talk about the reasons why people choose not to vaccinate, why they should, and a possible solution to this problem.

THEATRE ARTS

TRACK 13C

Title: THE IMPACT OF DISEASE DURING THE COLUMBIAN EXCHANGE
Presenter(s): Justine Forster
Type: Oral
Faculty Sponsor(s): Paula Casey
Abstract: The world was forever altered by the spread of disease from Europe to the Americas during the Columbian Exchange. There was an unexpected genocide of most of the indigenous tribes, a successful hostile takeover, and the creation of a new disease which ran rampant throughout Europe. Also, a natural immunity caused by another disease, led to a push towards Africa in search of slaves who could possibly have an immunity to smallpox. This presentation will explore how migration led to evolutionary changes, the power of disease during the Columbian Exchange, and how the disease impacted and changed the world.

Title: REFORMING THE CURRENT EDUCATION PARADIGMS TO ENCOURAGE SUCCESS
Presenter(s): Gabriela Rodriguez
Type: Oral
Faculty Sponsor(s): Paula Casey
Abstract: The current education system in the United States comes from the industrialization period, using the assembly line model to form how students learn. One major flaw in this model is that it discourages the growth mindset, thereby encouraging the fixed mindset. Reform is necessary to increase the quality of education and to encourage students' progress. Changes like the open-ended questions and the Not yet system can help students apply the growth mindset in the classroom. This would result in more personalized lesson plans that promote focus, diversify learning strategies, and praise milestones students reach.

Title: **SAVORY LATIN APPETIZERS AND TAPAS: IS GRAND JUNCTION POISED FOR A NEW LATIN RESTAURANT?**

Presenter(s): Jose Velez

Type: Oral

Faculty Sponsor(s): Wayne Smith

Abstract: The purpose of this cooking demonstration is to not only share the presenter's acquired culinary skills and knowledge, but to also demonstrate and allow attendees to taste test and vote on different appetizers and tapas with a strong Latin culinary influence. Grand Junction is an amazing city with much diversity and culture; however, our Latin food is mostly influenced by Americanized Mexican flavors and no other variety. Is there a market for more traditional Latin dishes originating from places like Puerto Rico, Panama, Argentina, Honduras, and others? During this demonstration, Jose Velez, a culinary student will introduce several appetizers and tapas with flavors and spices not typically found in Western Colorado. Guests will be able to sample and judge on different appetizers that perhaps will make it to market in this area. In essence, guests will be able to contribute to menu research. The data and information gathered from this market research will be influential on which of these dishes to introduce in a new Latin restaurant. It is expected that the audience will like most, if not all appetizers and tapas due to the new flavors and cooking techniques.

PLEASE SEE THESE ADDITIONAL WCCC PRESENTATIONS
IN THE TEACHER EDUCATION SECTION, TRACK 12B

Title: **IMPORTANCE OF PHYSICAL ACTIVITY IN EARLY CHILDHOOD EDUCATION.**
Title **A LOOK AT TRAUMA INFORMED PRACTICES: WAYS EDUCATORS CAN HELP RECOVERY.**

MAVERICK MILESTONE COURSES

TRACK 15

Title: **METALLURGY**

Presenter(s): Ian Anusencion, Koya Barrette, Jesse Boyce, Jayna Briscoe, Evangeline Diaz, Tara Hall, Erik Hamilton, Hayley Henderson, Marquise Hill, Kyle Kennell, Jared Kirts, Tyler Linza, Chandler Livingston, Gabriele McCombs, Sarah Nilsson, Trevor Novins, Tyler Oeltjenbruns, Jose Prada, Jack Rahier, Mia Sanchez, William Tuck, Jacintha Turner, Cassie Twiggs

Type: Art

Faculty Sponsor(s): Araan Schmidt, Scott Kessler

Abstract: These are presentations of the work in the milestone class: The Metallurgy of Metallic Arts. All 24 students will present both their cast metal sculptures as well as the scientific photographs of the microcrystalline structures. Students will also be presenting their resources as they pertain to these outcomes.

